

BHARAT SANCHAR NIGAM LIMITED
(A Government of India Enterprise)

Tender No. MM/BNO&M/BN-III/T-791/2024 issued on **15.02.2024**

Bid Document for
Development (Creation, Upgradation and Operation & Maintenance)
of
Middle mile network of BharatNet
on
Design Build Operate and Maintain (DBOM) Model

Bharat Sanchar Nigam Limited

Regd. & Corporate Office:

Bharat Sanchar Bhawan, H.C. Mathur Lane, Janpath, New Delhi -110 001.

Corporate Identity Number (CIN) : U74899DL2000GOI107739.

Web: www.bsnl.co.in

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MM Cell, 2nd floor, Bharat Sanchar Bhavan, Janpath, New Delhi - 110001

SECTION - I: DETAILED NOTICE INVITING TENDER

Tender No: MM/BN0&M/BN-III/T-791/2024 Dated: 15-02-2024

On behalf of Universal Service Obligation Fund (USOF), Department of Telecommunication, Government of India, the Chairman and Managing Director, BSNL, New Delhi invites online sealed tenders, on rupee payment basis, in two bid (Technical & Financial) system, for Design, Supply, Construction, Installation, Upgradation, Operation and Maintenance of middle mile network of BharatNet, in the Packages/ Circles as detailed below (**Table-A**):

TABLE: A (Amendment No. 4.1)

Category	Package Serial No.	State(s)/ UT in the package	No. of Blocks	No. of GPs			Existing leased RKM from BSNL	Total incremental 24F OFC RKM (Laid) (Kms)	Total incremental 48F OFC RKM (Laid) (Kms)	Estimated RKM to be laid (Kms)	Bid Security (INR cr.)
				GPs for upgradation (i)	GPs for creation (ii)	Total GPs (iii)					
Column 1	Column 2	Column 3	Column 4	Column 5			Column 6	Column 7	Column 8	Column 9	Column 10
Category 1A	1	1. Madhya Pradesh 2. DNH & DD	316	17,850	5,046	22,896	15,648	36,082	25,835	65,648	20
Category 1A	2	Rajasthan	352	8,746	2,606	11,352	27,543	27,875	-	57,543	20
Category 1A	3	UP(E)	587	34,428	8,644	43,072	6,343	33,367	37,355	56,343	20
Category 1A	4	1. Karnataka 2. Goa 3. Puducherry	245	6,182	209	6,391	33,504	13,013	-	51,504	20
Category 1B	5	Uttarakhand	95	1,819	6,118	7,937	1,699	3,845	-	26,699	20
Category 1B	6	UP(W)	240	12,449	3,769	16,218	6,264	20,267	6,065	26,264	20
Category 1B	7	Bihar	534	8,324	81	8,405	5,664	14,958	9,988	22,664	20
Category 1B	8	HP	80	252	3,363	3,615	115	713	-	20,115	20
Category 2	9	1. West Bengal 2. A&N	353	2,744	668	3,412	8,825	10,846	-	18,825	10
Category 2	10	Haryana	142	6,082	174	6,256	8,023	10,819	-	18,023	10
Category 2	11	NER-I 1. Mizoram 2. Tripura 3. Meghalaya	130	761	3,056	3,817	623	1,398	-	15,623	10
Category 2	12	Punjab	151	12,664	673	13,337	7,421	11,447	10,792	15,421	10
Category 2	13	1. J&K 2. Ladakh	318	413	4,079	4,492	308	782	-	13,308	10
Category 2	14	Assam	229	1,502	1,163	2,665	3,324	4,435	-	12,324	10
Category 2	15	NER-II 1. Arunachal Pradesh, 2. Nagaland 3. Manipur	258	508	5,394	5,902	190	733	-	12,190	10
Category 2	16	Kerala	152	977	1	978	7,431	754	-	8,500	10

***** The estimated quantity (in RKM) mentioned in column-9 includes the OFC (in RKM) to be laid by the PIA for creation of new GPs (as per column 5.(ii)) and additional OFC (in RKM) to be laid to upgrade the already service ready GPs (as per column 5.(i)).***

The BharatNet network implemented in Phase- I consists of (A) using BSNL's existing fibre (on lease) from Block to FPOI (as per Column-6) and (B) laying of incremental OFC (24 core) from FPOI to GPs (as per Column-7). As part of upgradation, the PIA shall lay additional OFC for connecting Block to GPs in a ring architecture using the existing incremental BharatNet OFC from FPOI to GPs (i.e. B). After the PIA upgrades this network in ring architecture from Block to GPs, integrating the incremental OFC from FPOI to GPs (B), the BSNL's existing leased fibre (Block to FPOI- i.e. A, as per Column-6) shall no more be part of upgraded ring architecture.

Note-1:

- i. The packages have been classified in two major categories i.e. Category-1 (Package No.-1 to 8) & Category-2 (Package No. 9 to 16).
- ii. Category-1 packages are further divided in to two sub-categories i.e. Category- 1A (Package No. 1 to 4) and Category-1B (Packages No. 5 to 8).
- iii. Any bidder can get maximum one (01) package from Category-1A; maximum two (02) packages from Category-1 (i.e. categories- 1A & 1B combined) and maximum four (04) Packages overall (i.e. Category 1A, 1B & 2 combined).

Note-2: Details of Blocks/ GPs along with Lat/ Longs have been uploaded on BSNL portal which can be accessed through URL https://bsnl.co.in/rfp_amended_bharatnet_details.html

2. Accessibility of Tender/ Bid Document: The Tender document for prospective bidders for participating in e-tender shall be available for downloading from XX/XX/XXXX at 18:00 Hours onwards from the website of BSNL <http://www.bsnl.co.in>, by clicking Link "Tenders (BSNL Portal)" on the home page. The same tender shall also be available on the e-tender portal <http://etenders.gov.in/eprocure/app>. This link can also be visited from BSNL website "Tenders-> E- Tenders BSNL CO". The Tender document shall not be available for download on or after its submission/ closing date & time. For online bid submission etc. bidders have to mandatorily register (If not already registered) on NICs e-tender system CPPP- (<http://etenders.gov.in/eprocure/app>) and follow all steps as per functionality of the e-tender portal. (Kindly refer Section XIII of tender document for instructions on e-tendering).
3. The Bidder shall pay a sum of Rs 11,800/- (Rupees Eleven Thousand eight Hundred Only) i.e. Rs. 10,000 plus applicable GST @ 18%, through NEFT / RTGS / or any other online payment facility as applicable, towards cost of the Bidding Documents/ Tender Fee, in the following bank account details:

1	Name of Beneficiary	A.O. (Cash) Bharat Sanchar Nigam Ltd.
2	Name of Bank	Punjab National Bank
3.	Name of Branch	ECE House K.G. Marg New Delhi 110001
4	Account No.	1120002102306372

5	IFSC Code	PUNB0112000
6	MICR Code	110024043

Note:-

- (i) The Tender Fee is non-refundable”.
- (ii) The Bidders shall also upload online payment receipt and / or transaction details for the payment of cost of Bidding Documents in their Technical part of online bids.
- (iii) Public Procurement (Preference to Make in India), Order 2017 and guidelines issued vide No. P-45021/2/2017-PP(B.E.-II) dated 16.09.2020 & No. P-45021/102/2019-BE-II- (part(I) (E-50310) dated 04.03.2021 and Department of Telecommunications Gazette notification dated 29th August 2018 along with instructions as amended from time to time by Govt. of India, shall be applicable for this tender. Bidder shall submit the Local content (LC) of their bid as per Format provided and shall also submit certificate from their statutory/ cost Auditor to substantiate the LC of their bid.

For award of work, preference will be given to Class-I Local category bids based on declaration submitted by the respective bidders. Since work for any package is indivisible, the award of work will be governed as per para 3A (c) of DPIIT guidelines dated 16.09.2020, cited above. *(Amendment No. 6.2)*

- (iv) Bidder shall submit the Local content (LC) of their bid as per Format provided and shall also submit certificate from their statutory/ cost Auditor to substantiate the LC of their bid.
- (v) For award of work, preference will be given to Class-I Local category bids based on declaration submitted by the respective bidders. Since work for any package is indivisible, the award of work will be governed as per para 3A (c) of DPIIT guidelines dated 16.09.2020, cited above. The bidder shall pay the tender fee of Rs. 11,800/- (including GST) only, irrespective of number of packages applied for.
- (vi) In case of bidder is submitting its bid for more than one package, the bidder will be required to upload the same scanned copy of tender fee instrument in all the packages along with a declaration for the packages participated and for considering the Tender fee as uploaded in the package with highest package serial number as per column 2 of TABLE A.

4. Sale of hard copy of tender Document: BSNL has decided to use process of e-tendering for inviting this tender, and so the hard copy of the tender document will not be available for sale.

5. ELIGIBILITY CRITERIA:

Please refer **Clause 2** of **Section IV (Part-A)** of tender document for Eligibility Criteria. **Any bidder may bid in one or more packages or even for all the packages.**

For bidding process separate e-tenders will be configured on e-tender portal CPPP, for each of the 16 packages under this Tender Enquiry. Also refer clause No. 5 Section IV Part A.

6. Bid Security:

- 6.1 The bidder shall furnish the EMD/Bid Security as indicated in column (10) of TABLE- A for the package for which bid is submitted, preferably through online payment mode as per the aforementioned BSNL Bank/Beneficiary Details. However, Bid security may also be submitted through DD/ Banker's cheque in one of the following ways:-
- a) Demand Draft/ Banker 's cheque drawn in favour of "AO (Cash), BSNL, C.O. New Delhi" and payable at "New Delhi."
 - b) Bank Guarantee or e-Bank Guarantee from a Scheduled Bank in India (except from Co-operative banks), drawn in favour of "DGM (MMT), Bharat Sanchar Nigam Limited, Corporate Office, New Delhi. It should be valid for 180 days from the tender opening date. Format for Bank Guarantee is given at Section-VIII.A.
 - c) Insurance Surety Bond issued by an Insurance Company, approved by IRDAI, drawn in favour of "DGM (MMT), Bharat Sanchar Nigam Limited, Corporate Office, New Delhi. It should be valid for 180 days from the tender opening date. Format for Bank Guarantee is given at Section-VIII.B.
 - d) Bank Transaction details with UTR Number, towards the successful e-payment for Tender Fee & EMD, required to be mentioned in case of e-Payment Mode. *(point c & d as per Amendment No. 6.3)*
- 6.2 MSE (Micro & Small Enterprise) bidders are exempted from payment of Tender Fee/Bid Security provided they submit current and valid Udyam Registration Certificate (URC) issued from the Ministry of MSME. Udyam Registration Certificate (URC), submitted by MSE bidder in their online bid for claiming exemption from Tender Fee & Bid Security, must be current & valid on the date of opening of Technical bid part. Micro and Small Enterprises (MSEs) registered under Udyam Registration are eligible to avail the benefits under the policy. **In case of bid by a Consortium, all the members of the Consortium should be MSE to avail the exemption from payment of Tender Fee/Bid Security.**
- 6.3 Declaration / Updation of Udyam registration by MSE bidders on CPPP is mandatory in their own benefit, failing which such MSE bidders will not be able to avail the benefits under the Public Procurement policy for MSEs order 2012 for Tenders invited electronically through CPPP. Kindly note that Medium Scale Units are not eligible for exemptions from tender Fee and EMD.
- 6.4 In case of Consortium, the Bid security shall be payable by the lead bidder only.
- 6.5 In case the bidder is submitting single Bid security of Rs. 60 Cr against its bid for 4 or more packages, as per Clause 3.1 of Section-IV-A, the Bidder will be required to upload the same scanned copy of Bid Security in all the packages along with a declaration for the packages participated and for considering the Bid Security as uploaded in the package with highest package Serial No..
- 7. Last Date & Time of Submission of Tender bid: xx/xx/xxxx, by 11:30 Hrs.** In case the date of submission (opening) of bid is declared to be a holiday by Government of India, the date of submission (opening) of bid will get shifted automatically to next working day at the

same scheduled time. Any change in bid opening date due to any other unavoidable reason will be intimated on e-Tendering portal & as well as on BSNL website.

8. Opening of Tender Bids: At 12:00 Hours on next day after bid closing date. Place of opening of Tender bids: BSNL has adopted e-tendering process which offers a unique facility for Online Tender Opening Event (TOE). BSNL's Tender Opening Officers as well as authorized representatives of bidders can attend the Online Tender Opening Event (TOE) from the comfort of their offices. However, authorized representatives of bidders PIA, along with authorization form as per Section X, if desire so, can attend the TOE at BSNL Corporate Office, MM Cell, 2nd floor, Bharat Sanchar Bhavan, Janpath, New Delhi – 110001, where BSNL's Tender Opening Officers would be conducting online Tender Opening Event (TOE). *(Amendment No. 6.4)*
9. The bidder is required to submit his bid/offer documents for the tender enquiry online at the e-Tendering portal and offline documents as defined in Section IV Part A. Tender bids received after respective due date & time will not be accepted.
10. Incomplete, Ambiguous, Conditional, digitally unsealed tender bids will be rejected.
11. CMD, BSNL reserves the right to accept or reject any or all tender bids without assigning any reason. He is not bound to accept the lowest bid in the tender.
12. The bidder shall furnish a declaration under his/her digital signature that no addition/ deletion/ corrections have been made in the terms & conditions of downloaded tender enquiry document and bid is being submitted against tender enquiry document which is identical to the tender document appearing on E-tender Portal (<https://www.etenders.gov.in>).
13. In case of any correction/ addition/ alteration/ omission in the tender document by the bidder, the tender bid shall be treated as non-responsive and shall be rejected summarily. All documents submitted in the bid offer should be preferably in English. In case the certificate viz. experience, registration etc. is issued in a language other than English, the bidder shall attach an English translation of the same duly attested by the bidder & the translator, to be true copy in addition to the relevant certificate.
14. All computer-generated documents should be duly attested/ signed by the authorized signatory of the bidder. However, PDF files with digital signatures on 1st page will be acceptable. *(Amendment No. 23.2)*
15. Integrity Pact Program is implemented for this tender for which signing of Integrity Pact is mandatory for the purchaser and bidder. Format of Integrity Pact is provided in the tender document at Section-XIV. To oversee the implementation of Integrity Pact Program, IEM are appointed by BSNL. The details of Independent External Monitor is as under-

(1) Name – Shri Sudhir Bhargava, IAS (Retd.)

Email Id - iem_1_bsnl_2016@bsnl.co.in; subhrgv@gmail.com

(2) Name – Shri Ramabadrana Krishnan, Ex - Director (HR), BHEL

Email Id - iem_2_bsnl_2017@bsnl.co.in; rkrishnan1955@gmail.com

16. The Date / time schedule for various activities is as mentioned below:

S. No.	Activity	Date & Time
1	Issue of NIT and Accessibility of Tender document on BSNL website	15/02/2024
2	Last date & time of seeking clarifications (by Email)	04/03/2024 18:00 Hrs
3	Expected date of release of clarifications and Accessibility of Tender document on CPPP (e-tender portal)	18/03/2024
4	Last Date & Time of submission of Bids(online)	28/06/2024 17:30 Hrs
5	Opening of Tender Bids (Technical Part)	01/7/2024 11:00 Hrs
6	Opening of Tender Bids (Financial Part) shall be informed separately through E-portal.	To be notified after Technical bid opening.

17. The queries in respect of the Tender document, if any, can be submitted through below mentioned Email, latest by 04/03/2024, 18:00 hrs. Any query received after this date will not be entertained.

BSNL Contact-1

BSNL's Contact Person	Mohammad Faizan, AGM(MMT)
Telephone	011-23717844 (between 9:30 Hrs to 18:00 Hrs on working days)
E mail ID	mohammad@bsnl.co.in

BSNL Contact -2

BSNL's Contact Person	Sanjay Vatsa, DM(MMT-I), Mobile No. 9868176305
Telephone	011-23037172 (between 9:30 Hrs to 18:00 Hrs on working days)
E mail ID	Sanjay.vatsa@bsnl.co.in

SECTION –I A: TENDER INFORMATION

1. Type of tender : 16 separate e-tenders will be configured on e-tender portal CPPP, for each of the 16 packages under this Tender Enquiry, each having following attributes:

- (a) No. of Bid Submission Stages for tender : Single Stage
- (b) No. of Envelopes for submission of Bids : **Two** Electronic Envelopes System
- (c) E-reverse auction : **NOT APPLICABLE**

Note1:-The bidder shall submit Techno-commercial bid and financial bid simultaneously.

2. Bid Validity Period: 180 days from the **Tender** opening date.

3. The tender offer shall contain **two electronic envelopes** viz. techno-commercial and financial envelope. The techno-commercial part/envelope will be opened first and then second electronic envelope consisting of financial bids will be opened for those bidders whose techno-commercial bids are found to be responsive.

a) Techno-commercial envelope called ‘Technical e-envelope’ shall contain **scanned copies** of the following, but not limited to, documents :-

- (i) Bank Transaction details with UTR Number towards the successful **e-payment** for Tender Fee & EMD **OR** valid MSE (Micro or small Enterprise) certificate for claiming exemption, as the case may be.
- (ii) DD/ Banker Cheque or Bank Guarantee or Insurance Surety Bond towards Tender Fee, EMD/Bid Security **(if not submitted through e-payment mode)** **OR** valid MSE (Micro or small Enterprise) certificate for claiming exemption, as the case may be.
- (iii) Supporting Documents/clause by clause compliances as per detail in **Annexure-III** of the Tender document
- (iv) All required certificate(s)/ documents showing fulfillment of the eligibility criteria(s) stated in clause 2 of Section IV (Part-A) of the Tender document

Note-2: It is important to note that the bidder should not upload the same document more than once on e-tender portal in order to establish the eligibility conditions or other terms & conditions of the tender even if he is participating in more than 1 packages. He has to upload all documents required to establish his overall eligibility, only in his bid for e-tender for the highest ranked package out of total packages, he is bidding for. The Package S No.-1 shall be considered at higher rank than package at Package Sr. No.-2 and so on. In other lower ranked packages, bidder shall upload, Bid Form (package wise) & a declaration that “All documents uploaded in the package S No..... (Number of the highest

ranked package bidden for) shall be taken for this package S No. also". Refer Clause 2 of Section -IV A for Eligibility and Clause 5 of Section- IVA for Evaluation Criteria)

b) Financial e- envelope shall contain scanned copies of :

- (i) Bid Form, duly filled and signed as per Section- VI
- (ii) Price Schedule duly filled & signed both in PDF and Excel format as per Section-VII

A BoQ template (online template under financial bid at CPPP for entering only the summary of financial quotes rates) shall also be prepared on CPPP for each e-tender for bidder to enter its quoted values in financial bid part. This will only be a summary of price bid and is equivalent to "Read-out quoted rates" of any manual tendering process.

Note-3: In case there is any discrepancy between the information entered by bidder in the BoQ (template at CPPP) and that as per the scanned copy of signed & stamped PDF document [price schedule (Section -VII) uploaded by bidder on CPP Portal, **then information as per the uploaded signed & stamped PDF document [Price schedule (Section-VII)] shall prevail over the information entered in the BoQ (template under financial bid at CPPP).** *(point b including note 3 as per Amendment No. 6.6.1)*

4. Instructions regarding offline submissions *(heading as per Amendment No. 6.6.2)*

(a) Tender Fee & EMD is required to be submitted by the bidder **preferably through online payment mode** as per the Bank/Beneficiary Details provided in the Tender Enquiry document. In case of **MSE (Micro & Small Enterprise)** bidder, valid MSE Certificate /Udyam Registration certificate, broadly covering the tendered equipment/ services, for claiming exemption of Tender Fee / EMD shall be required to be submitted.

However, scanned copies of the following documents (which ever applicable) are to be **mandatorily uploaded** by the bidder in their online Technical bid part (1st electronic Envelope i.e. Technical Envelope) on e-tender portal failing which the tender bid shall be archived unopened / rejected on e-tender portal at bid opening stage except in case the originals of these documents are already received on/before bid opening end date:

- (i) Bank Transaction details with UTR Number towards the successful **e-payment** for Tender Fee/EMD.
- (ii) DD/ Banker Cheque or Bank Guarantee or Insurance Surety Bond **(if not submitted through e-payment mode).**
- (iii) Valid MSE Certificate /Udyam Registration certificate, if claiming exemptions from Tender Fee/ EMD.

Moreover, **Originals** of Bank Instruments such as DD or EMBG or Insurance Surety Bond towards Tender Fee, EMD/Bid Security respectively **(if not submitted through e-payment mode)**, shall be submitted by bidder on any date before or **within 5 days**

after bid submission end date to DM (MMT-III), BSNL, C.O. 2nd Floor, Bharat Sanchar Bhawan, Janpath, New Delhi 110001 in a sealed envelope bearing the Tender number, Name of work, **failing which** the tender bid (if already opened on basis of scanned copies uploaded in 1st electronic Envelope i.e. Technical Envelope) **shall be rejected**.

- (b)** During tender process, BSNL's tender inviting authority may require the bidder to produce **original copy** of any document such as **Power of Attorney, Integrity Pact, Bid Form, Consortium Agreement etc.** submitted as scanned copy in the Technical bid part (1st electronic Envelope) on e-tender portal, **which the bidder will have to comply with.**

SECTION-II: GENERAL INSTRUCTIONS TO BIDDERS

1. DEFINITIONS *(list of definitions as per Amendment No. 6.7)*

- (a) "**Advance Purchase Order/Advance work order**" or "**Letter of Intent**" means the intention of BSNL to place the Purchase Order/ work order on the successful bidder.
- (b) "**Appointed Date**" means the date of signing of Agreement by the successful bidder after acceptance of APO and submission of Performance Security by the successful bidder.
- (c) "**Bid date**" means the date (the bid submission end date) upto which the bidder can submit online bids.
- (d) "**Bidder**" means the Company, who participates in this tender and submits its bid. Bidder will also mean Lead bidder in case of Consortium Bids.
- (e) "**Contract Price**" means the price payable to the Contractor under the purchase order/work order for the full and proper performance of its contractual obligations.
- (f) "**FAT**" means Final Acceptance Test or Acceptance Testing carried out by the Independent Engineer (IE)/ BSNL after successful completion of the PAT (Preliminary Acceptance Test) by PIA as per Acceptance Testing template duly approved by BSNL.
- (g) "**Fiber Maintenance Agency (FMA)**" means the Company executing the AMC works of the existing Network.
- (h) "**Firm Work Order**": Firm work order means the individual work order under contract which will be issued to the contractor by CGM of respective BSNL Circle or his authorized representative on behalf of USOF after the survey report and BOQ approved by BSNL. However, the flexibility shall remain with respective CGM of BSNL Circle or his representative to further decide about the quantum of work in each firm order as per the local conditions. Accordingly, payment will be made for the works executed, goods supplied or/and services rendered based on the firm work order.
- (i) "**Independent Engineer**" means a Third-Party Agency appointed by BSNL for the Acceptance testing/ inspection of works, bill verification, dispute resolution etc as specified in Section -IV B.
- (j) "**Inspector**" means the designated official from BSNL Quality Assurance (QA) circle.
- (k) "**Planned Maintenance Agency (PMA)**" means the individual or firm or Company executing the Replacement of damaged/Lossy/Overhead OFC works of existing BharatNet Network.
- (l) "**Project Implementation Agency (PIA)/ Contractor**" means the Company or Consortium of companies executing the works under the contract. The bidder will become PIA after acceptance of A.P.O.
- (m) "**Purchaser**" means BSNL on behalf of USOF, DoT.

- (n) "**Purchase Order/ work order**" means the order placed by BSNL on the PIA signed by BSNL on behalf of USOF, DoT including all attachments and appendices thereto and all documents incorporated by reference therein.
- (o) "**Successful Bidder(s)**" means the bidder(s) to whom work in this tender is awarded and the contract has been signed between the parties.
- (p) "**Telecom Service Provider**" means any Telecom operator in India, who is licensed by the Department of Telecommunications (DOT), Government of India to provide telecom services to the general public or to the other DOT licensed Telecom operators. "Telecom Service Provider" also refers to any Telecom operator in other countries providing telecom services to general public of that country or to other telecom operators of the same country.
- (q) **Tender Inviting Authority- CMD, Bharat Sanchar Nigam Limited (BSNL), New Delhi** in the capacity of agent of USOF, DoT (Department of Telecommunications, Government of India) for the execution of this project, invites sealed tenders on behalf of USOF, DoT
- (r) "**Works**" means all the equipment, machinery, and/ or other materials and services which the PIA requires to deliver towards fulfilment of scope of work under this Tender.

2. ELIGIBLE BIDDER:

- 2.1 Refer **clause 2** of **Section IV-A** for Eligibility Criteria.

3. COST OF BIDDING

- 4.1 The bidder shall bear all costs associated with the preparation and submission of the bid. BSNL will, in no case, be responsible or liable for these costs, regardless of the conduct or outcome of the bidding process.

4. BID DOCUMENTS

- 4.1 The works required to be executed by agency, bidding procedures and contract terms and conditions are as prescribed in the Bid Documents. The Bid documents include:
 - (a) Notice Inviting Tender
 - (b) General Instructions to Bidders
 - (c) General (Commercial) Conditions of Contract
 - (d) Special Instructions to Bidders and Eligibility Conditions
 - (e) Special (Commercial) Conditions of Contract, if any
 - (f) Special (Technical) Conditions of Contract and Technical Specifications
 - (g) Bid Form
 - (h) Price Schedules
 - (i) Bid security /Performance Security Bond Forms
 - (j) Letter of authorization to attend bid opening
- 4.2 The Bidder is expected to examine all instructions, forms, terms and specifications in the Bid Documents and clarifications/ amendments/ addenda, if any. **Failure to furnish all information required as per the Bid Documents or submission of the bids not**

substantially responsive to the Bid Documents in every respect, will be at the bidder's risk and may result in rejection of the bid.

5. CLARIFICATION OF BID DOCUMENTS

- 5.1 Refer Clause No. 8 of Section IV-A.
- 5.2 Any clarification issued by BSNL, through BSNL tender website/e-tendering portal, in response to query raised by prospective bidders shall form an integral part of bid documents and it may amount to an amendment of relevant clauses of the bid documents.

6. AMENDMENT OF BID DOCUMENTS

- 6.1 At any time, prior to the date of submission of Bids, BSNL may on behalf of USOF, DoT, for any reason, whether at its own initiative or instruction of USOF, DOT or otherwise in response to a clarification requested by a prospective bidder, modify bid documents by amendments.
- 6.2 The amendments shall be notified in writing through BSNL tender website/e-tendering portal to all prospective bidders and these amendments will be binding on them.
- 6.3 In order to afford prospective bidders a reasonable time to take the amendment into account in preparing their bids, BSNL may, at its discretion, extend the deadline for the submission of bids suitably.

7. DOCUMENTS TO BE SUBMITTED IN THE BID

Refer Clause no. 4 of Section IV-A

8. BID FORM

- 8.1 The bidder shall complete the bid form and appropriate Price Schedule furnished in the Bid Documents, indicating the goods & services to be supplied, brief description of the goods & services, quantity and prices as per **Section VI and VII**.

9. BID PRICES

- 9.1 Bids would be evaluated on the basis of the lowest assessed Bid Price (the "Bid Price") including GST. The Bid Price shall be the summation of (a) Bid Project Cost as per Bill of Quantity (BOQ)/ SOR and (b) O&M cost for complete period of contract.
- 9.2 The bidder shall give the total composite price inclusive of all Taxes and the basic unit price and all other components of the price need to be individually indicated against the Material/services it proposes to supply under the contract as per the price schedule given in Section VII. The offer shall be firm in Indian Rupees. No Foreign exchange will be made available by BSNL.
- 9.3 Prices indicated in the Price Schedule shall be entered in the following manner:
 - (a) Deleted
 - (b) The contractor shall quote as per price schedule given in **Section VII** for all the items given in schedule of requirement.
- 9.4 A bid submitted with an adjustable price quotation will be treated as non-responsive and rejected.
- 9.5 Deleted

9.6 The price approved by BSNL on behalf of USOF, DoT for execution of works will be inclusive of taxes as mentioned in clause 9.2 subject to other terms and condition as stipulated in clause 12 of Sec. III of Bid- document.

10. DOCUMENTS ESTABLISHING BIDDER'S ELIGIBILITY AND QUALIFICATION

10.1 The bidder shall furnish, as part of the bid documents establishing the bidder's eligibility, the following documents **or whichever is required as per terms and conditions of Bid Documents.**

- (a) Certificate of Incorporation.
- (b) Article or Memorandum of Association or partnership deed or proprietorship deed as the case may be.
- (c) ~~Registration certificate from State Director of Industries or from Secretariat for Industrial Approval (SIA), Ministry of Industries, Government of India. (point c stands deleted as per Amendment No. 6.8.1)~~
- (d) Approval from Reserve Bank of India /SIA in case of foreign collaboration as per relevant guidelines of Govt. of India.
- (e) Latest and valid MSEs (MICRO & SMALL ENTERPRISES) Certificate from designated bodies under ministry of Micro ,Small & Medium Enterprises , if applicable to bidder.
- (f) Type Approval Certificate given by Telecom Engineering Centre (TEC)/ TSEC issued by the Quality Assurance Circle of BSNL or proof of having applied for TAC/ TSEC (Copy of Form-B/ Form QF-103 be attached) **(if applicable)**.
- (g) Undertaking duly signed by lead bidder and its consortium partner(s) stating that all of them shall be liable for due performance of the contract jointly and severally as per clause 12.4(d) (if applicable).
- (h) Power of Attorney as per clause 14.4 (a) and (d) and authorization for executing the power of Attorney as per clause 14.4 (b) or (c).
- (i) List of all Directors including their name(s), Director Identification Number(s) (DIN) and address (es) along with contact telephone numbers and mobile numbers of office and residence.
- (j) Certificates from all Directors of the bidder stating that none of their near relatives are working in BSNL in accordance with clause 34.
- (k) Additional documents to establish the eligibility and qualification of bidder as specified in Section-IV-A, IV-B and IV-C.

~~10.2 Documentary evidence for financial and technical capability~~

- ~~(a) The bidder shall furnish Annual Report and/ or a certificate from its bankers/ its C.A. as evidence that he has financial capability to perform the contract~~
- ~~(b) The bidder shall furnish documentary evidence about technical and production capability necessary to perform the contract. (clause 10.2 stands deleted as per Amendment No. 6.8.2)~~

10.3 In order to enable the Purchaser to assess the provenness of the system offered, the bidder shall provide documentary evidence regarding the system being offered by it.

- 10.4 The offered product has to be type approved. For this purpose, the supplier/OEM shall submit a sample type for evaluation to BSNL QA. The sample would be evaluated for its ability to meet the technical specifications, manufacturability, reliability, testability, ease of installation, maintainability etc. Necessary documents to substantiate these attributes will have to be submitted at the time of application for approval by the supplier for obtaining type approval. In case goods offered have already been type approved/ validated by the Purchaser, documentary evidence to this effect shall be submitted by the bidder. In case the product is not type approved, the bidder can submit registered QF-103 (acceptance of registration by BSNL for TSEC application)/ Form-B (acceptance of registration by TEC for TAC application) at the time of bidding. However, the bidder has to get the TSEC/ TAC before supply of the product(s).
- 10.5 A signed undertaking from Authorized Signatory of the bidder certifying that all components/ parts/ assembly/ software used in the Desktops and Servers like Hard disk, Monitors, Memory etc. shall be original, new components/ parts/ assembly/ software and that no refurbished/ duplicate/ second hand components/ parts/ assembly/ software are being used or shall be used.
- 10.6 For supply of any software i.e. operating system or any applications software the bidder should submit a Certificate Of Authenticity (COA), issued by the respective OEM and duly signed by Authorized Signatory of the bidder stating that all Software supplied are authentic and legal copy is/are being supplied.

11. DOCUMENTS ESTABLISHING GOOD'S CONFORMITY TO BID DOCUMENTS

- 11.1 Pursuant to clause 7, the bidder shall furnish, as part of its bid, documents establishing the conformity of its bid to the Bid Documents of all goods and services which it proposes to supply under the contract.
- 11.2 The documentary evidences of the "goods and services" conformity to the Bid Documents, may be, in the form of literature, drawings, data etc. and the bidder shall furnish:
- (a) A detailed description of goods with essential technical and performance characteristics;
 - (b) A list, giving full particulars including available sources of all spare parts, special tools, etc., necessary for the proper and continuous functioning of the goods for a period of three years following commencement of use of the goods by the purchaser, and
 - (c) A clause-by-clause compliance on the purchaser's Technical Specifications and Commercial Conditions demonstrating substantial responsiveness to the Technical Specifications, Commercial Conditions and Special Conditions. A bid without clause-by-clause compliance of the Technical Specifications (Section IV-C), Commercial Conditions (Section III) and Special Conditions (Section IV) shall be considered as non-responsive.

12. BID SECURITY

- 12.1 The bidder shall furnish, as part of its bid, a bid security as per Clause 6 of **Section-I**.
- 12.2 The bid security form is required to protect BSNL against the risk of bidder's conduct.
- 12.3 A bid not secured in accordance with para 12.1 shall be rejected by BSNL being non-

responsive at the bid opening stage.

12.4 The necessary action shall be taken in case of following

- (a) If the bidder withdraws or amends its bid or impairs or derogates from the bid in any respect during the period of bid validity specified by the bidder in the Bid form or extended subsequently, or
- (b) In the case of successful bidder, if the bidder fails:
 - (i) to sign the contract in accordance with clause 28 or
 - (ii) to furnish performance security within the specified time in accordance with clause 27.
- (c) In both the above cases, i.e. 12.4 (a) & (b), the bidder may also be suspended for a period of 3 years starting from the date of act as stated therein, from being eligible to submit the bids for Contract with BSNL.
- (d) The sole bidder or all the members of the consortium as the case may be, shall submit an irrevocable undertaking duly signed by it stating that the bidder shall be liable for due performance of the contract, failing which it shall be liable to be barred from having any business dealing with BSNL for a period of three years.

13. PERIOD OF VALIDITY OF BIDS

13.1 Bid shall remain valid for 180 days from the date of opening of bids prescribed by BSNL pursuant to clause 19.1. **A bid valid for a shorter period shall be rejected by BSNL being non- responsive, if bidder does not amend it on being pointed out by BSNL.**

In exceptional circumstances, BSNL may request the consent of the bidder for an extension to the period of bid validity. The request and the response thereto shall be made in writing. **A bidder accepting the request and granting extension will not be permitted to modify its bid. However, bidder may not agree to the above request without risk of forfeiting the EMD.**

14. FORMAT AND SIGNING OF BID

14.1. Deleted

14.2. The Bid shall be typed or printed and all the pages numbered consecutively and shall be signed by the bidder or a person or persons duly authorized to bind the bidder to the contract. The letter of authorization shall be indicated by written power-of-attorney accompanying the bid. All pages of the original bid, except for un-amended printed literatures, shall be digitally signed by the person or persons signing the bid. In addition, the experience certificates have to be counter-signed by the bidder before uploading. The bids submitted shall be sealed properly.

14.3. The bid shall contain no interlineations, erasures or overwriting except as necessary to correct errors made by the bidder in which case such corrections shall be signed by the person or persons signing the bid.

14.4. Power of Attorney

- (a) The power of Attorney should be submitted and executed on the non-judicial stamp paper of appropriate value as prevailing in the respective states(s) and the same be

attested by a Notary public or registered before Sub-registrar of the state(s) concerned.

- (b) The power of Attorney be executed by a person who has been authorized by the Board of Directors of the bidder in this regard, on behalf of the Company /institution/ Body Corporate.
- (c) ~~In case of the bidder being a firm, the said Power of Attorney should be executed by all the partner(s) in favour of the said Attorney. (point c stands deleted as per Amendment No. 6.9.1)~~
- (d) ~~In case, the bidder is a consortium, all the members of consortium shall execute a power of attorney in favour of the said authorized signatory. (point d as per Amendment No. 6.9.2)~~
- (e) Attestation of the specimen signatures of such authorized signatory who issues PoA for the bid by the Company's/ firm's bankers shall be furnished. Name, designation, Phone number, mobile number, email address and postal address of the authorized signatory shall be provided.
- (f) In case the Authorized signatory of Bidder is already holding a Power of Attorney to sign bids in all the tenders, then such POA shall be accepted, subject to compliance of the clause 14.4.d above and verification of the original document as and when required by BSNL.

15. SEALING AND MARKING OF BIDS

15.1 Bids have to be submitted online only. In addition, some documents have to be submitted off-line in accordance with relevant instructions of this document (refer **Section-XIII**)

- (a) The envelope for offline submission shall be addressed to BSNL at the address mentioned in this document.
- (b) The envelope shall bear (the project name), the tender number and the words 'DO NOT OPEN BEFORE' (due date & time).
- (c) The envelope shall indicate the name and address of the bidders to enable the documents to be returned unopened in case it is declared 'late' or rejected.
- (d) The responsibility for ensuring that the tenders are delivered in time would vest with the bidder.
- (e) Offline documents delivered in person shall be delivered as per Note 4 of Section I-A. BSNL shall not be responsible if the bids are delivered elsewhere.
- (f) Venue date and time of tender opening as mentioned in the Notice Inviting Tender (NIT) i.e. Section-I. If due to administrative reasons, the venue, date or time of Bid opening is changed, it will be displayed prominently on notice board and also on BSNL website.

15.2 If the envelope for offline submission are not sealed and marked as required at para 15.1 and Clause no. 2 of Section IV-A, the bid shall be rejected.

16. SUBMISSION OF BIDS.

16.1. Bids must be received by BSNL online as per instructions in relevant sections of this

document not later than the specified date and time indicated in the **Detailed NIT (Section-I)**. The bidder is required to submit the bid online at the e-tender portal. Tender bids received after due time & date will not be accepted. Offline submission of bids would not be accepted and only the documents mentioned in relevant instructions of this document shall be submitted offline.

16.2. BSNL may, at its discretion, extend this deadline for the submission of bids by amending the Bid Documents in accordance with clause 6 in which case all rights and obligations of BSNL and bidders previously subject to the deadline will thereafter be subjected to the deadline as extended.

16.3. The bidder shall submit its bid offer against a set of bid documents purchased by him for the entire package. Bid not submitted for the entire package will be rejected being non-responsive.

17. LATE BIDS

17.1 No bid shall be received by BSNL (online/offline) after the deadline for submission of bids prescribed by BSNL pursuant to **clause 16**.

18. MODIFICATION AND WITHDRAWAL OF BIDS

18.1. The bidder may modify, revise or withdraw its bid after submission prior to the deadline prescribed for submission of bid.

18.2. Subject to **clause 20**, no bid shall be modified subsequent to the deadline for submission of bids.

19. OPENING OF BIDS BY BSNL

19.1. BSNL shall open bids online in the presence of bidders or their authorized representatives who chose to attend, at the time specified in the Detailed NIT (**Section-I**). The bidder's representatives, who are present, shall sign in an attendance register. Authority letter to this effect shall be submitted by the bidders before they are allowed to participate in bid opening (A Format is given in **Section X**).

19.2. A maximum of two representatives of any bidder shall be authorized and permitted to attend the bid opening.

19.2.1. The bids will be opened in 2 stages i.e. the techno-commercial (Qualification) bid shall be opened on the date of tender opening given in NIT. The financial bid will not be opened on the Date of opening of techno commercial bids.

19.2.2. The financial bids of those bidders who are techno-commercially responsive will be considered for opening, subject to conditions as mentioned in Section IV Part A. The Date and Time of opening of financial bid will be intimated through e-portal.

19.3. The bidder's names, modifications, bid withdrawals and such other details as BSNL, at its discretion, may consider appropriate will be announced/ displayed on e-tender portal, at

the time of opening.

- 19.4. The date fixed for opening of bids, if subsequently declared as holiday by BSNL, the revised date of schedule will be notified. However, in absence of such notification, the bids will be opened on next working day, time and venue remaining unaltered.

20. CLARIFICATION ON BIDS SUBMITTED BY BIDDER

- 20.1 To assist in the examination, evaluation and comparison of bids, BSNL may, at its discretion ask the bidder for the clarification of its bid. The request for the clarification and the response shall be in writing. **However, no post bid clarification at the initiative of the bidder shall be entertained.**

21. PRELIMINARY EVALUATION

- 21.1. BSNL on behalf of USOF, DoT shall evaluate the qualification bids submitted online as defined in Section IV-A and Annexure-III to determine whether they are complete, whether any computational errors have been made, whether required sureties have been furnished, whether the documents have been properly signed and whether the bids are generally in order.
- 21.2. Arithmetical errors shall be rectified on the following basis. If there is a discrepancy between the unit price and total price that is obtained by multiplying the unit price and quantity, the unit price shall prevail and the total price shall be corrected by BSNL. If there is a discrepancy between words and figures, the amount in words shall prevail. If the bidder does not accept the correction of the errors, its bid shall be rejected. However, any discrepancy between the required and quoted quantities will not be considered as arithmetical errors and will be evaluated by loading of bids (if quantities quoted are lower than that put to tender).
- 21.3. Prior to the detailed evaluation pursuant to clause 22, BSNL will determine the substantial responsiveness of each bid to the Bid Document. For purposes of these clauses, a substantially responsive bid is one which conforms to all the terms and conditions of the Bid Documents without material deviations. BSNL's determination of bid's responsiveness shall be based on the contents of the bid itself without recourse to extrinsic evidence.
- 21.4. A bid, determined as substantially non-responsive will be rejected by BSNL and shall not subsequent to the bid opening be made responsive by the bidder by correction of the non-conformity.
- 21.5. BSNL may waive any minor infirmity or non-conformity or irregularity in a bid which doesn't constitute a material deviation, provided such waiver doesn't prejudice or affect the relative ranking of any bidder.

22. EVALUATION AND COMPARISON OF SUBSTANTIALLY RESPONSIVE BIDS (Amendment No. 6.10)

22.1. BSNL shall evaluate in detail and compare the bids, previously determined to be substantially responsive pursuant to clause 21.

- (a) The evaluation and comparison of responsive bids shall be done on total cost (i.e. inclusive of GST) basis on the prices of the Material/ services offered as indicated in the price schedule in the Sec. VII of the Bid document after arithmetic correction in the manner laid down herein above. Taxes claimed by vendor shall be supported by GST compliant Challans / Invoices at the time of claim for payment. It is clarified that GST will be reimbursed on actual basis subject to quoting in the bid as per prescribed rates except the changes in GST rates during the original delivery schedule.

23. CONTACTING BSNL

- 23.1. Subject to **Clause 20**, no bidder shall try to influence BSNL on any matter relating to its bid, from the time of the bid opening till the time the contract is awarded.
- 23.2. Any effort by a bidder to modify its bid or influence BSNL in BSNL's bid evaluation, bid comparison or contract award decision shall result in the rejection of the bid.

24. PLACEMENT OF ORDER

- 24.1. BSNL shall consider placement of orders for commercial works execution only on those eligible bidders whose offers have been found technically, commercially and financially acceptable and whose services /goods have been type approved/ validated (wherever applicable) by BSNL. **BSNL reserves the right to counter offer price(s) against price(s) quoted by any bidder.**
- 24.2. The ordering price of any bidder shall not exceed the lowest evaluated price.
- 24.3. BSNL reserves the right for the placement of order of entire tendered quantity of the package on the bidder with the lowest evaluated price.
- 24.4. Wherever a package consists of more than one State/ UT, the Purchase Order shall be placed State/ UT wise for GST compliance. Terms & Conditions related to Milestones/ Penalties shall be as per Purchase Orders.

25. BSNL'S RIGHT TO VARY QUANTITIES

- (a) BSNL on behalf of USOF, DoT will have the right to increase or decrease up to 25% of the overall quantity of works in any packages specified in the schedule of requirements, without any change in the unit price or other terms and conditions at the time of issue of AWO, which shall be binding on bidders. However, the quantities can vary beyond 25% based on the exact requirement projected after the survey by PIA and payment shall be made only for the actual work executed.
- (b) Additional quantities up to **50%** of works contained in the running tender/ contract can be ordered during the contract execution stage or within a period of twelve months (earliest one) from date of commissioning of 90% of GPs (and 100% blocks)

at the same rate or a rate negotiated (downwardly) with the existing contractors considering the reasonability of rates based on prevailing market conditions and the impact of reduction in taxes and material/services to be obtained within time period scheduled afresh.

- (c) In exceptional situation where the requirement is of an emergent nature and it is necessary to ensure continued works from the existing contractors, BSNL reserves the right to place repeat order up to 100% of the quantities of material/ services contained in the running tender/ contract during the contract execution stage or within a period of twelve months from the date of completion of project at the same rate or a rate negotiated (downwardly) with the existing contractors considering the reasonability of rates based on prevailing market conditions and the impact of reduction in duties and taxes etc.
- (d) BSNL will have full power to accord internal approval to procure any equipment/ material in any quantity by any means in the exigencies of services and interest of BSNL.
- (e) The Work Orders shall be issued for the quantities finalized through surveys, approved by BSNL. The Work Order quantities shall not be related to Advance Work Order quantities in any manner. The Quantity variation clauses- 25.(a) to 25.(d) of Section-II shall be applicable on the basis of total of quantities mentioned in all the Work Orders issued in a package based on actual quantities as per survey.
(Amendment No. 6.11)

26. BSNL'S RIGHT TO ACCEPT ANY BID AND TO REJECT ANY OR ALL BIDS

- 26.1. BSNL on behalf of USOF, DoT reserves the right to accept or reject any bid, and to annul the bidding process and reject all bids, at any time prior to award of contract without assigning any reason whatsoever and without thereby incurring any liability to the affected bidder or bidders on the grounds of BSNL's action. The bidder shall have no claim of any nature whatsoever on BSNL for period prior to signing of contract. The bidder will not be entitled to any sums in the event any work is carried out by the bidder after issue of APO in the event the contract is not signed.

27. ISSUE OF ADVANCE PURCHASE/WORK ORDER

- 27.1 The issue of an Advance Purchase/work Order shall constitute the intention of BSNL as an agent of USOF to enter into contract with the bidder. It is clarified that issue of APO/WO does not mean that BSNL is bound to issue purchase/work order.
- 27.2 The bidder shall within 14 days of issue of the advance purchase/work order, shall give its acceptance along with performance security (PBG or insurance security bond) in conformity with proforma enclosed in section IX (A) provided with the bid document. Non-submission of acceptance and PBG in the prescribed period will automatically result in withdrawal of APO or levy of penalty, alongwith other actions w.r.t. EMD/ business banning etc. unless the period of acceptance is extended by BSNL subsequently. In case, the extension is given by BSNL, the period of extension may lead to

commensurate reduction in delivery timelines. The extension by BSNL shall be in writing only.

28. SIGNING OF CONTRACT

- 28.1. After submission of acceptance of APO/ AWO along with performance security; Agreement, signed between the successful bidder and BSNL Corporate Office (on behalf of USOF, DoT), shall constitute the award of contract to the successful bidder for the respective package.
- 28.2. After signing of agreement for a package, Purchase Order(s)/ Work Order(s) shall be issued to the successful bidder (PIA) by the respective circle(s) (part of the package). *(Amendment No. 6.12)*

29. ANNULMENT OF AWARD

- 29.1. Failure of the successful bidder to comply with the requirement of clause 27 & 28 shall constitute sufficient ground for the annulment of the award and the forfeiture of the bid security in which event BSNL may make the award to any other bidder at the discretion of BSNL or call for new bids.

30. Deleted

31. REJECTION OF BIDS

- 31.1. While all the conditions specified in the Bid documents are critical and are to be complied, special attention of bidder is invited to the following clauses of the bid documents. Non-compliance of any one of which shall result in rejection of the bid.
 - (a) Clauses 12.1 of Section II: The bids will be rejected at opening stage if Bid security is not submitted as per Clauses 12.1.
 - (b) Clause 2 & 10 of Section II: If the eligibility condition as per clause 2 of Section II is not met and/ or documents prescribed to establish the eligibility as per Clause 10 of section II are not enclosed, the bids will be rejected without further evaluation.
 - (c) Clause 11.2 (c) of Section II: If clause-by-clause compliance and Nil deviation statements as prescribed are not given, the bid will be rejected at the stage of primary evaluation.
 - (d) Section III General Commercial conditions, Section IV-A Special Instructions to Bidders, Section IV-B Special (Commercial) Conditions of Contract & Section IV-C Special (Technical) Conditions of Contract and Technical Specifications: Compliance if given using ambiguous words like "Noted", "Understood", "Noted & Understood" shall not be accepted as complied. Mere "Complied" will also be not sufficient, reference to the enclosed documents showing compliances must be given.
 - (e) Section VII Price Schedule: Prices are not filled in as prescribed in price schedule.
- 31.2. Before outright rejection of the Bid by Bid-opening team for non-compliance of any of the provisions mentioned in clause 31.1 of Section II, the bidder company should be given opportunity to explain their position, however if the person representing the company is not satisfied with the decision of the Bid opening team, he/ they can submit the representation to the Bid opening team immediately but in no case after closing of the tender process with full justification quoting specifically the violation of tender condition if any.

- 31.3. Bid opening team will not return the bids submitted by the bidders on the date of tender opening even if it is liable for rejection and will preserve the bids in sealed cover as submitted by taking the signatures of representatives of the participating bidder/ companies present on the occasion.
- 31.4. The in-charge of Bid opening team will mention the number of bids with the name of the company found unsuitable for further processing on the date of tender opening and number of representations received in Bid opening Minutes and if Bid opening team is satisfied with the argument of the bidder/ company mentioned in their representation and feel that there is prima- facie fact for consideration, the in-charge of the bid opening team will submit the case for review to competent authority as early as possible preferably on next working day and decision to this effect should be communicated to the bidder company within a week positively. Bids found liable for rejection and kept preserved on the date of tender opening will be returned to the bidders after issue of P.O. against the instant tender.

32. BSNL'S RIGHT TO DISQUALIFY

- 32.1 BSNL on behalf of USOF, DoT reserves the right to disqualify the bidder for a suitable period who had on previous occasion(s) failed to execute/complete the works in time. Further, the bidders whose works do not perform satisfactory in the field in accordance with the specifications may also be disqualified for a suitable period as decided by BSNL. *(Amendment No. 6.13)*

33. BSNL'S RIGHT TO BAN BUSINESS DEALINGS

- 33.1 BSNL reserves the right to ban business dealings with a bidder for a suitable period in case the bidder fails to honour its bid without sufficient grounds (also refer Appendix-I to Section II).

34. NON-RELATIONSHIP CERTIFICATE

- 34.1. The bidder should give a certificate that none of his/her near relative is working in BSNL or he may give list of near relatives employed in the BSNL. In case of proprietorship firm, certificate will be given by the proprietor. For partnership firm, certificate will be given by all the partners. In case of limited company, certificate will be given by all the Directors of the company excluding Government of India/ Financial institution nominees and independent non-Official part time Directors appointed by Govt. of India or the Governor of the state and full time Directors of PSUs, both state and central. In case of consortium all the partners/ directors of consortium shall give non-relationship certificate as above.
- 34.2. Due to any breach of these conditions by the company or firm or any other person the tender will be cancelled and bid security will be forfeited at any stage whenever it is noticed and BSNL will not pay any damage to the company or firm or the concerned person. The company or firm or the person will also be debarred for further participation in the concerned unit.
- 34.3. The near relatives for this purpose are defined as:-
- (a) Members of a Hindu undivided family.
 - (b) They are husband and wife.

- (c) The one is related to the other in the manner as father, mother, son(s) & Son's wife (daughter in law), Daughter(s) and daughter's husband (son in law), brother(s) and brother's wife, sister(s) and sister's husband (brother in law).

34.4. The format of the certificate to be given is "I.....s/o.....r/o hereby certify that none of my relative(s) as defined in the tender document is/ are employed in BSNL unit as per details given in tender document. In case at any stage, it is found that the information given by me is false/ incorrect, BSNL shall have the absolute right to take any action as deemed fit/without any prior intimation to me."

35. VERIFICATION OF DOCUMENTS AND CERTIFICATES

35.1. The bidder will verify the genuineness and correctness of all documents and certificates, including experience/ performance certificates, issued either by the bidder or any other firm/ associate before submitting them in the bid. **The onus of proving genuineness of the submitted documents would rest with the bidder.**

35.2. As per requirement of the tender's conditions, if any document/ paper/ certificate submitted by the participant bidder is found to be false/ fabricated/ tempered/ manipulated at any stage during bid evaluation or award of contract, then the bid security of the bidder would be forfeited and the bidder would be disqualified from the tender. Action would also be taken for banning of business dealing with the defaulting firm. In case contract has already been awarded to the bidder, then PBG, would be forfeited and the contract would be rescind/ annulled and BSNL would be at liberty to complete works from any other source at the risk and cost of the defaulting bidder. Action would also be taken for banning business dealing with the defaulting firm. The various actions which BSNL shall be at liberty to take are more specifically set out in Appendix-1 hereto.

Appendix-1 to Section II (Amendment No. 6.14)

Revised Appendix-1 to Section-II (General Instructions to Bidders)		
S. No.	Defaults of the bidder / vendor.	Action to be taken
A	B	C
1(a)	Submitting fake / forged	i) Rejection of tender bid of respective Vendor.
	a) Bank / Insurance surety bond Instruments with the bid to meet terms & condition of tender in respect of tender fee and/ or EMD;	ii) Banning of business upto 3 years which implies barring further dealing with the vendor for procurement of Goods & Services including participation in future tenders invited by BSNL upto 3 years from date of issue of banning order.
	b) Certificate for claiming exemption in respect of tender fee and/ or EMD;	iii) Termination/ Short Closure of APO/ PO/WO, if issued. This implies non-acceptance of further supplies / work & services except to make the already received material work/ complete work in hand.
	(c) Bank Guarantee/ Insurance surety bond Instruments submitted towards performance security or any type of security.	iv) EMD, if submitted, shall also be forfeited, in case of default at para (c).
	and detection of default at any stage from receipt of bids till award of APO/ issue of	

Revised Appendix-1 to Section-II (General Instructions to Bidders)		
S. No.	Defaults of the bidder / vendor.	Action to be taken
A	B	C
	PO/WO.	
	Note: - Payment for already received supplies/ completed work shall be made as per terms & conditions of PO/ WO.	
1(b)	Submitting fake / forged documents towards meeting eligibility criteria such as experience capability, supply proof, registration with Goods and Services Tax, Income Tax departments and any other supporting documents towards other terms & conditions with the bid to meet terms & condition of tender	
	<i>(i) If detection of default is prior to award of APO</i>	i) Rejection of Bid & ii) Forfeiture of EMD. iii) Banning of business for upto three years which implies Barring further dealing with the vendor for procurement of Goods & Services including participation in future tenders invited by BSNL for upto three years from the date of issue of banning order.
	<i>(ii) If detection of default after issue of APO but before receipt of PG/ SD (DD, BG etc.)</i>	i) Cancellation of APO, ii) Rejection of Bid & iii) Forfeiture of EMD, if submitted. iv) Banning of business for upto three years which implies Barring further dealing with the vendor for procurement of Goods & Services including participation in future tenders invited by BSNL for upto three years from the date of issue of banning order.
	<i>(iii) If detection of default after receipt of PG/ SD (DD,BG etc.) .</i>	i) Cancellation of APO ii) Rejection of Bid & iii) Forfeiture of PG/ SD. However, on realization of PG/ SD amount, EMD, if not already released shall be returned. iv) Banning of business for upto three years which implies Barring further dealing with the vendor for procurement of Goods & Services including participation in future tenders invited by BSNL for upto three years from the date of issue of banning order.
	<i>(iv) If detection of default after signing of Agreement/ issue of PO/ WO</i>	i) Termination/ Short Closure of PO/WO and Cancellation of APO ii) Rejection of Bid & iii) Forfeiture of PG/ SD. However on realization of PG/ SD amount, EMD, if not released shall be returned. iv) Banning of business for upto three years which implies Barring further dealing with the

Revised Appendix-1 to Section-II (General Instructions to Bidders)		
S. No.	Defaults of the bidder / vendor.	Action to be taken
A	B	C
		vendor for procurement of Goods & Services including participation in future tenders invited by BSNL for upto three years from the date of issue of banning order.
	Note 3:- However, settle bills for the material received in correct quantity and quality if pending items do not affect working or use of supplied items.	
	Note 4:- No further supplies are to be accepted except that required to make the already supplied items work.	
2	If vendor or his representative uses violent/ coercive means viz. Physical / Verbal means to threatens BSNL Executive / employees and/ or obstruct him from functioning in discharge of his duties & responsibilities for the following: a) Obstructing functioning of tender opening executives of BSNL in receipt/ opening of tender bids from prospective Bidders, suppliers/ Contractors. b) Obstructing/ Threatening other prospective bidders i.e. suppliers/ Contractors from entering the tender venue and/ or submitting their tender bid freely.	Banning of business for 3 years which implies Barring further dealing with the vendor for procurement of Goods & Services including participation in future tenders invited by BSNL for 3 years from date of issue of banning order.
3	Non-receipt of acceptance of APO/ AWO and SD/ PG by L-1 bidder within time period specified in APO/ AWO.	Forfeiture of EMD and banning of business, including a ban on participation in BSNL tenders, for a period of 1 year from date of issue of banning order.
4.1	Failure to supply and/ or Commission the equipment and /or execution of the work at all even in extended delivery schedules, if granted against PO/ WO.	i) Termination of PO/ WO. ii) Under take purchase/ work at the risk & cost of defaulting vendor. iii) Recover the excess charges if incurred from the PG/ SD and outstanding bills of the defaulting Vendor.
4.2	Failure to supply and/ or Commission the equipment and /or execution of the Work in full even in extended delivery schedules, if granted against PO/ WO.	i) Short Closure of PO/ WO to the quantity already received by and/ or commissioned in BSNL and/ or in pipeline provided the same is usable and/or the Vendor promises to make it usable. ii) Under take purchase/ work for balance quantity at the risk & cost of defaulting vendor. iii) Recover the excess charges if incurred from the PG/ SD and outstanding bills of the defaulting Vendor.
5.1	The supplied equipment does not perform satisfactory in the field in accordance with the specifications mentioned in the PO/ WO/Contract.	i) If the material is not at all acceptable, then return the non-acceptable material (or its part) & recover its cost, if paid, from the o/s bills/ PG/ SD. OR ii) If the material is inducted in network & it is

Revised Appendix-1 to Section-II (General Instructions to Bidders)

S. No.	Defaults of the bidder / vendor.	Action to be taken
A	B	C
		not possible to return it and/ or material is acceptable with degraded performance, the purchaser may determine the price for degraded equipment (Financial penalty = Price – price determined for degraded equipment) himself and/ or through a committee. Undertake recovery of financial penalty from outstanding dues of vendor including PG/ SD.
5.2	Major quality problems (as established by a joint team / committee of User unit(s) and QA Circle) / performance problems and non-rectification of defects (based on reports of field units and QA circle).	i) If the material is not at all acceptable, then return the non-acceptable material (or its part) & recover its cost, if paid, from the o/s bills/ PG/ SD; OR ii) If the material is inducted in network & it is not possible to return it and/ or material is acceptable with degraded performance, the purchaser may determine the price for degraded equipment (Financial penalty = Price – price determined for degraded equipment) himself and/ or through a committee. Undertake recovery of financial penalty from outstanding dues of vendor including PG/ SD; and iii) Withdrawal of TSEC/ IA issued by QA Circle.
6	Submission of claims to BSNL against a contract	i) Recovery of over payment from the outstanding dues of Vendor including EMD/ PG & SD etc. and by invoking 'Set off' clause 20 of Section III or by any other legal tenable manner. ii) Banning of Business for 3 years from date of issue of banning order or till the date of recovery of over payment in full, whichever is later.
	(a) for amount already paid by BSNL.	
	(b) for Quantity in excess of that supplied by Vendor to BSNL.	
	c) for unit rate and/ or amount higher than that approved by BSNL for that purchase.	
	Note 5:- The claims may be submitted with or without collusion of BSNL Executive/ employees.	
	Note 6:- This penalty will be imposed irrespective of the fact that payment is disbursed by BSNL or not.	
7	Network Security/ Safety/ Privacy:- If the vendor tampers with the hardware, software/ firmware or in any other way that :	i) Termination of PO/ WO. ii) Banning of business for 3 years which implies barring further dealing with the vendor for procurement of Goods & Services including participation in future tenders invited by BSNL for 3 years from date of issue of banning order.
	a) Adversely affects the normal working of BSNL equipment(s) and/ or any other TSP through BSNL.	iii) Recovery of any loss incurred on this account from the Vendor from its PG/ SD/ O/s
	b) Disrupts/Sabotages functioning of the BSNL network equipment such as	

Revised Appendix-1 to Section-II (General Instructions to Bidders)

S. No.	Defaults of the bidder / vendor.	Action to be taken
A	B	C
	exchanges, BTS, BSC/ MSC, Control equipment including IN etc., transmission equipment but not limited to these elements and/ or any other TSP through BSNL. c) tampers with the billing related data/ invoicing/ account of the Customer/ User(s) of BSNL and/ or any other TSP(s). d) hacks the account of BSNL Customer for unauthorized use i.e. to threaten others/ spread improper news etc. c) undertakes any action that affects/ endangers the security of India.	bills etc. iv) Legal action will be initiated by BSNL against the Vendor, if required.
8	If the vendor is declared bankrupt or insolvent or its financial position has become unsound and in case of a limited company, if it is wound up or it is liquidated.	(i) Termination/ Short Closure of the PO/ WO. (ii) Settle bills for the quantity received in correct quantity and quality if pending items do not affect working or use of supplied items. (iii) No further supplies are to be accepted except that required to make the already supplied items work. (iv) In case of turnkey projects, If the material is commissioned and is usable without any degradation of performance, then settle bills for the acceptable equipment/ material (or its part) (v) In case of turnkey projects, if the material is inducted in network & it is not possible to return it and/ or material is acceptable with degraded performance, the purchaser may determine the price for degraded equipment (Financial penalty = Price – price determined for degraded equipment) himself and/ or through a committee. (vi) Undertake recovery of financial penalty from outstanding dues of vendor including PG/ SD.
9	In the event of the vendor, its proprietor, Director(s), partner(s) is / are convicted by a Court of Law following prosecution for offences involving moral turpitude in relation to the business dealings with BSNL.	i) Termination/ Short Closure of the PO/ WO. ii) Settle bills for the material received in correct quantity and quality if pending items do not affect working or use of supplied items. iii) No further supplies are to be accepted except that required to make the already supplied items work. iv) In case of turnkey projects, If the material is commissioned and is usable without any degradation of performance, then settle bills for the acceptable equipment/ material (or its part). v) In case of turnkey projects, If the material is

Revised Appendix-1 to Section-II (General Instructions to Bidders)		
S. No.	Defaults of the bidder / vendor.	Action to be taken
A	B	C
		inducted in network & it is not possible to return it and/ or material is acceptable with degraded performance, the purchaser may determine the price for degraded equipment (Financial penalty = Price – price determined for degraded equipment) himself and/ or through a committee. Undertake recovery of financial penalty from outstanding dues of vendor including PG/ SD.
10	If the vendor does not return/ refuses to return BSNL's dues:	i) Take action to appoint Arbitrator to adjudicate the dispute.
	a) in spite of order of Arbitrator.	i) Termination of contract, if any. ii) Banning of business for 3 years which implies barring further dealing with the vendor for procurement of Goods & Services including participation in future tenders invited by BSNL from date of issue of banning order or till the date by which vendor clears the BSNL's dues, whichever is later. iii) Take legal recourse i.e. filing recovery suite in appropriate court.
	b) in spite of Court Orders.	i) Termination of contract, if any. ii) Banning of business for 3 years which implies barring further dealing with the vendor for procurement of Goods & Services including participation in future tenders invited by BSNL from date of issue of banning order or till the date by which vendor clears the BSNL's dues, whichever is later.
11	If the Central Bureau of Investigation/ Independent External Monitor (IEM) / Income Tax/Goods and Services Tax / Custom Departments recommends such a course	Take Action as per the directions of CBI or concerned department.
12	The following cases may also be considered for Banning of business:	i) Banning of business for 3 years which implies Barring further dealing with the vendor for procurement of Goods & Services including participation in future tenders invited by BSNL for 3 years from date of issue of banning order.
	(a) If there is strong justification for believing that the proprietor, manager, MD, Director, partner, employee or representative of the vendor/ supplier has been guilty of malpractices such as bribery, corruption, fraud, substitution of tenders, interpolation, misrepresentation with respect to the contract in question.	
	(b) If the vendor/ supplier fails to execute a contract or fails to execute it satisfactorily beyond the provisions of Para 4.1 & 4.2.	

Revised Appendix-1 to Section-II (General Instructions to Bidders)		
S. No.	Defaults of the bidder / vendor.	Action to be taken
A	B	C
	(c) If the vendor/ supplier fails to submit required documents/ information, where required.	
	(d) Any other ground which in the opinion of BSNL is just and proper to order for banning of business dealing with a vendor/ supplier.	
Note 7: The above penalties will be imposed provided it does not clash with the provision of other sections of this tender.		
Note 8:-In case of clash between these guidelines & provision of other sections of this tender, the provision of other sections shall prevail over these guidelines.		
Note 9: Banning of Business dealing order shall not have any effect on the existing/ ongoing works/ AMC / CAMC which will continue along with settlement of Bills.		

SECTION-III: GENERAL (COMMERCIAL) CONDITIONS OF CONTRACT

1. APPLICATION

- 1.1. The general condition shall apply in contracts made by BSNL for the execution of works.

2. STANDARDS

- 2.1 The works executed under this contract shall conform to the standards prescribed in the Technical Specifications mentioned in **Section IV-C**.

3. PATENT RIGHTS

- 3.1 The contractor shall indemnify BSNL against all third-party claims of infringement of patent, trademark or industrial design rights arising from use of the Service / goods or any part thereof in Indian Telecom Network.

4. PERFORMANCE SECURITY

- 4.1 All successful bidders[including MSEs(MICRO & SMALL ENTERPRISES)] who are registered with Appropriate Authority under m/o MSME) shall furnish performance security to BSNL for an amount equal to 5% of the value of advance work order within 14 days from the date of issue of Advance Purchase Order issued by BSNL on behalf of USOF, DoT . However, if the quoted price is less than BSNL's internal estimated cost by 15% or more, the bidder shall be required to deposit 10% of the APO value as PBG. In case of Consortium, minimum 50% of the Performance Security in both cases (5% or 10%) shall be furnished by the Lead member of the Consortium.
- 4.2 The proceeds of the performance security shall be payable to BSNL on behalf of USOF, DoT as compensation for any loss resulting from the contractor's failure to complete its obligations under the contract.
- 4.3 The performance security Bond shall be in the form of Bank Guarantee or insurance security bond issued by a nationalized/scheduled Bank or Insurance company approved by IRDA and in the form provided in 'Section IX-A' of this Bid Document. Validity of such BG shall be 3 ½ years. Validity shall be got extended by PIA as and when required to cover the periods of extension and be valid for six months beyond the date of such extensions.
- 4.4 The performance security Bond will be discharged by BSNL on behalf of USOF, DoT after completion of the contractor's performance obligations including any warranty obligations under the contract.
- 4.5 Performance Security for O&M (*Amendment No. 6.15*)
- 4.5.1 The successful bidders shall submit the Performance security, in accordance with clause 4.1 to 4.4 above. This Performance Security shall initially be taken for the construction Phase.

4.5.2 PIA shall have option to continue the same Performance Security (submitted against AWO) for the O&M period also by extending its validity.

4.5.3 In case vendor requires release of main PBG, a Performance bank guarantee applicable for O&M Phase, shall have to be submitted at start of the O&M phase and shall be applicable as 5% of the O&M cost of 7 years as per AWO. The PBG submitted after award of contract shall be released only after new PBG for the O&M period is submitted and accepted by buyer after due verification. Bank guarantee for O&M period is to remain valid till completion of O&M period plus six months.

5. INSPECTION AND TESTS

- 5.1 The Purchaser or its representative shall have the right to inspect and test the goods and/or works as per prescribed test schedules for their conformity to the specifications. Where the Purchaser decides to conduct such tests on the premises/installation sites of the supplier or its subcontractor(s), all reasonable facilities and assistance like Testing instruments and other test gadgets including access to drawings and production data shall be furnished to the inspectors at no charge to the purchaser.
- 5.2 Should any inspected or tested goods and/or works fail to conform to the specifications the purchaser may reject them and the supplier shall either replace the rejected goods and/or works or make all alterations necessary to meet Specification requirements free of cost to the purchaser.
- 5.3 In case of goods, notwithstanding the pre-supply tests and inspections prescribed in clause 5.1 & 5.2 above, the equipment and accessories on receipt in the Purchaser's premises will also be tested during and after installation before "take over" and if any equipment or part thereof is found defective, the same shall be replaced free of all cost to the purchaser as laid down in clause 5.4 below.
- 5.4 If any equipment/good/work or any part thereof, before it is taken over under clause 5.5, is found defective or fails to fulfill the requirements of the contract, the inspector shall give the PIA notice setting forth details of such defects or failure and the PIA shall make the defective equipment/good/work good, or alter the same to make it comply with the requirements of the contract forthwith and in any case within a period not exceeding three months of the initial report. These replacements shall be made by the PIA free of all charges at site. Should it fail to do so within this time, the purchaser reserves the discretion to reject and replace at the cost of the PIA the whole or any portion of equipment/good/work as the case may be, which is defective or fails to fulfill the requirements of the contract. The cost of any such replacement made by the purchaser shall be deducted from the amount payable to the PIA.
- 5.5 When the performance tests called for have been successfully carried out, the inspector/ultimate consignee will forthwith issue a commissioning certificate. The inspector/ultimate consignee shall not delay the issue of any "commissioning certificate" contemplated by this clause on account of minor defects in the equipment which do not materially affect the commercial use thereof provided that the supplier shall undertake to make good the same in

a time period not exceeding six months. "Commissioning certificate" shall be issued by the BSNL concerned unit within six weeks of successful completion of tests.

- 5.6 Nothing in clause 5 shall in any way release the PIA from any warranty or other obligations under this contract.

6. DELIVERY/MAKING OVER WORKS EXECUTED TO BSNL AND DOCUMENTS

- 6.1 Delivery of the goods/works and documents shall be made by the PIA in accordance with the terms specified by the purchaser in its schedule of requirements and special conditions of contracts, and the goods/works shall remain at the risk of the supplier until delivery has been completed.
- 6.2 All technical assistance for construction, commissioning and monitoring of the equipment and services shall be provided by the PIA at no extra cost during laboratory evaluation, FAT, inspection AT/ type approval, and field trial, if any.
- 6.3 The extension of delivery period against the purchase/work order, if any, should be granted subject to the condition that BSNL shall have the absolute right to revise the price(s) in compliance with clause-23 (Fall Clause) of Section-III and, also to levy LD/ penalty for the delayed work of execution. *(Amendment No. 6.16)*

7. TRAINING

- 7.1 The bidder shall provide training for supervisory staff of the purchaser or ultimate consignee or USOF, DOT free of cost where required for the purpose of Quality and Acceptance Testing.
- 7.2 The bidder shall provide training for the functioning of active elements like routers, SNOG elements, RFMS etc.
- 7.3 The training session frequency, duration and batch sizes shall be mutually decided so as to meet the actual requirement. It is anticipated that 1 man week training for every 200 GPs per year for first two years and 1 man week per 400 GP per year for subsequent years, should be sufficient. The training material including the videos around 100 hour for Cat. -1 packages and 50 hr in category-2 packages shall be shared by PIA to BSNL and/or USOF and/or ultimate consignee, for further on line training sessions as per the requirement.
- 7.4 The PIA has to arrange the training material, venue and all other arrangements except conveyance and stay arrangement.

8. INCIDENTAL SERVICES

- 8.1 The PIA/supplier may be required to provide any or all of the following services:
- (a) Performance or supervision of on-site assembly and/ or start-up of the supplied Goods;
 - (b) Furnishing of tools required for assembly and/ or maintenance of supplied Goods;
 - (c) Performance of supervision or maintenance and/ or repair of the supplied Goods, for a period of time agreed by the parties provided that this service shall not relieve the

supplier of any warranty obligations under this contract.

9. SPARES

The PIA shall keep the required spares for meeting the SLA defined in Section IV-B. The PIA shall have an agreement with all the OEMs for supporting the supplied products for the life time of the contract (10 years). The OEM shall be bound to supply the spares to BSNL during the entire contract period as per the MAF on the same commercial terms and conditions.

In case any equipment is not repairable due to non-availability of the spares, PIA shall replace the supplied products with equal or upgraded/ higher version during life time of contract (10 years) at free of cost"

10. WARRANTY

- 10.1 All the equipment as per sl No. 3-9 of the Price Schedule (Section-VII) shall be under warranty for one year w.e.f the date of commissioning . Date of commissioning for block & GP routers and associated hardware will be taken as the date on which 90% of the GPs of a block , including block router is visible in state NoC -(on achievement of payment mile stone 4 in table at para 12.1 (h) of section IV-B) , The warranty shall start from 1st day on next calender quarter (ie 1st jan / 1st apr / 1st jul / 1st oct) from date of commissioning . for rest of such equipment commissioned after the achievement of mile stone as above , the warranty shall start from 1st day on next calender quarter (ie 1st jan / 1st apr / 1st jul / 1st oct) from date of commissioning of all reamiining routers and associated hardware of the block .

For other eqpt like RFTMS , UBR , digital microwave and electronics of SNoC , the warranty shall start from 1st day on next calender quarter (ie 1st jan / 1st apr / 1st jul / 1st oct) from date of commissioning (date on which the equipment is commissioned after successful acceptance testing , for electronics of S NoC , this date will be date on which the S Noc is declared as commissioned) .

- 10.2 The PIA/ supplier shall warrant that the stores to be supplied/works to be executed shall be new and free from all defects and faults in materials used, workmanship and manufacture and shall be of the highest grade and consistent with the established and generally accepted standards for materials/works of the type ordered and shall perform in full conformity with the specifications and drawings. The PIA/supplier shall be responsible for any defect that may develop under the conditions provided by the contract and under proper use, arising from faulty material, design or workmanship such as corrosion of the equipment, inadequate quantity of material to meet equipment requirements, inadequate contact protection, deficiencies in circuit design, unapproved less depth, inadequate protections, and/or otherwise and shall remedy such defects at its own cost when called upon to do so by the Purchaser who shall state in writing in what respect the stores are faulty. This warranty shall survive inspection or payment for/ and acceptance of goods/works, but shall expire (except in respect of complaints notified prior to such date) after the period specified in Section-IV-C, after the stores have been taken over under clause 5.5 above.

- 10.3 If it becomes necessary for the PIA/ Supplier to replace or renew any defective portion(s) of the equipment/works under this clause, the provisions of the clause 10.1 shall apply to the portion(s) of the equipment/works so replaced or renewed or until the end of the above mentioned period as specified in Section-IV-C. If any defect is not remedied by the supplier within a reasonable time, the Purchaser may proceed to get the defects remedied from other supplier/contractor/PIA etc., at the supplier's risk and expenses, but without prejudice to any other rights which the purchaser may have against the PIA/supplier in respect of such defects.
- 10.4 Replacement under warranty clause shall be made by the PIA/ free of all charges at site including freight, insurance and other incidental charges.

11. Documents required for claiming payment

Payment terms are as per **Clause 12 of Section IV part-B** of this tender document.

- 11.1 For claiming this payment the following documents are to be submitted to the paying authority.
- a) Invoices in the name of USOF, DOT or any authority designated by them clearly indicating break up details of composite price i.e. Basic, Goods and Services Tax (GST), any other Duties and Taxes, etc.
 - b) QA Inspection Certificate of the material used (as applicable).
 - c) Proof of completion of work (AT certificate).
 - d) E-waybill as prescribed in the GST law in case of movement of goods (if applicable).
 - e) Proof of payment of GST, if applicable.
 - f) Timely uploading of correct and necessary information on GSTN portal is mandatory as prescribed in GST compliances.

Note:-

- (1) If the PIA fails to furnish necessary supporting documents i.e. GST invoices in the name of USOF, DOT / Customs invoices etc. and also fails to upload the information on GSTN in respect of the Duties/taxes for which input tax credit is available to the purchaser i.e. USOF, DOT (as applicable to this tender), the amount pertaining to such Duties/Taxes will be deducted from the payment due to the PIA.
- (2) Tax amount will be paid to the PIA only after PIA declares the details of the invoices in its return in GSTR-1 and GSTR-3B uploaded by the PIA and after submission of proofs of GST compliances.
- (3) TDS/TCS under Income Tax Act 1961 & GST Acts shall be deducted by BSNL on behalf of USOF, DOT under USOF PAN/TAN/ GSTIN as a Tax deductor of USOF, DoT at the prescribed rate, if any (as the case may be).
- (4) BSNL on behalf of USOF, DoT can adjust/ forfeit Bank Guarantee obtained from the PIA against any loss due to non compliances towards Tax Laws on account of PIA's default.

- (5) In case USOF, DOT has to pay GST on reverse charge basis, the PIA would not charge GST on its invoices. Further, the PIA undertakes to comply with the provisions of GST law as may be applicable.

11.2 No payment will be made for goods/ works/services rejected at the site on testing.

11.3 The PIA has to give the mandate for receiving payment costing Rs.5 lakhs and above electronically and the charges, if any, levied by bank has to be borne by the bidder/ PIA. The bidder company is required to give the following information for this purpose:-

- a) Beneficiary Bank Name:
- b) Beneficiary branch Name:
- c) IFSC code of beneficiary Branch:
- d) Beneficiary account No.:
- e) Branch Serial No.(MICR No.):

11.4 GST Invoice:

- i. All the details of PIA (name, address, GSTIN/ unregistered supplier, place of supply, SAC/ HSN code etc.) and other mandatory details shall be mentioned on the invoice.
- ii. Invoice/Supplementary invoice/Debit Note/Credit Note/Receipt Voucher in the name of USOF, DOT need to be issued in compliant format and timely within the time prescribed under GST law.
- iii. In case of any deficient/incomplete/rejected supply, BSNL on behalf of USOF, DoT shall convey the same in reasonable time to enable the PIA to issue credit note and take tax adjustment.
- iv. It would be the responsibility of the PIA to declare correct information on invoice and GSTN portal viz. the amount, the place of supply, rate of tax etc.
- v. Registered location of both the parties i.e. USOF, DoT and PIA should be mentioned in the agreement with GSTIN No. Further, PIA should raise invoices at the registered premise of USOF, DoT and ensure that the place of supply as per GST law is same as registered premise of USOF, DoT or at the premises of its agent BSNL.
- vi. PIA to raise invoices as per the supply location as per GST law. *(Amendment No. 6.17.1)*
- vii. Invoice number should be mentioned on the e-way bill, if applicable. *(Amendment No. 6.17.2)*
- viii. PIA shall be responsible for timely issuance and delivery of invoice/ DN/ CN on or before the stipulated time period provided by the GST law.
 - (a) It is the responsibility of the supplier to ensure that outward supply return (GSTR-1) would be filed correctly. If not, than cost would be borne by supplier.
 - (b) Reporting of correct outward supply by supplier in the outward return (GSTR-1) is

the responsibility of the supplier. In case of mismatch because of supplier's fault, prompt amendments must be made by the supplier else supplier would be required to indemnify USOF, DoT for the loss of credit (if applicable for this tender) due to mis-match. The compliances to be adhered by supplier includes (but is not limited to) the following:

- (i) Uploading appropriate invoice details on the GSTN portal within the stipulated time;
- (ii) Issuing GST compliant invoice / CN/ DN in the name of USOF, DoT PO issued by BSNL on behalf of USOF should be referred by supplier for capturing information on the invoice.
- (iii) Supplier needs to pay the entire self-assessed tax on timely basis.
- (iv) Where invoice is not uploaded or incorrect upload of invoice detail on GSTN portal by supplier then credit on such invoice will be given provisionally subject to matching. So, acceptance of changes made by USOF, DOT on GSTN on account of non-upload or incorrect upload of invoice details on GSTN is to be submitted by supplier. Such changes w.r.t. the mismatch are required to be accepted by supplier within the time limit prescribed under the GST law. It should be noted that in case supplier does not accept such changes within the time limit prescribed under GST law, the loss of input tax credit (if any) would be recovered from the supplier. In case of mismatch because of Supplier's fault, prompt amendments must be made by the supplier else supplier would be required to indemnify USOF, DOT for the losses of credit and interest paid due to mismatch.
- (v) Supplier to issue all necessary documentation and perform all necessary compliances to BSNL.
- (vi) A self-declaration along with evidence that the bidder is not blacklisted by GST authorities. In case supplier gets black listed during the tenure of this contract, then supplier must indemnify USOF/ due to default of supplier.
- (vii) Where the location agreed are more than one state, then separate invoice state wise shall have to be submitted.
- (viii) It shall be the responsibility of the supplier to mention place of supply of goods/services in the invoice issued in the name of USOF, DoT and submitted to designated authority of BSNL which is acting as a processing/ paying authority on behalf of USOF, DoT.

12. PRICES

12.1 Prices charged by the PIA for the goods delivered and works/services performed under the contract shall not be higher than the prices quoted by the PIA in its Bid except for variation caused by change in taxes as specified in Clause-12.2 mentioned below.

- 12.2 For changes in taxes/duties during the scheduled time period, the unit price shall be regulated as under:
- (a) Prices will be fixed at the time of issue of purchase/work order as per taxes and statutory duties applicable at that time
 - (b) In case of reduction of taxes and other statutory duties during the scheduled time period, purchaser shall take the benefit of decrease in these taxes/ duties for the supplies made from the date of enactment of revised duties/taxes.
 - (c) In case of increase in duties/taxes during the scheduled time period, the purchaser shall revise the prices as per new duties/taxes for the supplies,, to be made during the remaining delivery period as per terms and conditions of the purchase/work order.
- 12.3 Any increase in taxes and other statutory duties/ levies, after the expiry of the delivery date shall be to the supplier's account. However, benefit of any decrease in these taxes/duties shall be passed on to the Purchaser by the supplier. The total price is to be adjusted (by reducing the basic price) with increased duties and taxes as per price mentioned in PO.

13. CHANGES IN PURCHASE ORDERS

- 13.1 BSNL on behalf of USOF, DoT may, at any time, by a written order given to PIA, make changes within the general scope of the contract in any one or more of the following:
- (a) drawings, designs or specifications, where works to be executed under the contract are to be specifically **completed as per requirements conveyed by BSNL**;
 - (b) the services to be provided by the PIA.
- 13.2 If any such change causes an increase or decrease in the cost of, or the time required for the execution of the contract an equitable adjustment shall be made in the contract price or delivery schedule, or both, and the contract shall accordingly be amended. Any proposal by the supplier for adjustment under this clause must be made within thirty days from the date of the receipt of the change in order.

14. SUB-CONTRACTS FOR SERVICES *(heading as per Amendment No. 6.18.1)*

- 14.1 Sub- Contracting to any other agency can be done with prior approval of BSNL (being an agent of USOF, DoT), only upto 70% of the contract value for services {not exceeding 70% CAPEX excluding material cost}.

The procurement & supply of material, hiring of machines with or without labor shall not be covered under sub-contracting. *(Amendment No. 26.1)*

- 14.2 The no. of Sub Contractors shall be limited to maximum 25 in case of Category 1-A and 1-B packages and 20 in case of Category 2 packages. *(Amendment No. 6.18.2)*

- 14.3 The eligibility conditions for the Sub Contractors shall be at least 50% of the proportionate technical eligibility mentioned in Eligibility Criteria (Sr. No.- 4) in Table-A under clause-2.1 of

Section IV-A for the proposed subcontracted works other than material supplies. While according to approval, BSNL shall evaluate the Sub Contractors eligibility based on its technical experience considered against already approved sub-contracts in the same or any package of this project. If such sub-contracted works are completed, the experience can be re-considered. *(Amendment No. 6.18.3)*

- 14.4 Even in such cases, the PIA shall ensure the quality of goods and services as envisaged in this document, with robust mechanism of monitoring and quality check, as the responsibility of contract lies with the PIA. Sub- Contracting, even if approved by BSNL shall not relieve the PIA from any liability or obligation under the Contract.
- 14.5 After, the specific approval of Sub contracting of work to any Subcontractor is approved by BSNL, the PIA shall further keep BSNL updated, in writing, whenever, such approved subcontracts are awarded.

15. DELAYS IN THE CONTRACTOR'S PERFORMANCE

15.1 Performance of the services shall be made by the PIA in accordance with the time schedule specified in the purchase order/ work order.

- (a) In case the works are not completed in the stipulated period, as indicated in the Purchase Order/ work order, BSNL on behalf of USOF, DoT reserves the right either to short-close/ cancel the purchase order/ work order and/ or recover penalty.
- (b) Before taking such action of short-closure/ cancellation of purchase order/ work order, BSNL/ IE shall serve, four (04) written notices of default, to the PIA at an interval of ten (10) days after each notice.
- (c) If the PIA does not remedy its failure within a period of 10 days after 4th notice, BSNL may take action as mentioned at para-(a) above.
- (d) The cancellation/ short-closing of the order shall be at the risk and cost of the PIA and BSNL reserves the right to give work order for the balance works at the risk and cost of the defaulting PIA within one year from the date of short closure of the Purchase Order/ Work Order OR date of scheduled completion of the respective project phase (i.e. construction or O&M), whichever is later. *(Amendment No. 6.19.1)*

15.2 Delay by the PIA in the performance of its works obligations shall render the PIA liable to any or all of the following sanctions:

- (a) forfeiture of its performance security,
- (b) imposition of penalty, and/ or
- (c) Short- closure of the contract in part or full and/ or termination of the contract for default.

15.3 If at any time during the performance of the contract, the PIA encounters condition impeding timely performance of service (execution of work), the PIA shall:

- (a) Promptly notify to BSNL in writing the fact of the delay, effect on SLAs and its likely duration and its cause(s). As soon as practicable after receipt of the PIA's notice, BSNL shall evaluate the situation and may at its discretion extend the period for performance of the contract (by not more than 04 weeks or as per provisions of clause 16, **Section-III**) or grant relaxation in SLAs as per provision given below :
- (b) If the work is not completed as per the milestone, applicable penalties/ LD shall be levied. However, the PIA need not seek delivery period extension till the delay of 10 weeks from the milestone. PIA shall request for delivery period extension, Work Order wise, after delay of 10 weeks as per project milestones. However, BSNL reserves the right to short close any time beyond delivery period. The PIA has to submit their request for extension in time along with the undertaking as per clause 23 Section-III (Fall Clause) and a copy of QA/IE inspection certificate at least two weeks before the expiry of time period. The PIA shall also submit unconditional acceptance of the conditions for time period extension i.e. applicability of penalties, prices to be provisional and to be regulated as per clauses 12.3 & 23 of section-III and submission of additional BG, wherever applicable. The decision regarding extension shall be communicated within four weeks of the receipt of request and after receipt of the unconditional acceptance and the undertaking mentioned above. (*Amendment No. 6.19.2*)
- (c) In case extension is being granted beyond 04 weeks then the PIA shall submit additional BG while seeking extension. For piecemeal works (package wise) the amount of additional BG shall be 3 % of the value of balance quantity of works to be done for which extension in time period has been sought. The additional BG shall be valid for six months beyond extension of scheduled period sought and shall be discharged after the works has been completed and made over to the ultimate consignee within the last extended scheduled period on submission of inspection certificate from QA/IE and BSNL designated officer's receipt without prejudice to the other remedies available to BSNL.

15.4 If the works are not completed in the extended time period, the purchase/work order shall be short-closed and both the Performance securities i.e. PBG and additional BG shall be forfeited. The decision of BSNL shall be final.

16. FORCE MAJEURE

16.1 If, at any time, during the continuance of this contract, the performance in whole or in part by either party of any obligation under this contract is prevented or delayed by reasons of any war or hostility, acts of the public enemy, civil commotion, sabotage, fires, floods, explosions, epidemics, quarantine restrictions or act of God (hereinafter referred to as events) provided notice of happenings of any such eventuality is given by either party to the other within 10 days from the date of occurrence thereof, neither party shall by reason of such event be entitled to terminate this contract nor shall either party have any claim for damages against other in respect of such non-performance or delay in

performance, and deliveries under the contract shall be resumed as soon as practicable after such an event come to an end or cease to exist, and the decision of BSNL as to whether the deliveries have been so resumed or not shall be final and conclusive. Further that if the performance in whole or part of any obligation under this contract is prevented or delayed by reasons of any such event for a period exceeding 60 days, either party may, at its option, terminate the contract.

- 16.2 Provided, also that if the contract is terminated under this clause, BSNL shall be at liberty to take over from the Contractor at a price to be fixed by BSNL on behalf of USOF, DoT , which shall be final, all unused, undamaged and acceptable materials, bought out components and stores in course of manufacture which may be in possession of the Contractor at the time of such termination or such portion thereof as BSNL may deem fit, except such materials, bought out components and stores as the Contractor may with the concurrence of BSNL elect to retain.

17. TERMINATION FOR DEFAULT

- 17.1 BSNL on behalf of USOF, DoT may, without prejudice to any other remedy for breach of contract, by written notice of default, sent to the Contractor, terminate this contract in whole or in part

- (a) if the Contractor fails to deliver any or all of the goods & services within the time period(s) specified in the contract, or any extension thereof granted by BSNL pursuant to clause 15;
- (b) if the Contractor fails to perform any other obligation(s) under the Contract; and
- (c) if the Contractor, in either of the above circumstances, does not remedy its failure within a period of 15 days (or such longer period as BSNL may authorize in writing) after receipt of the default notice from BSNL.
- (d) if the average monthly SLA achievement (for GP uptime in the package) is less than 90% for more than 20% of Blocks (SLA to be calculated as an average of all the GPs in a block) consecutively for 3 months for the network where PIA has started O&M phase of existing network (after hand over by BSNL) and newly constructed network. This condition shall be applicable after 1 year from the appointed date. *(Amendment No. 6.20.1)*

- 17.2 In the event BSNL on behalf of USOF, DoT terminates the contract in whole or in part, BSNL on behalf of USOF, DoT may procure, upon such terms and in such manner as it deems appropriate, works similar to those undelivered and the Contractor shall be liable to BSNL on behalf of USOF, DoT for any excess cost for such similar works. However, the Contractor shall continue the performance of the contract to the extent not terminated. *(Amendment No. 6.20.2)*

- 17.3 ~~BSNL reserves the right to discontinue the contract any time in future depending upon directions from USOF, DoT.~~ (stands deleted as per Amendment No. 6.20.3)

18. TERMINATION (INSOLVENCY & CONVENIENCE)

- 18.1 Termination **for Insolvency**: BSNL on behalf of USOF, DoT may at any time terminate the Contract by giving written notice to the Contractor, without compensation to the Contractor, if the Contractor becomes bankrupt or otherwise insolvent as declared by the competent court provided that such termination will not prejudice or affect any right of action or remedy which has accrued or will accrue thereafter to USOF, DoT/ BSNL.
- 18.2 Termination **for Convenience**: BSNL on behalf of USOF, DoT, may, by prior written notice sent to the contractor at least **03 months** in advance, terminate the Contract, in whole or in part at any time for its convenience. The notice of termination shall specify that termination is for USOF, DoT's/ BSNL's convenience, the extent to which performance of work under the Contract is terminated, and the date upon which such termination becomes effective.
- 18.3 BSNL reserves the right to discontinue the contract any time in future depending upon directions from USOF, DoT. (*Amendment No. 6.21*)

19. DISPUTE RESOLUTION

19.1 Dispute Resolution Committee (DRC)

- 19.1.1 Disputes arising under this Request for Proposal (RFP) shall be formally notified in writing (Dispute Notice) by either party ("**the Notifying Party**") to the other party ("**the Receiving Party**"). The parties are encouraged to resolve disputes amicably through direct negotiation and information sharing.
- 19.1.2 If the dispute remains unresolved after direct negotiation and communication, the parties shall establish a package wise Dispute Resolution Committee (DRC). The DRC shall comprise the following members:
- a) BSNL - BharatNet BA Head
 - b) PIA (Project Implementing Agency) – Authorized Representative
 - c) IE (Independent Engineer) - Authorized Representative

19.2 Dispute Adjudication Board (DAB)(list of issue)

If the dispute remains unresolved after negotiations and the intervention of the DRC, either party may refer the dispute to the Dispute Adjudication Board (DAB) within 15 days from the date of the dispute notice as provided in Clause 19.1 above.

The DAB shall be established on a package-wise basis and shall consist of the following members:

- a) BSNL – CGM, BSNL
- b) PIA (Project Implementing Agency) – Authorized State Representative
- c) IE (Independent Engineer) - Authorized State Representative

19.3 The mechanism for resolution of disputes through conciliation under Outside Expert Committee (OEC) :

If any difference or dispute (hereinafter referred as “Dispute”) remains unresolved after negotiations and the intervention of the DAB also, the party **aggrieved (hereinafter referred as “Claimant”)** shall refer the Dispute to conciliation under Outside Expert Committee (hereinafter referred as “OEC”). The OEC nominated by USOF/ BSNL shall be comprised of 3 members who shall be independent in terms of Section 12 read with Schedule 5 of the Arbitration and Conciliation Act, 1996 (hereinafter referred as “Act”). The proceedings shall be governed by Part III of the Act. The detailed procedure has been given in **Annexure A**.

19.4 Settlement of commercial disputes between CPSEs inter se and CPSE(s) and Government Department(s)/ Organization(s):

In the event of any dispute or difference relating to the interpretation and application of the provisions of commercial contract(s) between Central Public Sector Enterprises (CPSEs)/ Port Trusts inter se and also between CPSEs and Government Departments/Organizations (excluding disputes concerning Railways, Income Tax, Customs & Excise Departments), such disputes or differences shall be taken up by either party for resolution through AMRCD (Administrative Mechanism for Resolution of CPSE’s Disputes) as mentioned in **DPE OM No. 05/0003/2019-FTS-10937 dated 14-12-2022** and the decision of AMRCD on the said dispute will be binding on both the Parties. *(Amendment No. 6.22)*

19.5 It is clarified that the parties have agreed that the Arbitration and Conciliation Act, 1996, shall be applicable only for the purpose of Conciliation".

In case of failure of the conciliation process between the parties and/ or refusal of either of the party to accept the outcome of the conciliation process, the aggrieved party shall be free to seek redressal of its dispute by approaching the Commercial Court. The Courts at New Delhi shall have exclusive jurisdiction. *(Amendment No. 6.22)*

Annexure A

1. Conciliation through Outside Expert Committee (OEC):

- A. If any dispute, difference, question or disagreement arises between the parties hereto or their respective representatives or assignees, in connection with construction, meaning, operation, effect, interpretation of the third party contract or breach thereof which parties are unable to settle mutually, the same may first be referred to conciliation through Outside Expert Committee (“OEC”) as provided in the Conduct of Proceedings through OEC in Annexure B
- B. **The venue of the OEC meeting shall be as decided by USOF/ BSNL.**
- C. OEC members will be paid fees and provided facilities as per prevalent guidelines.
- D. Parties are free to terminate the conciliation proceedings at any stage as provided under the Arbitration and Conciliation Act, 1996.

- E. Subject to terms and conditions contained in the above paras, the provisions of the Part III of Arbitration and Conciliation Act, 1996 shall be applicable to the conciliation proceedings and the parties and the OEC members shall be bound by the same.

Annexure B

Conduct of Conciliation Proceedings by OEC

Proposal for OEC

1. The Claimant shall give notice for conciliation to the other parties. The notice shall be given to the concerned officer(s) named for the other parties in the third party contract, clearly bringing out the points of dispute and the amount claimed with documents in support of the claim and the party concerned shall not raise any issue thereafter. It shall be ensured by parties that no parallel proceedings relating to dispute under the same contract are going on in any Court/ Forum /Tribunal. In case, if any dispute is pending relating to the same Contract, then both the parties shall either withdraw the proceedings from the Court/ Tribunal / forum or shall keep the case in abeyance.

Constitution of OEC

2. The OEC shall comprise of 3 members, appointed by USOF/ BSNL.
3. In case of vacancy created because of the resignation/recusal of any member, or if any OEC member is not available to attend further OEC Meetings, the vacancy shall be filled by the nomination by the USOF/ BSNL.
4. The OEC members shall give a declaration of independence and impartiality (as per Appendix) to both the parties before the commencement of the OEC proceedings.

Constitution of OEC

5. The claimant shall submit its statement of claims to OEC members, and to the other party(ies) **(hereinafter referred as “Respondents”)** prescribed in the appointment letter within 30 days of the issue of the appointment letter (as per Appendix, placed below clause 21).
6. The respondents shall file its reply and counter claim (if any) within 30 days of the receipt of the statement of claims.
7. Parties may file their rejoinder/additional documents if any in support of their claim/counter claim within next 15 days. No documents shall be allowed thereafter, except with the permission of OEC.
8. OEC will commence its meetings only after completion of the pleadings.
9. In case of 3 members OEC, 2 members will constitute a valid quorum and the meeting can take place to proceed in the matter after seeking consent from the member who is not available. However, OEC Recommendations will be signed by all Members. Further, efforts must be made for unanimous recommendations. In exceptional circumstances such as death/serious illness of OEC member or if any OEC member has resigned/recused himself from the case during OEC proceedings and non-appointment of any other member in the place of vacancy so caused, then with the consent of all the parties, two OEC members shall give and sign the recommendations. At the conclusion of OEC proceedings, OEC members shall give its recommendations for resolution of disputes based on material before it with proper justification and reasons. Failure

report **or recommendations without reasons** shall not be construed to be a recommendation by the OEC.

10. The parties shall be represented by their in-house employees/executives. No party shall be allowed to bring any advocate or outside consultant/advisor/ agent to contest on their behalf. Ex-officers of BSNL and/or USOF who have handled the matter in any capacity are not be allowed to attend and present the case before OEC on behalf of Contractor.
11. Solicitation or any attempt to bring influence of any kind on either OEC Members **or BSNL or USOF** is completely prohibited in conciliation proceedings and **USOF/ BSNL** reserves the absolute right to close the conciliation proceedings **at their joint** discretion **if they** apprehends any kind of such attempt made by the Contractor or its representatives.
12. Parties agree to rely only upon documentary evidence in support of their claims and not to bring any oral evidence in the OEC proceedings.
13. OEC will give full opportunity of hearing to the parties before giving its recommendations.
14. OEC will conclude its proceedings in generally 4 meetings, and give its recommendations within **60** days of its first meeting. OEC will give its recommendations to all the parties recommending possible terms of settlement. **USOF/ BSNL** may extend the time/ number of meetings, in exceptional cases, if OEC requests for the same with sufficient reasons.
15. Parties shall not claim any interest on claims/counterclaims from the date of notice invoking conciliation till execution of settlement agreement, if so arrived at. In case, parties are unable to reach a settlement, no interest shall be claimed by either party for the period from the date of notice invoking conciliation till the date of OEC recommendations and 30 days thereafter in any further proceeding.

Actions after OEC Recommendations

16. The recommendations of OEC are non-binding and the parties may decide to accept or not to accept the same. Parties are at liberty to accept the OEC recommendation with any modification they may deem fit.
17. Each party shall communicate its comments/response on the Recommendations given by the OEC along with its decisions whether the recommendations are acceptable or not, to the other parties within a period of 15 days from the electronic receipt of the recommendations of OEC. If recommendations are acceptable by all the parties, a settlement agreement under Section 73 of the Arbitration and Conciliation Act, 1996 will be signed within 15 days of last communication of the period ending 15 days within which the decision of the parties has to be communicated, and same shall be authenticated by all the OEC Members. The Agreement so signed and authenticated shall have the same effect as an award passed under Section 30 of the Arbitration and Conciliation Act, 1996.
18. The timelines mentioned in the above guidelines are with an objective to achieve expeditious conclusion of OEC proceedings. However, it does not mean that any action beyond the timelines will be invalid. However, the party concerned will make all efforts to complete the actions within the stipulated time.
19. The parties shall keep confidential all matters relating to the conciliation proceedings including minutes of OEC meeting and Recommendations of OEC. Parties shall not rely upon them as

evidence in any arbitration / court proceeding whether or not such proceedings relate to the dispute that is the subject of the conciliation proceedings,

- a. views expressed or suggestions made by the other party in respect of a possible settlement of the dispute;
- b. admissions made by the other party in the course of the OEC proceedings;
- c. proposals made by the OEC;
- d. the fact that the other party had indicated his willingness to accept a proposal for settlement made by the OEC.

20. Confidentiality extends also to the settlement agreement, except where its disclosure is necessary for purposes of implementation and enforcement. This stipulation will not apply to disclosure made by **BSNL or USOF** to Govt. of India or its authorities, if required.

21. The OEC members shall be entitled to the Fee as applicable.

Appendix

Declaration of independence and impartiality by OEC Member

To,

1. BSNL
2. USOF
3. Contractor

Subject: Declaration of independence and impartiality by Outside Expert Committee (OEC) Member in the dispute under Contract No _____.

I, the undersigned, hereby accept to act as Member of the Expert Committee and conciliate in the disputes under reference between the parties above named, I confirm that I am aware of the requirements of law particularly of the Arbitration and Conciliation Act, 1996, to act as a conciliator, I am able to act as conciliator and am available to act as Member of the Expert Committee, I hereby declare that I am independent of each of the parties and have no ownership interest in any part of the contract under reference or any financial interest in the said contract. I have no interest in the outcome of the dispute or its settlement.

I hereby affirm that I shall act with honesty, integrity, diligence, and will remain independent and impartial while discharging my duties as conciliator/OEC Member. I will disclose any interest or relationship with the parties or the subject matter which might compromise in any manner my ability or capacity to remain impartial and independent in the matter.

I further, being a member of the OEC, agree to abide by the terms and conditions of Clause _____ and conduct the proceedings as per Clause _____ of the Contract/Agreement No. _____.

(Signature)

Name:

Address:

Phone:
Email:
Date:

20. SET OFF

Any sum of money due and payable to the Contractor (including security deposit refundable to him) under this contract may be appropriated by BSNL or any other person(s) contracting through BSNL and set off the same against any claim of BSNL such other person or person(s) for payment of a sum of money arising out of this contract or under any other contract made by the Contractor with BSNL or such other person(s) contracting through BSNL.

21. INTIMATION OF STATUS OF WORK EXECUTED

The bidders, who are given Purchase/ Work Orders, must give the details of the works made against all the Purchase Orders every month on the first working day of the following month to BA Heads and concerned user branch of BSNL.

22. DETAILS OF THE PRODUCT/ SERVICES OFFERED

The bidder should furnish the name of its collaborator (if applicable), brand name, model number and type of the products offered in this tender. The technical literatures of the products should also be submitted. No change in either technology or product shall be permitted after opening of bids.

23. FALL CLAUSE

- 23.1 At any time during the contract (a) if it comes to the notice of BSNL regarding reduction of price for the same or similar works; and/ or (b) the prices received in a new tender for the same or similar works are less than the prices chargeable under the contract. The prices would be determined as follows:
- 23.2 The prices once fixed will remain valid during the scheduled time period except for the provisions in clause 12.1 of **Section III**.
- 23.3 BSNL, for the extended period, if any, will determine and intimate the new price, taking into account various related aspects such as quantity, geographical location etc., and the date of its effect for the balance works to the vendor. In case the vendor does not accept the new price to be made applicable during the extended period and the date of its effect, BSNL on behalf of USOF, DoT shall have the right to terminate the contract without accepting any further works. This termination of the contract shall be at the risk and responsibility of the Contractor and BSNL reserves the right to give work order for the balance works at the risk and cost of the defaulting vendor besides considering the forfeiture of its performance security.

23.4 The Contractor while applying for extension of time for works, if any, shall have to provide an undertaking as "We have not reduced the price, and/ or offered price the same or similar works to any person/organization including Department of central/state Government or any central/state PSU at a price lower than the price chargeable under the contract for scheduled time period."

23.5 In case under taking as in Clause 23.4 is not applicable, the vendor will give the details of prices, quantity etc. to BSNL, while applying extension of delivery period.

24. COURT JURISDICTION

24.1 Any dispute arising out on account of terms & conditions of the tender/ bid document/ evaluation of bids/ issue of APO/AWO shall be subject to the jurisdiction of the competent court at the place from where the NIT/ tender has been issued i.e. New Delhi. The courts at New Delhi will have exclusive jurisdiction under this NIT and the contract that may be entered into pursuant to this NIT.

24.2 This Contract/ PO/WO is subject to jurisdiction of Court at New Delhi..

25. Audit and Security services

25.1 The PIA shall be required to provide comprehensive support to BSNL during the Third Party Audit and Security Audit etc. The PIA shall be responsible in getting the required readiness built in the network during audit for security solutions.

25.2 BSNL reserves the right to inspect, monitor and assess the progress and performance of the project either itself or through another designated Contractor as it may deem fit, throughout the course of the Contract. BSNL may demand and upon such a demand being made, BSNL shall be provided any document, data material or any other information which it may require, to enable it to assess the progress of the project.

25.3 BSNL shall also have the right to conduct, either itself or through another Contractor as it may deem fit, an audit to monitor the performance of the Contractor of its obligations/ functions in accordance with the standards committed to or required by BSNL and the Contractor undertakes to cooperate with and provide to BSNL or any other Contractor appointed by USOF (DoT)/ BSNL, all documents and other details as may be required by them for this purpose.

26. Term and Extension of Contract

26.1 The term of this Contract shall be as per Clause-10 (Project Completion Schedule) of Section IV-B.

26.2 BSNL shall reserve the sole right to grant any extension to the term of each work order above against the request of PIA and shall notify in writing to the PIA within 15 days of the request, whether it shall grant the PIA an extension of the term. The decision to grant or refuse the extension shall be at BSNL's discretion. Accordingly, the Bank Guarantee of the same amount shall be extended up to extended period of the Contract, if required.

26.3 Where BSNL is of the view that no further extension of the term be granted to the PIA, BSNL shall notify the PIA of its decision at least 3 (three) months prior to the expiry of the Term. Upon receipt of such notice, the PIA shall continue to perform all its obligations hereunder, until such reasonable time beyond the Term of the Contract within which, BSNL shall either appoint an alternative Contractor or create its own infrastructure to operate such Services as are provided under this Contract. BSNL shall make payment for work executed for the extended period post contract expiry.

~~26.4 BSNL on behalf of USOF, DoT reserves the right to terminate the contract if the SLA achievement is less than 90% consecutively for 3 months or less than 80% for two consecutive months. (stands deleted as per Amendment No. 6.23)~~

27. Third Party Damage:

If the PIA damages other Private Service provider's cables /sewage line/ Government or public properties, such as electricity cable or roads etc., the damage charges/penalty will be paid by the PIA only as per the claim of such third party. BSNL/USOF, DoT will not be liable to pay any penalty or any damage charges made by the PIA as per the indemnity clause below:

~~"PIA shall either pay to third parties all expenditure incurred for restoring services which are damaged by it while carrying out the work or the same amount will be deducted from his bills. Such expenditure shall be intimated to the PIA either by Engineer in- charge or concerned third parties in writing. The amount deducted by BSNL from his bill shall be paid to concerned third parties by the designated authority of BSNL." (Amendment No. 6.24)~~

28. UTILITIES

28.1 Existing utilities and roads

Notwithstanding anything to the contrary contained herein, the PIA shall ensure that the Government Instrumentalities owning the existing roads, right of way or utilities, on, under or above the Site (Route) of the New Network and/or the Existing Network are enabled by it to keep such utilities in continuous satisfactory use, if necessary, by providing suitable temporary or permanent diversions with the authority of the controlling body of that road, right of way or utility, and shall initiate and undertake at its own cost, legal proceedings for acquisition of any right of way necessary for such diversion.

28.2 Shifting of obstructing utilities (Amendment No. 6.25)

~~During the execution of the underground OFC construction work, if there is a requirement of shifting of any utility including electric lines, water pipes and telephone cables etc, the PIA shall, first, explore an alternative path and execute the construction after getting approval of BSNL BharatNet BA Head. In case, no alternative path is feasible, the PIA shall explore the possibility of laying ADSS OFC for that section, and shall lay the same after getting approval from BSNL BharatNet BA Head. In case where the shifting of utility becomes unavoidable, the PIA shall, subject to Applicable Laws, provisions of Applicable Permits and with the assistance of BSNL, undertake shifting of any utility, including electric lines, water pipes and telephone~~

cables, to an appropriate location or alignment within or outside the Site (Route) of the New Network and/or the Existing Network, if and only if such utility causes or shall cause a Material Adverse Effect on the development, operation or maintenance of the Project. The PIA shall submit, to the BharatNet BA Head, BSNL, the estimate of such shifting cost for approval of the same and shall carry out the shifting work after obtaining approval of cost estimate(s) and issue of Work Order for the same. The cost of such shifting shall be paid to the PIA, as per Work Order, and in the event of any delay in shifting thereof, the PIA shall be excused for failure to perform any of its obligations hereunder if such failure is a direct consequence of delay on the part of the entity owning such electric lines, water pipes or telephone cables, as the case may be. The PIA shall indemnify the Government Instrumentality for any damage to the utilities on account of the Development Works or the Upgradation Works.

29. **Felling of trees** *(Amendment No. 6.26)*

BSNL shall assist the PIA in obtaining the applicable permits for felling of trees to be identified by BSNL for this purpose if and only if such trees cause a material adverse effect on the development, operation or maintenance of the Project. In the event of any delay in felling thereof for reasons beyond the control of the PIA, it shall be excused for failure to perform any of its obligations hereunder if such failure is a direct consequence of delay in the felling of trees. For the avoidance of doubt, the costs and expense in respect of felling of trees shall be paid to the PIA as per Work Order and any revenues thereof shall be kept with USOF, DoT/ BSNL. The PIA shall submit, to the BharatNet BA Head, BSNL, the estimate of cost of such works for approval of the same and shall carry out the work after obtaining approval of cost estimate(s) and issue of Work Order for the same.

30. **Penalty for causing inconvenience to the Public.**

The bidder shall not be allowed to dump the empty cable drums/waste materials in Govt/public place, which may cause inconvenience to Govt/ Public. If the bidder does not dispose off the empty cable drums/waste materials within 3 days of becoming empty, BSNL is at liberty to dispose off the drum in any manner deemed fit and the costs incurred by BSNL in disposing off such materials shall be borne by the Bidder. USOF, DoT/ BSNL may also levy a **penalty up to Rs One Thousand for each such default.**

31. **Penalty for cutting/damaging the old cable.**

- 31.1 During excavation of trench, utmost care is to be taken by the bidder, so that the existing underground cables of BSNL are not damaged or cut. In-case any damage/ cut is done to the existing cables of BSNL, a penalty as per the schedule given below will be charged from the bidder or the amount will be deducted from his running bills. Penalty shall be levied @20% of the penalty amount as per table below in case the repair of damages is carried out within 72 hours and submission of No Objection Certificate within 10 days of occurrence is received by PIA.

Sr. No.	Size of existing UG/OF cables Cut/ Damaged	Amount of penalty per Damage instance

1.	Copper UG cable	Rs 50,000.00 (Fifty Thousand)
2.	OFC of any size	Rs 1,00,000 (one Lakh)
3.	Misc. (to include electrical cable, drainage/sewage pipe, water pipe belonging to state govt or local municipal agency etc.)	Rs 1,00,000 (One Lakh)

The bidder shall carry out such repairs for restoration of the damaged cable free of charge. The cost of jointing kit shall also be borne by the bidder. If bidder fails to repair the damage, the cost of repair (including cost of labor + jointing kit) shall be recovered from the bidder in addition to the penalty as prescribed.

31.2 In accordance with Indian telegraph act, If any person, willfully or negligently damages telegraph line, he shall be liable to pay the expenses (if any), as may be incurred in making good such damage.

31.3 PIA shall settle all such claim raised by other operators/ agencies regarding cutting/ damaging their cables or other infrastructure without any cost to USOF, DoT/ BSNL.

32 Indemnities whole clause (Amendment No. 18)

32.1 General indemnity

32.1.1 The PIA shall indemnify, defend, save and hold harmless USOF, DoT/ BSNL and its officers, servants, agents, Government Instrumentalities and BSNL owned and/or controlled entities/enterprises, (**hereinafter referred as the “Authority Indemnified Persons”**) against any and all suits, proceedings, actions, demands and claims from third parties for any loss, damage, cost and expense of whatever kind and nature, whether arising out of any breach by the PIA of any of its obligations under this contract or any related agreement or on account of any defect or deficiency in the provision of services by the PIA to USOF, DoT/ BSNL or to any User, or from any negligence of the PIA under contract or tort or on any other ground whatsoever, except to the extent that any such suits, proceedings, actions, demands and claims have arisen due to any negligent act or omission, or breach or default of this contract on the part of the Authority Indemnified Persons.

32.2 Indemnity by the PIA

32.2.1 Without limiting the generality of Clause-32.1 above, the PIA shall fully indemnify, hold harmless and defend the ‘Authority Indemnified Persons’ from and against any and all loss and/or damages arising out of or with respect to:

- (a) failure of the PIA to comply with Applicable Laws and Applicable Permits;
- (b) payment of Taxes required to be made by the PIA in respect of the income or other taxes of the PIA’s contractors, suppliers and representatives;

- (c) non-payment of amounts due as a result of materials or services furnished to the PIA or any of its contractors which are payable by the PIA or any of its contractors;
- (d) its omissions or acts of fraud, gross negligence and willful misconduct;
- (e) any personal bodily injury or death of any person caused by, arising out of or in connection with its performance of this Contract; or
- (f) loss of or physical damage to property of BSNL or any third party caused by, arising out of or in connection with the performance of this contract.
- (g) Claims towards any default by PIA, in payment of statutory benefits to its employees/sub-contractors engaged to perform the contract.

32.2.2 Without limiting the generality of the provisions of this clause, the PIA shall fully indemnify, hold harmless and defend the 'Authority Indemnified Persons' from and against any and all suits, proceedings, actions, claims, demands, liabilities and damages which the 'Authority Indemnified Persons' may hereafter suffer, or pay by reason of any demands, claims, suits or proceedings arising out of claims of infringement of any domestic or foreign patent rights, copyrights or other intellectual property, proprietary or confidentiality rights with respect to any materials, information, design or process used by the PIA or by the PIA's Contractors in performing the PIA's obligations or in any way incorporated in or related to the Project. If in any such suit, action, claim or proceedings, a temporary restraint order or preliminary injunction is granted, the PIA shall make every reasonable effort, by giving a satisfactory bond or otherwise, to secure the revocation or suspension of the injunction or restraint order. If, in any such suit, action, claim or proceedings, the Project, or any part thereof or comprised therein, is held to constitute an infringement and its use is permanently enjoined, the PIA shall promptly make every reasonable effort to secure for BSNL a license, at no cost to USOF, DoT/BSNL authorizing continued use of the infringing work. If the PIA is unable to secure such license within a reasonable time, the PIA shall, at its own expense, and without impairing the Specifications and Standards, either replace the affected work, or part, or process thereof with non-infringing work or part or process, or modify the same so that it becomes non-infringing.

32.3 **Notice and contest of claims**

In the event that Authority Indemnified Person receives a claim or demand from a third party in respect of which it is entitled to the benefit of an indemnity under this clause it shall notify the PIA within 15 (fifteen) days of receipt of the claim or demand and shall not settle or pay the claim without the prior approval of the Indemnifying Party, which approval shall not be unreasonably withheld or delayed. In the event that the PIA wishes to contest or dispute the claim or demand, it may conduct the proceedings in the name of the BSNL/Dot/USOF subject to the BSNL/Dot/USOF being secured against any costs involved, to its reasonable satisfaction.

32.4 Defence of claims

- 32.4.1 The Authority Indemnified Persons shall have the right, but not the obligation, to contest, defend and litigate any claim, action, suit or proceeding by any third party alleged or asserted against such Party in respect of, resulting from, related to or arising out of any matter for which it is entitled to be indemnified hereunder, and reasonable costs and expenses thereof shall be indemnified by the PIA. If the PIA acknowledges in writing its obligation to indemnify the Authority Indemnified Persons in respect of loss to the full extent provided by this clause, the PIA shall be entitled, at its option, to assume and control the defence of such claim, action, suit or proceeding, liabilities, payments and obligations at its expense and through the counsel of its choice; provided it gives prompt notice of its intention to do so to the Authority Indemnified Persons and reimburses the Authority Indemnified Persons for the reasonable cost and expenses incurred by the Authority Indemnified Persons prior to the assumption by the PIA of such defence. The PIA shall not be entitled to settle or compromise any claim, demand, action, suit or proceeding without the prior written consent of the Authority Indemnified Persons, unless the PIA provides such security to the Authority Indemnified Persons as shall be reasonably required by the Authority Indemnified Persons to secure the loss to be indemnified hereunder to the extent so compromised or settled.
- 32.4.2 If the PIA has exercised its rights under Clause-32.3 above, the Authority Indemnified Persons shall not be entitled to settle or compromise any claim, action, suit or proceeding without the prior written consent of the PIA (which consent shall not be unreasonably withheld or delayed).
- 32.4.3 If the PIA exercises its rights under Clause-32.3 above, the Authority Indemnified Persons shall nevertheless have the right to employ its own counsel, and such counsel may participate in such action, but the fees and expenses of such counsel shall be at the expense of the Authority Indemnified Persons, when and as incurred, unless:
- (a) the employment of counsel by such party has been authorized in writing by the PIA;
 - (b) the Authority Indemnified Persons shall have reasonably concluded that there may be a conflict of interest between the PIA and the Authority Indemnified Persons in the conduct of the defence of such action;
 - (c) the PIA shall not, in fact, have employed independent counsel reasonably satisfactory to the Authority Indemnified Persons, to assume the defence of such action and shall have been so notified by the Authority Indemnified Persons; or
 - (d) the Authority Indemnified Persons shall have reasonably concluded and specifically notified the PIA either:
 - i. that there may be specific defences available to it which are different from or additional to those available to the PIA; or
 - ii. that such claim, action, suit or proceeding involves or could have a material adverse effect upon it beyond the scope of this Contract.

Provided that if Sub-clauses (b), (c) or (d) of this Clause-32.4.3 shall be applicable, the counsel for the Authority Indemnified Persons shall have the right to direct the defence of such claim, demand, action, suit or proceeding on behalf of the Authority Indemnified Persons, and the reasonable fees and disbursements of such counsel shall constitute legal or other expenses hereunder.

32.5 No consequential claims

Notwithstanding anything to the contrary contained in this clause, the indemnities herein provided shall not include any claim or recovery in respect of any cost, expense, loss or damage of an indirect, incidental or consequential nature, including loss of profit, except as expressly provided in this Contract.

32.6 Limitation of Liability

Notwithstanding anything to the contrary in this Contract, the liability of the PIA towards the Authority Indemnified Persons for any damages or compensation of any nature whatsoever under this Contract, shall not exceed Total cost of Project awarded to PIA. For the avoidance of doubt, the limitation hereunder shall not apply to any or all liabilities in respect of third parties. The Parties agree that the PIA's liability will be uncapped in case of any liabilities arising due to:

- (a) any amount payable as indemnity to USOF, DoT/ BSNL due to its acts or omissions or fraud, gross negligence and willful misconduct;
- (b) breach of any Applicable Laws or any Applicable Permits;
- (c) any claims or loss on account of Intellectual Property rights violation by the PIA;
- (d) any personal bodily injury or death of any person caused by, arising out of or in connection with its performance of this Contract; or
- (e) any loss of or physical damage to property of BSNL, or any third party caused by, arising out of or in connection with the performance of this Contract."

32.7 Survival on Termination

The provisions of this clause shall survive Termination under Clauses 17 and 18 of Section-III: GENERAL (COMMERCIAL) CONDITIONS OF CONTRACT under the RFP.

33. Easements, Permits, Licenses and Other Facilities

33.1 The PIA shall obtain at its own cost, all easements, permits and licenses, required to execute the contract including but not limited to following:

33.1.1 "Right of Way" easements and permits.

33.1.2 Railway, Highway, Forest and other Authorities crossing permits including bridge.

33.1.3 Canal/stream crossing permits.

33.1.4 ROW

PIA shall pay applicable charges against the demand note/ estimate raised by the concerned authorities. PIA shall submit the copies of the proof of payment along with the invoices for reimbursement. *(Amendment No. 6.27.1)*

- 33.2 **No extra charges will be paid to the bidders for pursuance of easements, permits, RoW etc.** from the different local authorities.
- 33.3 The bidder shall be fully responsible for handling and obtaining all necessary easements, permits and licenses, for moving all construction equipment, tools, supplied materials and men across Railways and Highway, across public or private road as well as premises of any public utility within the right of user and for bearing all costs that may be incurred in respect of the same. *(Amendment No. 6.27.2)*
- 33.4 The bidder is to confine his operation to the provided construction “Right of User” unless it has made other arrangement with the particular property owners and /or tenants such other arrangements shall be entirely at the responsibility of the bidder as to cost and arrangement as also breach and claim and shall be entitled with a copy to the Divisional Engineer.
- 33.5 The bidder will not be entitled to extra compensation for hardship and increase in cost by the cable trench being routed adjacent to or across other pipeline, Highway, Railways, telephones or poser poles and wires or guy wires, embankment, cliffs, streams or other obstacles which may physically or otherwise in any manner, restrict or limit the use of the construction “Right of User”. Some construction and such contingency shall be deemed to have been provided for in the rates.
- 33.6 At locations where the optical fiber cable trench is routed across or along railways or roads the bidder shall without extra cost provide and maintain such detours and road controls as are required by the railways or government or local agencies having jurisdiction.

34. Protection of Life and Property and Existing Facilities.

- 34.1 The bidder is fully responsible for taking all possible safety precaution during preparation for and actual performance of the works and for keeping the construction site in a reasonable safe condition. The bidder shall protect all life and property from damage or losses resulting from his construction operations and shall minimize the disturbance and inconvenience to the public.
- 34.2 If the excavation of trench alters the contours of the ground around road and highway crossing in such locations dangerous to traffic, the bidder shall at his own cost, take all necessary precautions to protect public and shall comply with all BSNL regulations as to placing of warning boards (minimum size 3’ x 2’), traffic signals, barricades, flags etc., at such location. If the bidder does not put the warning signal as per above directions, then a penalty of Rs 1000/- per day shall be levied on the bidder, till the directions are complied by the bidder. The bidder shall take due precautions to avoid damages to other pipe lines, water mains, sewers, telephones, telegraphs and power conduits, laid wires poles and guy wires, railways, highways, bridges or other underground or above ground structure and/or property crossing

or adjacent to the cable trench being excavated.

- 34.3 Attention of the bidder is drawn to the rules regarding laying of cables at road crossing, along Railways Bridges, highways safety precautions while working in Public Street as per Engineering Instructions.
- 34.4 The bidder shall be solely responsible for location through approved non-destructive means and ensuring the safety of all existing underground pipeline, electrical cables, and or other structures.
- 34.5 The bidder shall be solely liable for all expense for and in respect of repairs and/or damages occasioned by injury of or damage to such underground and above structures or other properties and undertake to indemnify USOF, DoT/ BSNL from and against all actions, cause of actions, damages, claims and demands what-so-ever, either in law or in equity and all losses and damages and costs (inclusive between attorney and client), charges and expenses in connection therewith and/ or incidental thereto. The bidder shall take all responsibilities and risk in crossing other pipelines and cables and shall be responsible for protecting all such existing pipelines, poles, electric lines, sewers, cables or other facilities from damage by the bidder's operation in connection with the work. The bidder without cost of USOF, DoT/ BSNL shall promptly repair any damage incurred.
- 34.6 The current market value of any commodities lost as a result of any damage to the aforesaid existing facilities shall be paid by the bidder together with such additional sums necessary to liquidate the personal of property damages, resulting there from.

35. Labour Welfare Measures and Workman Compensation

- 35.1 **Obtaining License before commencement of work.** The bidder shall obtain a valid labour license under the Contract Labour (R &A) Act 1970 and the Contract Labour (Regulation and Abolition) Central Rules 1971, before commencement of the work, and continue to have a valid license until the completion of work. The bidder shall also abide by the provisions of the Child Labour (Prohibition and Regulation) Act 1986. Any failure to fulfill this requirement shall attract the penal provisions of the contract arising out of the resultant non-execution of work.
- 35.2 **Bidders Labour Regulations:** The bidder shall ensure compliance of all statutory obligations, viz. payment of wages / salary to the workers engaged by him on regular and timely basis (by 7th every month) and any other amounts including any Statutory Dues, charges, taxes and levies payable as per the relevant statues applicable and subsequent amendment thereof and same should be sole liability of Bidder and USOF, DoT/ BSNL will not be liable in any circumstances whatsoever. The Bidder shall comply with the provisions of Employees State Insurance Act 1948, Workmen's Compensation Act, the Employees Provident Fund (and Family Pension Fund) Act 1952, the Payment of Bonus Act 1963, the Industrial Disputes Act 1947, the Payment of Wages Act, Contract Labour (Regulation & Abolition) Act 1970 with Contract Labour (R&A) 1971 and / or any other rules, regulations and / or statues that may be applicable from time to time or that may be introduced by the Central /State Government

or Municipal / Local Self Government authorities, subsequent to the date of this agreement. Default on this account shall be deemed as sufficient ground for termination of the Agreement. In case of accident arising out of and in the course of this agreement. BSNL as Project Management Agency and USOF, DoT being owner/ Principal Employer will not be responsible for payment of any compensation or under any other law. It will be the sole responsibility of the bidder for payment towards loss or compensation whatsoever.

- 35.3 The person engaged by bidder shall be treated as bidder's own employees and they will claim no privileges from USOF, DoT/ BSNL. The bidder will be directly responsible for administration of his employee as regards their wages, uniforms, general discipline and courteous behavior.
- 36. Insurance:** Without limiting any of his other obligations or liabilities, the bidder shall, at his own expense, take and keep comprehensive insurance including third party risk for the plant, machinery, men, materials etc. brought to the site and for all the work during the execution and Operation & Maintenance. The bidder shall also take out workmen's compensations insurance as required by law and undertake to indemnify and keep indemnified BSNL from and against all manner of claims and demands and losses and damages and cost (including between attorney and client) charges and expenses that may arise in regard the same or that USOF, DoT/ BSNL may suffer or incur with respect to end / or incidental to the same. The bidder shall have to furnish originals and/or attested copies as required by the department of the policies of insurance taken within 15 (fifteen) days of being called upon to do so together with all premium receipts and other papers related thereto which USOF, DoT/ BSNL may require.
- 37. Compliance with Laws and Regulation:** During the performance of the works the bidder shall at his own cost and initiative fully comply with all applicable laws of the land and with any and all applicable by-laws, rules, regulations and orders and any other provisions having the force of law made or promulgated or deemed to be made or promulgated by the Government, Governmental agency or municipal board, Government of other regulatory or Authorized body or persons and shall provide all certificates of compliance therewith as may be required by such applicable law, By-laws, Rules, Regulations, orders and/or provisions. The bidder shall assume full responsibility for the payment of all contributions and pay roll taxes, as to its employees, servants or agents engaged in the performance of the work specified in the bidder documents. If the bidder shall require any assignee or sub-bidder to share any portion of the work to be performed hereunder may be assigned, sub-leased or sub-contracted to comply with the provisions of the clause and in this connection the bidder agrees as to undertake to save and hold USOF, DoT/ BSNL harmless and indemnified from and against any/all penalties, actions, suits, losses and damages, claims and demands and costs (inclusive between attorney and client) charges and expenses whatsoever arising out or occasioned, indirectly or directly, by failure of the bidder or any assignee or sub-bidder to make full and proper compliance with the said by-laws, Rules, Regulations, Laws and Order and provisions as aforesaid.

38. The PIA's Office:

The PIA's office shall be equipped with the following facilities within 7 days from the issue of Work Order:

- (i). Land line / Mobile,
- (ii). E-mail facility with PC

The PIA should have at-least one office in each Business Area of BSNL and one nodal person in each district with above facilities. It may have more than one offices in a district as per the operational need.

Two model letters, appended below (~~stands deleted Amendment No. 22~~)
Model Amendment Letter Intimating Conditions for Extension of Delivery Period
Registered Acknowledgement Due
Address of BSNL

To
M/s
.....

Sub: This office contract no Dated placed on you for supply of
Ref : Your letter no dated

~~You have failed to deliver the services/ goods/ entire quantity of the services/ goods/ execution/ installation/ commissioning of the entire project within the contract delivery period/ delivery period as agreed schedule or last extended up to _____. In your above referred letter, you have asked for extension/ further extension of time for delivery/ execution/ installation/ commissioning. In view of the circumstances stated in your above referred letter, the time of delivery can be extended from _____ (original/ last delivery period) to _____ (presently agreed delivery period) subject to your unconditional acceptance of the following terms and conditions:~~

- ~~1. That, liquidated damages shall be levied in accordance with agreed clause 11.1 & 11.2 Section IV B of terms and conditions of the tender.~~
- ~~2. That, notwithstanding any stipulation in the contract for increase in price on any ground, no such increase, whatsoever, which takes place after zzz shall be admissible on such of the said goods & services as are delivered after the said date as per clause 12 Section III.~~
- ~~3. That, the prices during this extended delivery period shall be provisional and shall be governed as per agreed clauses 12 and 23 of Section III and shall be finalized in accordance with the current PO/WO price or the current PO/WO price with latest budget/ duty impact or the prices in the new tender (T.E. no ____)~~
~~from the date of its opening, on whichever is lower basis.~~
- ~~4. An additional BG of Rs. ____ in accordance with clause 15.3, Section III of the contract with validity up to ____.~~
- ~~5. An undertaking as required vide clause 23, Section III.~~

~~Please intimate your unconditional acceptance of this letter along with the additional BG within ten days of the issue of this letter failing which the contract will be cancelled at your risk and expense without any further reference to you. This letter shall form part and parcel of the agreement/ contract/ APO/ PO and all other terms & conditions of the contract remain unaltered.~~

Yours faithfully,
(.....)
for and on behalf of.....

~~zzz Original delivery date or the last extended/ re-fixed delivery period (as the case may be)~~

~~NB: The entries which are not applicable for the case under consideration are to be deleted.~~

Model Amendment Letter for Extension of Delivery Period

**Registered
Acknowledgement Due**

Address of BSNL

.....
.....

To

M/s

.....

Sub: This office contract no..... Dated placed on you for supply of

.....

Ref : 1. Your letter no..... dated..... requesting DP extension

2. This office letter no. dated..... intimating conditions for DP extension

3. Your letter no..... dated.... accepting the conditions for DP extension

~~You have failed to deliver the services/ goods/ entire quantity of the services/ goods/ execution/ installation/ commissioning of the entire project within the contract delivery period/ delivery period as agreed schedule or last extended up to In your above letter under reference (1), you have asked for extension/ further extension of time for delivery/ execution/ installation/ commissioning. The terms and conditions for extension of delivery period were conveyed to you vide this office letter under reference (2). In view of the circumstances stated in your above referred letter, and upon your unconditional acceptance of the terms and conditions of this extension vide your letter under reference (3), the time of delivery is hereby extended from (last delivery period) to (presently agreed delivery period) on the terms and conditions in letter under reference (2) above and agreed by you vide letter under reference (3) i.e.:~~

~~(a) Liquidated damages shall be levied in accordance with agreed clause 11.1 & 11.2 of Section IV-B of terms and conditions of the tender.~~

~~(b) That, notwithstanding any stipulation in the contract for increase in price on any ground, no such increase, whatsoever, which takes place after zzz shall be admissible on such of the said goods & services as are delivered after the said date as per clause 12 Section III.~~

~~(c) — The prices during this extended delivery period shall be provisional and shall be governed as per clauses 12 and 23 of Section III and shall be finalized in accordance with current PO/WO price or the current PO/WO price with latest budget/ duty impact or the prices in the new tender (T.E. no) from the date of its opening, on whichever is lower basis.~~

~~The letters under reference above and this letter shall form part and parcel of agreement/ contract/ APO/ PO/WO and all other terms & conditions of the contract remain unaltered.~~

Yours faithfully,
(.....)
for and on behalf
of.....

Copy to:-

.....
.....
.....
.....

(All
concer
ned)

~~zzz Original delivery date or the last unconditionally re-fixed delivery date (as the case may be) NB : The entries which are not applicable for the case under consideration are to be deleted.~~

~~PROJECT TIME EXTENSION, IF ANY WILL BE ISSUED BY BSNL~~

SECTION-IV-A: SPECIAL INSTRUCTIONS TO BIDDERS AND SPECIAL CONDITIONS OF CONTRACT

1. The special instructions to bidders and the special conditions of contract shall supplement the 'Instructions to Bidders' as contained in Section II & "General (Commercial) Conditions of Contract" as contained in Section III and **wherever there is a conflict, the provisions herein (Section-IV-A, Section-IV-B & Section-IV-C) shall prevail over those in Section II and Section III.**

2. ELIGIBILITY CONDITIONS

- 2.1 For determining the eligibility of Bidders for submission of Bids hereunder, the following shall apply:

- (a) The Bidder may be a single entity or a group of entities (the "**Consortium**"), coming together to implement the Project. However, any Bidder applying individually or as a member of a Consortium, as the case may be, for a Package, cannot be member of another Bidder applying for the same Package. The term Bidder used herein and, in this RFP, would apply to both a single entity and a Consortium.
- (b) The Bidder or each of the Consortium members should be registered under Companies Act, 1956 or as amended with at least 5 years of operations in India as on Bid Date. A Consortium shall be eligible for consideration subject to the conditions set out in Clause 2.1 and Clause 2.4.
- (c) A Bidder shall not have a conflict of interest (the "**Conflict of Interest**") that affects the Bidding Process for a Package. Any Bidder found to have a Conflict of Interest shall be disqualified. In the event of disqualification, BSNL shall be entitled to blacklist the Bidder from participation in the tendering process for the work of Ministry of Communications / Department of Telecom / any public sector undertaking engaged in Telecom / OFC business in India and any work under other Centrally Sponsored Schemes for a period of one year from the Bid Date and/or forfeit and appropriate the Bid Security or Performance Security, as the case may be, as mutually agreed genuine pre-estimated loss and damage likely to be suffered and incurred by BSNL and not by way of penalty for, *inter alia*, the time, cost and effort of BSNL, including consideration of such Bidder's proposal (the "**Damages**") without prejudice to any other right or remedy that may be available to BSNL under the Bidding Documents or otherwise. Without limiting the generality of the above, a Bidder shall be deemed to have a Conflict of Interest affecting the Bidding Process, if:
 - (i) A constituent of such Bidder, for the Package, is also a constituent of another Bidder, for the Package; or

- (ii) Such Bidder has the same authorized representative for purposes of this Bid as any other Bidder for the same Package; or
- (iii) For the same Package, such Bidder, or any Associate thereof has participated as a consultant to BSNL in the preparation of any documents, design or technical specifications of the Package.

Explanation: In case a Bidder is a Consortium, then the term Bidder as used in this Clause 2.1, shall include each Member of such Consortium.

- (d) The financial Eligibility parameters as mentioned in the Table-A (Sr. No.- 2 & 3) below would be consolidated parameters of the company. *(Amendment No. 6.28)*
- (e) In case of Consortium, the number of bidders including Lead Bidder can be maximum three.
- (f) An ISP/TSP license holder for an LSA shall be ineligible to participate in the package comprising of that LSA.

Following are the common criteria for eligibility for submitting bids against one or more packages in the tender. However, the Bid Security shall be submitted for each package separately which are independent packages for the purpose of tender evaluation. Accordingly, financial bids are to be submitted separately against each package for which bids are submitted.

Table – A (Amendment No. 8 & 19.1)

S N	Qualification Criteria	Supporting Documents
1.	The Bidder or each of the Consortium members should be registered under Indian Companies Act, 1956/ 2013 or Limited Liability Partnership Act, 2008 or as amended; with at least 3 years of operations in India as on Bid submission Date. <i>(Amendment No. 8)</i>	The Bidder or each of the Consortium members: (a) Copy of Certification of Incorporation / Registration Certificate (b) Copy of PAN card (c) Copy of GST Registration <i>(Amendment No. 8)</i>
2.	Financial Capacity: Net Worth: Minimum Net Worth required for a Bidder submitting its Bid for only 1 package shall be as per column-4 of table B at the close of the preceding financial year or subsequent to that. Minimum Net Worth required for a Bidder submitting its Bid for more than 1 package shall be equal to the sum of Net Worth [as per column-4 of Table B], of (i) 100% value for the	The Bidder or Lead Member: Audited financial statements for the last three financial years (2020-21, 2021-22 and 2022-23 or 2021-22, 2022-23 & 2023-24). Unaudited statement if certified by the Statutory Auditor for the year 2023-24 shall also be accepted. Certificate from the Statutory Auditor on net worth details for the financial

S N	Qualification Criteria	Supporting Documents
	highest S. No. of the bid package and (ii) 50% value of the subsequent bid packages <i>(for which bids are submitted)</i>, at the close of the preceding financial year or subsequent to that. In case, the bidder submits bids for more than 4 packages, then the Net Worth shall be equal to the sum of Net Worth [as per column-4 of table B], of (i) 100% value for the highest S. No. of the bid package and (ii) 50% value of the next 3 highest bid packages <i>(for which bids are submitted)</i>, at the close of the preceding financial year or subsequent to that subject to maximum Rs 750 Cr. A bidder having at least 750 Cr Net Worth can bid for any number of packages. Note: In case of Consortium, each member of the consortium should have positive Net Worth. All the consortium partners can meet the Net worth criteria cumulatively. <i>(Amendment No. 8)</i>	year preceding the Bid Date (i.e. 2022-23). <i>(Amendment No. 8)</i>
3.	Financial Capacity: Average annual turnover: Minimum Average annual Turnover of last three Financial Years, required for a Bidder submitting its Bid for only 1 package shall be as per column-5 of Table B. Minimum Average annual Turnover of last three Financial Years for a Bidder submitting its Bid for more than 1 package shall be equal to the sum of Minimum Average Turn Over [as per column-5 of table B], of (i) 100% value for the highest S. No. of the bid package and (ii) 25% value of the subsequent bid packages. In case the bidder submits bids for more than 4 packages, the minimum Average annual Turnover of last three Financial Years, shall be equal to the sum of Minimum Average Turn Over [as per column-5 of table B], of (i) 100% value for the highest S. No. of the bid package and (ii) 25% of	Audited financial statements for the last three financial years (2020-21, 2021-22 & 2022-23 or 2021-22, 2022-23 & 2023-24) from the Statutory Auditor. Unaudited statement if certified by the Statutory Auditor for the year 2023-24 shall also be accepted. <i>(Amendment No. 8)</i>

S N	Qualification Criteria	Supporting Documents
	the next 3 highest bid packages subject to maximum Rs. 3500 Cr. A bidder having at least 3500 Cr Average annual Turnover of last three Financial Years can bid for any number of packages. Note: In case of consortium of two members, at least 50% Average annual Turn Over requirement should be met by the Lead Member. In case of consortium of three members, at least 40% Average annual Turn Over requirement should be met by the Lead Member. Remaining turn over to be met by remaining consortium partners, cumulatively. However, the other members of the consortium should have minimum Rs. 100 Cr average annual turnover during last 3 financial years for category-1 packages, Rs 50 Cr (average annual turnover during last 3 financial years) for category-2 packages and Rs. 100 Cr average annual turnover <u>during last 3 financial years, if participating for both category-1 & Category-2 packages.</u> <i>(Amendment No. 8)</i>	
4.	Technical Capability: The bidder should have executed following projects in the last 10 years within India - (i) EPC OFC Network Construction project consisting of 24 or more core Under Ground OFC, for at least- • 8000 Kms if bidding for 1 package of Category-1; • 10000 Kms if bidding for 1 package of Category-1 and 1 package of Category-2. • 12000 Kms if bidding for 1 package of Category-1 and more than 1 package of Category-2 • 12000 Kms if bidding for more than 1 package of Category-1 and 2000 Kms per additional package of Category-2,	Experience/ Work Completion Certificate in case of EPC project and Satisfactory O&M completion certificate in case of O&M works issued & signed by the PO issuing authority or an authority authorized by the PO issuing authority of the client entity or by Project Implementation Authority along with the Work order/ Purchase Order with the name of contact person, postal address, email id and telephone numbers. <i>(Amendment No. 8)</i>

S N	Qualification Criteria	Supporting Documents
	• 4000 Kms if bidding for 1 package of Category-2, • 2000 Kms additional per package in addition to 4000 Kms, if bidding for more than 1 package of Category-2 subject to maximum 10000 Kms. • In case a bidder is participating both in Category-1 and Category-2 packages, the experience requirement will be cumulative experience as prescribed above subject to maximum 15000 Kms. A bidder having experience of EPC OFC Construction project consisting of 15000 Kms of 24 or more core Underground OFC can participate in all the packages. • The EPC OFC Construction project execution shall consist of both Supply and Construction of OFC Network. AND (ii) Satisfactorily completed the O&M of any OFC network of 24 or more Core Under Ground OFC [upto 40% of the O&M requirement can also be met through O&M of 24 or more core Aerial Fiber Cables (deployed in BharatNet by BBNL or state SPV)/ ADSS/ OPGW OFC for the number of 'Year Kms' (for the network for which O&M has been done for at least one year) at least equal to No. of Kms, as required for EPC Network Construction capability mentioned in para 4(i) above. Year Kms: If O&M of "X" Kms of OFC has been done for "N" years ($N \geq 1$), then 'Year Kms' = "X multiplied by N" AND (iii) Telecommunication equipment installation and commissioning consisting of at least- • 1000 active nodes, if bidding for 1 package of Category-1, • 2000 active nodes, if bidding for more than 1 package of Category-1,	

S N	Qualification Criteria	Supporting Documents
	• 800 active nodes, if bidding for 1 package of Category-2, • 400 active nodes additional per package in addition to 800 active nodes, if bidding for more than 1 package of Category-2 subject to maximum 2000 nodes in case of 4 or more bid packages. • However, a bidder having experience of installation & commissioning consisting of at least 2500 active nodes can participate in all the packages. • The active nodes to be considered for this criterion can be Routers, Layer-3 Switches, BNGs, PTNs/CPANs, DWDM, OLTs of 16 or more ports, enode-B, BTS and OTN. Note-1: The Sole bidder or members of the Consortium, should meet the Technical Capability requirements either on their own or jointly for the works awarded directly by the TSPs, Category-A ISPs, Central Government, State Government, Municipal Corporations for Smart City Projects, BharatNet SPVs, Government Institutions, PSUs for their own network and not sub-contracted works. <u>However, it is clarified that the work experience issued by TSPs to the executing agencies for the USOF/DOT awarded projects shall be accepted.</u> Note-2: Regarding the experience certificate issued to IP-1 Service Provider, the concerned TSP or ISP (Category-A only), has to certify that the TSP/ ISP (Category-A only) has taken fibres on lease from the said IP-1 out of the network constructed using 24 or more fibre Under Ground OFC or ADSS/ OPGW/ Aerial OFC, as the case may be, which should be constructed and owned by the concerned IP-1 Service Provider for at least one completed year. TSP/ ISP (Category-A only) shall also certify the Route KM of OFC with route wise details for which leasing has been done. The	

S N	Qualification Criteria	Supporting Documents
	information may be submitted in the format mentioned in the footnote below. <i>(Amendment No. 23.3)</i> Note-3: However, for installation and commissioning of active nodes, the experience certificate issued by the OEMs for the works awarded by the TSPs to the OEMs shall also be considered. Note-4: If a bidder falls short of the EPC requirement through underground OFC implementation, upto 40% of the EPC requirement can also be met through EPC work of 24 or more core Aerial Fiber Cables (deployed in BharatNet by BBNL or state SPV)/ ADSS/ OPGW OFC. Note-5: For the Hilly Circle packages (Uttarakhand, HP, J&K, NE-1 and NE2), upto 75% of the required experience of EPC construction and/ or O&M can be met through 24 or more core Aerial Fiber Cables (deployed in BharatNet by BBNL or State SPV)/ ADSS/ OPGW OFC also. Note-6: <u>For cumulative experience requirement of 15000 Kms for participation in both Category-1 and Category-2 packages/ all packages, upto 50% of the required experience of EPC construction and/ or O&M can be met through 24 or more core Aerial Fiber Cables (deployed in BharatNet by BBNL or State SPV)/ ADSS/ OPGW OFC also.</u> Note-7: The technical experience of ongoing projects/ partly completed projects shall also be considered if routes/ links are successfully completed end-to-end in such partly completed project. Note-8: If any project has been executed in the consortium, the lead bidder and the consortium partners can use the same project experience for qualification individually, if not participating as the partner of same consortium. If they are	

S N	Qualification Criteria	Supporting Documents
	participating as the consortium partners, then the experience shall be considered only once. However, other than consortium experience, the experience from any type of joint execution, like “teaming agreement, sub-contracting (including any EPC partnerships), backend partnership” shall not be considered. <i>(Amendment No. 23.4)</i> Note-9: The technical experience for work executed in foreign countries for TSPs/ Telcos or Government shall also be considered. <i>(Clarifications dated 17th May’2024)</i> Note-10: The above experience conditions can be met either through single project or multiple projects executed during last 10 years as on date of submission of bid. <i>(whole section except the mentuioned clauses and notes as per Amendment No. 8)</i>	
5.	The Bidder or any of the Consortium members should not be blacklisted/debarred with Ministry of Communication or BSNL or debarring order issued by Department of Expenditure (DOE), Ministry of Finance (MOF) covering all central Ministries/ Departments as per provision of OM No.F.1/20/2018-PPD by Department of Expenditure (DoE), MoF dated on 2nd Nov 2021 as on Bid submission date. <i>(Amendment No. 8)</i>	The Bidder or each of the Consortium members shall submit: An undertaking signed by CEO/ Country Head/ Authorized Signatory of the company to be provided on Non – judicial stamp paper of INR 100/- or such equivalent amount and duly attested by notary public. <i>(Amendment No. 8)</i>
6.	The Bidder or Lead Member should submit valid letter from the OEM against the proposed products confirming the following: OEM shall ensure that all equipment/ components/ sub- components being supplied by them shall be supported for entire contract period. If the same is desupported by the OEM for any reason whatsoever, the bidder shall replace it with an equivalent or better substitute without any additional cost to BSNL and without impacting the performance of the solution in any manner whatsoever. In case replacement with a product from an OEM other than the OEMs proposed	The Bidder or the lead member of the Consortium should submit valid Manufacturer Authorization Form (MAF) from at least one (01) OEM or up to maximum four (04) OEMs for each passive component (all types of OF Cables, Duct, Joint Closures (SJC & BJC), FDMS & FTB) and up to maximum four (04) OEMs for each active component (Routers, RFMS, UPS & Racks). Copy of Technical Specification Evaluation Certificate

S N	Qualification Criteria	Supporting Documents
	by bidder in their bid, prior approval of BSNL will be required. <i>(Amendment No. 19.1.1)</i>	(TSEC), from each OEM of Active and Passive components, shall be enclosed with the bid. TSEC issued against earlier tender (s) of BSNL/BBNL/MTNL/State Government/ Central Government /BharatNet Projects BSNL QA registered QF-103 or Form B issued by TEC for the quoted products shall also be acceptable for eligibility to submit the Bid only. {Bidders may refer the amended QA & testing clause (Amendment#9) for further details} In order to meet the delivery timelines, the successful bidder can procure and supply the material from one or more quoted OEMs in any combination. <i>(Amendment No. 19.1.1)</i>
7	If a bidder has been declared as non-performer in any USOF project(s) such as BharatNet Project and 4G saturation project, on the bid submission date, such bidder shall stand not eligible to submit the bid for this tender. <i>(Amendment No. 8)</i>	A Self-declaration for not being declared as non-performer in any USOF project(s), as per the clause. <i>(Amendment No. 8)</i> A Self-declaration for not being declared as non-performer in any USOF project(s) shall be submitted by all the members, in case of consortium bidder. <i>(Amendment No. 23.1.3)</i>

NOTE:

1. The criteria mentioned in above table for Category-1 is applicable to both sub-categories- 1A & 1B. *(Amendment No. 8)*
2. Regarding Point No.-6 above (in the Table of Eligibility criteria), following shall be acceptable to meet the eligibility for submitting the bid only *(Amendment No. 23.5)*
 - (i) Against the requirement of TSEC/ QF-103 of 48F ribbon type armored OFC (SoR item#4.2), bidders may also submit copy of TSEC of 48 or more Fibre Loose Tube type Armored cable and 48 or more Fibre Ribbon type unarmored cable to meet the eligibility for submitting the bid only. However, the PIA/ OEM shall submit the valid TSEC as per the TEC GR/ Standard No.: TEC 85260:2024 with latest amendment, before supply of the OFC. *(Amendment No. 23.5)*

- (ii) Against the requirement of TSEC/ QF-103 of 6F Aerial OF Drop Cable, bidders may also submit copy of TSEC of 4 or more Fiber Aerial Drop Cable to meet the eligibility for submitting the bid only. **(Amendment No. 23.5)**
- (iii) Against the requirement of TSEC/ QF-103 of UPS (SoR item#11), bidders may also submit copy of previous TSEC of any UPS or any CCU or both to meet the eligibility for submitting the bid only. However, the PIA/ OEM shall submit the valid TSEC as per the Technical Specifications in this RFP, before supply of the UPS. **(Amendment No. 23.5)**
- (iv) For the Armored Optical Fibre Cable for underground application (24F loose tube), latest TEC Standard Number- TEC 85170:2024 shall be applicable. However, bidders may submit copy of TSEC against the earlier TEC GR/ Standard No.- TEC 85170:2011 to meet the eligibility for submitting the bid only. Successful bidders shall obtain TSEC against the latest TEC Standard No. before supplies. **(Amendment No. 23.5)**
- (v) Against the requirement of TSEC/ QF-103 of 24F ADSS Cable, bidders may also submit copy of TSEC/ QF-103 of 24F or more Fiber ADSS Cable to meet the eligibility for submitting the bid only. **(Amendment No. 23.5)**
3. Regarding Note-2 above, bidder shall also submit an undertaking that it will obtain TSEC before commencement of supplies for the project. **(Amendment No. 19.1.2)**
4. In case of any bidder is quoting the active equipment from multiple OEMs (as per point-6 above), in such case the bidder shall ensure that all quoted equipment should meet the Interoperability requirement for smooth network operations. There shall be no exclusion/relaxation in SLA/ penalties on this account. **(Amendment No. 8)**
5. In case the experience of IP-1 service provider is being submitted in the bid, then the concerned IP-1 shall submit the Route-wise details, along with certificate(s) obtained from the respective TSP/ISP-Category A, regarding Fibres leased by IP-1 service provider to them, in the below given format: **(point 5 with below mentioned table as per Amendment No. 24.1)**

Route details (Start-End Solutions)	Route length (in RKM)	Cable size (in terms of number of fibres)	No. of fibres leased to TSP/ISP-A in the route for at least one year	Details of TSP/ISP (Category-A only)	Period of lease	Certificate from TSP/ISP-A Placed at Page No. of bid

The IP-1 shall undertake that

- None of the routes mentioned above have any overlapping lengths
- Only one certificate is submitted for claim of experience against one route even, where fibres may have been leased out to more than one TSPs/ISPs, in the same route.
- If, at any stage, it comes to the notice of the purchaser or it is found on verification, that any of the routes, mentioned above, has been claimed more than once for experience claimed in a package, the bids of all such packages, where such IP-1 involved either as sole bidder or as consortium partner, shall be declared non responsive.

Table B: Qualification Criteria (Amendment No. 4.2)

Category	Package S No.	Package Name	Financial Capacity (Net worth) in Rs Cr	Financial Capacity (Annual Turnover) In Rs Cr
Column 1	Column 2	Column 3	Column 4	Column 5
Category 1A	1	Madhya Pradesh (DNH & DD)	325	2,150
Category 1A	2	Rajasthan	250	1,525
Category 1A	3	UP(E)	350	2,550
Category 1A	4	Karnataka (Goa & Puducherry)	250	1,225
Category 1B	5	Uttarakhand	150	875
Category 1B	6	UP(W)	150	1,050
Category 1B	7	Bihar	150	1,025
Category 1B	8	HP	100	575
Category 2	9	West Bengal & A&N	100	650
Category 2	10	Haryana	75	500
Category 2	11	NER-I (Mizoram, Tripura, Meghalaya)	100	525
Category 2	12	Punjab	125	850
Category 2	13	J&K (Ladakh)	125	650
Category 2	14	Assam	75	400
Category 2	15	NER-II (Arunachal Pradesh, Nagaland, Manipur)	100	650
Category 2	16	Kerala	50	325

2.2 The Bidder shall enclose with its Qualification Bid, to be submitted as per the format at Annexure-V, complete with its Annexes, the following:

Certificate(s) from statutory auditors of the Bidder or its Associates specifying the Net Worth of the Bidder, as at the close of the preceding financial year, annual turnover of the Bidder for last 3 years as at the close of preceding financial year and also specifying that the methodology adopted for calculating such Net Worth conforms to the provisions of this Clause. For the purposes of this RFP, net worth (the “**Net Worth**”) shall mean the aggregate value of the paid-up share capital and all reserves created out of the profits and securities premium account, after deducting the aggregate value of the accumulated losses, deferred expenditure and miscellaneous expenditure not written off, as per the audited balance sheet, but does not include reserves created out of revaluation of assets, write-back of depreciation and amalgamation.

- 2.3 The sole bidder shall submit a Power of Attorney as per the format at Annexure-IX, authorizing the signatory of the Bidder to sign and submit the Bid. *(Amendment No. 6.29)*
- 2.4 In case the Bidder is a Consortium, it shall comply with the following additional requirements: *(Amendment No. 6.30)*
- (i) Number of members in a consortium shall not exceed 3 (three);
 - (ii) subject to the provisions of sub-clause (i) above, the Bid should contain the information required for each member of the Consortium;
 - (iii) Members of the Consortium shall nominate one member as the lead member (the “Lead Member”). The nomination(s) shall be supported by a Power of Attorney, in the format at Annexure-IX.B, signed by all the other Members of the Consortium; *(Amendment No. 6.31)*
 - (iv) the Bid should include a brief description of the roles and responsibilities of individual members, particularly with reference to their obligations;
 - (v) An individual Bidder cannot at the same time be member of a Consortium bidding for the same Package. Further, a member of a particular Bidder Consortium cannot be member of any other Bidder Consortium for the same Package;
 - (vi) The members of the Consortium bidding for the Package shall have entered into a binding Joint Bidding Agreement, substantially in the form specified at Annexure-XII (the “**Joint Bidding Agreement**”), for the purpose of making the Bid and submitting a Bid in the event of being qualified. The Joint Bidding Agreement, to be submitted along with the Bid, shall, *inter alia*:
 - (i) clearly mention the name of Lead Member, other members and proposed roles and responsibilities, if any, of each member;
 - (ii) include the commitment that each of the members, whose experience will be evaluated for the purposes of this RFP, shall discharge the obligations specified by the Bidder; *(Amendment No. 6.32)*
 - (iii) include a statement to the effect that all members of the Consortium shall be liable jointly and severally for all obligations of the consortium in relation to the Project until the Appointed Date is achieved in accordance with the contract;
 - (iv) include a provision that the Lead Member shall represent all the members of the Consortium and shall at all times be liable and responsible for discharging the functions and obligations of the Consortium; and that each member of the Consortium shall be bound by any decision, communication, notice, action or inaction of the Lead Member on any matter related to the Contract Agreement and BSNL shall be entitled to rely upon any such action, decision or communication of the Lead Member. BSNL shall have the right to release payments solely to the Lead

Member and shall not in any manner be responsible or liable for the inter se allocation of payments among members of the Consortium.

- (v) Except as provided under this RFP and the Bidding Documents, there shall not be any amendment to the Joint Bidding Agreement without the prior written consent of BSNL.

2.5 The following conditions shall be adhered to while submitting a Bid:

- (a) Bidders should attach clearly marked and referenced continuation sheets in the event that the space provided in the prescribed forms in the Annexes is insufficient. Alternatively, Bidders may format the prescribed forms making due provision for incorporation of the requested information;
- (b) information supplied by a Bidder (or other constituent Member if the Bidder is a Consortium) must apply to the Bidder, Member or Associate named in the Bid and not, unless specifically requested, to other associated companies or firms;
- (c) in responding to the qualification submissions, Bidders should demonstrate their capabilities in accordance with the provisions of this RFP;
- (d) in case the Bidder is a Consortium, each Member should satisfy the qualification requirements to the extent specified herein.

2.6 Notwithstanding anything to the contrary contained herein, in the event that the Bid Date falls within 3 (three) months of the closing of the latest financial year of a Bidder, it shall ignore such financial year for the purposes of its Bid and furnish all its information and certification with reference to the 3 (three) years preceding its latest financial year. For the avoidance of doubt, financial year shall, for the purposes of a Bid hereunder, mean the accounting year followed by the Bidder in the course of its normal business.

2.7 A Bidder shall be liable for disqualification and forfeiture of Bid Security if any legal, financial or technical adviser of BSNL in relation to the Project is engaged by the Bidder, its Members or any Associate thereof, as the case may be, in any manner for matters related to or incidental to such Project during the Bidding Process or subsequent to the (i) issue of the LOA or (ii) execution of the Contract Agreement. In the event any such adviser is engaged by the Selected Bidder, as the case may be, after issue of the LOA or execution of the Contract Agreement for matters related or incidental to the Project, then notwithstanding anything to the contrary contained herein or in the LOA or the Contract Agreement and without prejudice to any other right or remedy of BSNL, including the forfeiture and appropriation of the Bid Security or Performance Security, which BSNL may have thereunder or otherwise, the LOA or the Contract Agreement, as the case may be, shall be liable to be terminated without BSNL being liable in any manner whatsoever to the Selected Bidder or PIA for the same. For the avoidance of doubt, this disqualification shall not apply where such adviser was engaged by the Bidder, its Member or Associate in the past but its assignment expired

or was terminated at least 30 (thirty) days prior to the Bid Date. Nor will this disqualification apply where such adviser is engaged after a period of 3 (three) years from the Bid Date.

2.8 Any award of the contract pursuant to this RFP shall be subject to the terms of Bidding Documents.

2.9 Change in role of Consortium Members

- (a) By submitting the Bid, the Bidder acknowledges that it will be qualified on the basis of Financial Capacity and Technical Capability of the Consortium Members who shall discharge their obligation as specified in the Bid.
- (b) By submitting the Bid, the Bidder shall also be deemed to have acknowledged and agreed that in the event of a change in the role of the Lead Member and Consortium Member whose Financial Capacity and Technical Capability was taken into consideration for the purposes of qualification under and in accordance with this RFP, the Bidder shall be deemed to have the knowledge of the same and shall inform BSNL forthwith along with all relevant particulars about the same and BSNL may, in its sole discretion, disqualify the Bidder or withdraw the LOA from the Selected Bidder, as the case may be. In the event such change in control occurs after signing of the Agreement but prior to sign off of the project, it would, notwithstanding anything to the contrary contained in the Agreement, be deemed to be a breach of the Agreement, and the same shall be liable to be terminated without the competent authority being liable in any manner whatsoever to the Bidder. In such an event, notwithstanding anything to the contrary contained in the Agreement, the competent authority shall be entitled to forfeit and appropriate the Bid Security and Performance Security, as the case may be, as damages, without prejudice to any other right or remedy that may be available to the competent authority under the Bidding Documents and / or the Agreement or otherwise.

2.10 Public Procurement (Preference to Make in India):

- (i) In accordance to guidelines of GoI issued vide No. P-45021/2/2017-PP(B.E.-II) dated 16th September, 2020, No. P-45021/102/2019-BE-II- (part(I) (E-50310) dated 04.03.2021 and **Department of Telecommunications Gazette notification dated 29th August 2018 along with** instructions as amended from time to time by Govt. of India, in order to encourage make in India and promote manufacturing and production of goods and services in India, preference will be given to domestically manufactured equipment envisaged to be procured through this tender. A copy of the aforesaid Notifications/ Guidelines/ Amendments can be downloaded from Department of Promotion of Industry and Internal Trade website i.e. URL www.dipp.gov.in. Purchase preference for domestic manufacturer, methodology of its implementation, value addition to be achieved by domestic manufacturers, self-certification and compliance and monitoring shall be as per the aforesaid Guidelines/ Notifications. The Guidelines may be treated as an integral part of the tender document. *(Amendment No. 6.34.1)*

- (ii) As per aforementioned guidelines there shall be three categories for manufacturers/ suppliers:
- (a) Class-I Local Supplier: A supplier or service provider whose goods, services or works offered for procurement meets minimum 'Local Content' of 50%.
 - (b) Class-II Local Supplier: A supplier or service provider whose goods, services and works offered for procurement meets minimum 'Local Content' of 20% but less than 50%.
 - (c) Non-Local Supplier: A supplier or service provider whose goods, services and works offered for procurement has 'Local Content' less than 20%.
- (iii) The Local Content shall mean the amount of value added in India which shall be the total value of item procured (excluding net domestic indirect taxes) minus the value of imported content in the item (including all custom duties) as a proportion of the total value, in percent. DPIIT letter dated 16.09.2020 & 04.03.2021 shall be referred for calculation of Local Content of bid.
- (iv) It is mandatory for the bidder to submit a self-certification as per proforma in **Annexure-VI (Part-A) and an undertaking in Annexure-VI (Part-B)**, along with the bid that the items (Excluding Services (I&C) and AMC value) offered as package in this tender meets the minimum local content and shall give details of the locations at which the local value addition is made. In addition, such bidder is also required to provide a certificate from the statutory auditor or cost auditor of the company giving the percentage of local content in accordance to DPIIT letter dated 16.09.2020 & 04.03.2021. Furnishing of false information on this account shall attract penal provisions as per the Guidelines/ Notification. Bidders may note that whereas BSNL may at its discretion choose to randomly verify any of the documents submitted towards fulfilment of claims of PMI under this clause, it is under no obligation to verify the self-declaration of bidder and/or certificate of Chartered Accountant/Cost Accountant regarding the bidder meeting the criteria to be eligible for class I / class II status in this tender. Mere acceptance of the documents furnished by the bidder as part of the bid by BSNL in this regard shall not amount to endorsement of their content by BSNL, and consequences of false declarations if any, discovered at any stage before or after award of work shall completely fall on the bidder.

All instructions/ amendments on the subject of PMI issued by DPIIT or any other department of Government of India, up to the date of bid shall be applicable for this tender, and bidders claiming any benefits under subject provisions must ensure full compliance by furnishing the necessary documents, beyond the list of documents mentioned in this tender. (*Amendment No. 6.34.2*)

2.11 Annexure-VI (Part-A) and an undertaking in Annexure-VI (Part-B) are enclosed at Appendix-1 of this Amendment (#6) Conditions for Field Trial of the Class I/ Class II local suppliers for routers;

- (i) The offered Make-Model for Block Router and GP Routers can be from same OEM or different OEM. However, the same or its earlier version should have been supplied for minimum 30% of required quantities for the package, subject to maximum 2000.
- (ii) In case of Class-I & Class-II local suppliers (as per prevalent DPIIT, GoI guidelines mentioned in Clause-2.10 of Section-IV-A), the offered Make-Model for Block Router and GP Routers or its earlier version should have been supplied for minimum 10% of required quantities for the package subject to maximum 600.
- (iii) In case, a bidder quotes a router model (OEM-1) of a Class I/ II local supplier (as defined in the DPIIT guidelines mentioned in Para-2.10.(i) above), which does not meet the criteria as defined in para 2.11(ii) above, it must also quote another model (OEM-2) of some other OEM meeting the above required criteria.
- (iv) The PIA shall have to offer the router model (OEM-1) for field trial to BSNL within 60 days of the APO/AWO date. The Field trial is mandatory and must be successfully completed within 150 days of the APO/AWO date.
- (v) The Field trial shall consist of one ring in a block with Router category A and minimum 9 GP routers with mix of Category C and Category-D routers at GPs. The other ring shall be in different block with Category B router at the Block and minimum 9 GPs with mix of Category C and Category D routers at GP. Logical ring shall be created using multiple fibres on the same route, if a physical ring is not possible.
- (vi) In case, the Field trial for any category is not completed successfully within 150 days of the APO/AWO, the PIA must provide all the routers from OEM-2 for that category.
- (vii) No relaxation in this shall be given and any delay in achieving the milestone shall attract penalties as per the provision of the tender.
- (viii) The PIA shall submit the Field Trial test schedule; covering all the technical specifications as per the tender; to BSNL for approval.

2.12 The TSEC and field trial shall not absolve the PIA for offering the individual equipment for acceptance testing after installation.

2.13 Being a turn-key project, the responsibility of the PIA shall be to meet all the performance parameters, functional requirements and SLA benchmarks during the entire contract period. In case, the router or any other equipment does not meet these requirements during Acceptance Testing and/ or O&M period, the PIA shall be bound to replace such equipment with appropriate equipment meeting all the requirements specified in the tender for entire contract period on its own cost.

2.14 Any bidder from a country which shares land border with India will be eligible to bid if the bidder is registered with the competent authority as specified in Annexure-I of O.M. No. 7/10/2021-PPD(1) Dated 23.02.2023 from Department of Expenditure, Ministry of Finance. The bidders shall submit an undertaking in this regard as per format provided at **Annexure VII**, of this tender document.

- 2.15** The Mandatory Testing and Certification of Telecom Equipment (MTCTE) guidelines require that every telecom equipment must undergo mandatory testing and certification prior to sale, import or use in India.

The supplied products under this project shall meet the extant guidelines on MTCTE issued by TEC from time to time for various telecom equipment. *(Amendment No. 6.35.1)*

- 2.16** The instructions regarding supply of 'Trusted products' as mandated by DoT vide File no-20-271/2010 AS-I (Vol-III) dated 10.3.2021, along with its amendments, issued from time to time, shall have to be complied for this tender. The bidder/ OEM shall not be in the notified list of designated sources, from whom no procurement can be done, as per above letter. *(Amendment No. 19.2)*

Routers and RFMS, to be supplied under this tender, should comply "Trusted Products" before delivery. In case, the make/ model is not approved as "Trusted Product", then, the bidder/ OEM shall obtain the approval for the tendered products from the designated office. *(Amendment No. 19.2)*

Alternatively, the bidders can provide all documents/ information to BSNL for application on trusted portal, in their technical bid. The format for submission of information (to be submitted with technical bid) is enclosed at Annexure-XIV (APPENDIX-3 of Amendment # 6 dated 08.05.24)). *(Amendment No. 19.2)*

- 2.17** In case of imported products, OEM should have a registered office and Service Support Centre in India to provide after sales service support in India.

The bidder is required to submit a certificate to this effect, as part of its bid.

3. BID SECURITY

- 3.1** The bidder shall furnish Bid Security of an amount of Rs. 20 Cr per package of Category 1 (both 1A & 1B) and Rs. 10 Cr per Package of Category 2 along with Tender. However, the bidder needs to deposit only Rs 60 Cr as Bid Security for participating in 4 or more packages. Bid Security shall be in the form of Bank Guarantee (in the proforma given at Section- VIII.A) from any Scheduled Bank other than Gramin Bank & Cooperative Banks OR in the form of Insurance Surety Bond (in the proforma given in Section-VIII.B).

Bid Security in original shall be submitted offline within 5 days after bid submission end date, as per instructions regarding offline submissions mentioned in Section-I-A. Scanned copy of the same shall be mandatorily uploaded along with the other required documents in the technical bid part of Tender bid. *(Amendment No. 6.33)*

- 4.** The documents comprising the Bid shall include:

4.1 Qualification Bid

4.1.1 Bid Form in the prescribed format (Section-VI)

4.1.2 Bid Security in the form of Bank Guarantee or in the format of Insurance Surety Bond

(Section-VIII- (i) & (ii))

- 4.1.3 Power of Attorney for signing the Bid as per the format at Annexure-IX;
- 4.1.4 Integrity Pact as per the format at Section XIV
- 4.1.5 Online payment receipt towards the cost of the Bidding Documents;
- 4.1.6 Memorandum and Articles of Association, if the Bidder is a body corporate, and if a partnership then a copy of its partnership deed;
- 4.1.7 Bidder's duly audited balance sheet and profit and loss account for the preceding three years indicating turn over. Provisional statements, in case of preceding year certified by Chartered Accountant shall be accepted, if audited statements are not published;
- 4.1.8 Copies of the Work orders/ Agreements/ Contract issued by the customer and Satisfactory Service/ Performance Certificate from the Customer.
- 4.1.9 EPF/ESIC/Labour Department/GST Registration Certificates
- 4.1.10 Chartered Accountant (CA) Certificate on Net worth as on 31st Mar 2023 with CA's Registration Number and Seal.
- 4.1.11 Undertaking that the Bidder or any of the Consortium members is not blacklisted/debarred with Ministry of Communication or BSNL or debarring order issued by Department of Expenditure (DOE), Ministry of Finance (MOF) covering all central Ministries/ Departments as on Bid submission date (Section-XII)
- 4.1.12 Undertaking for clause by clause compliance and Nil deviation.
- 4.1.13 List of all Directors including their name(s), Director Identification Number(s) (DIN) and address (es) along with contact telephone numbers of office and residence.
- 4.1.14 Certificates from all Directors of the bidder stating that none of their near relatives are working in BSNL in accordance with clause 34 of Section-II.

4.2 Financial Bid

- 4.2.1 Financial Bid in the prescribed format – Section VII.

5. Evaluation Criteria and Number of Successful Bidders

- 5.1 Packages are numbered based on estimated Route Kilometers (RKM) i.e. package with highest estimated RKM is numbered as 1 and other packages are numbered in descending order of estimated RKM. There may be changes in RKM after bid submission due to survey, operation, changes in scope and policy reasons. Such changes shall not have any impact on category and ranking of the packages as mentioned in the tender.
- 5.2 Any bidder may bid in one or more packages or even for all the packages.
- 5.3 BSNL shall determine whether each Qualification (Techno-commercial) Bid is responsive to the requirements of the tender in respect of participated packages. A Qualification (Techno-

commercial) Bid shall be considered responsive if it is found to be complete as per the requirement of the tender, is unconditional and is accompanied by all the required documents.

- 5.4 The financial bids of only those bidders shall be opened which are found to be responsive for participated packages.
- 5.5 For the purpose of ordering against this tender, BSNL intends to limit the number of technically and commercially responsive bidders to One (1) in each package from the list of such bidders arranged in increasing order of their evaluated prices in the respective package starting from the lowest. Among all technically & commercially qualified bids in the respective packages, the lowest evaluated price will be termed as L1 price and the bidder quoting L1 price as L1 bidder.
- 5.6 Any bidder can get maximum one (01) package from Category-1A; maximum two (02) packages from Category-1 (i.e. categories- 1A & 1B combined). Maximum four (04) Packages overall (i.e. Category 1A, 1B & 2 combined).
- 5.7 The condition related to allotment of maximum number of packages as mentioned in Para-5.6 above shall also be applicable to such bidders having any common Directors/ Partners including the consortium partners.

The aforesaid condition of package allotment shall be applicable on the basis of a company in any capacity of bidder i.e. either sole bidder or lead bidder or any of the consortium members. If any company (say M/s "ABC") becomes successful in category wise maximum number of packages either as a sole bidder or lead bidder/ member of a consortium, the financial bids in subsequent packages shall not be opened where M/s "ABC" is a sole bidder or lead bidder/ member of a consortium. *(Amendment No. 6.36)*

- 5.8 Separate package wise e-tenders will be called. However, in order to avoid replication of efforts by bidder, participating in more than one packages, the Bidder will be required to upload all documents for meeting all eligibility criteria (cumulatively) and other documents required to substantiate his technical qualification for all the participated packages & agreement with the terms & conditions of tender only once i.e. in the e-tender for the package with highest rank. In other participated e-tenders, bidder will only upload a declaration for the packages participated and for considering all the documents (except EMD & Bid Form and any other document which is specific to that package) as uploaded in the package with highest rank towards eligibility criteria and other documents required to substantiate his technical qualification for that package.
- 5.9 The technical bid of all packages will be opened but the financial bids of participated packages (for which technically responsive) will be opened one by one in the order of Package Serial number (As per Table-A in Section-I), starting with package serial number-1. For next package serial number; the financial bid of any bidder, who has already become successful in number of packages as per limit mentioned in clause-5.6 above, shall not be opened. For

achieving this on CPPP e-tender system, such bidders who are not to be considered further for financial bid opening shall be indicated as “non-responsive” even though such bidders would have been techno-commercially responsive.

- 5.10 The upper limit of packages to be awarded will not be applicable on a bidder, who has already been finalized for maximum allowed packages, if there is only single bid of such bidder in a subsequent package or all the bidders of such package have already become L1 in maximum number of allowed packages or the PIA is not finalized in that subsequent package, for whatsoever reasons. In such case, the financial bid(s) of such bidder(s) shall be opened and lowest bid shall be declared L-1 for the package and the work of this package may also be awarded to this bidder, who will be liable to accept work of this package at finalized rates.
- 5.11 If a bidder's eligibility credentials fall short of the requirement of the participated packages, it's eligibility for subsequent lower ranked packages shall be decided after reducing the concerned eligibility parameters, by the amounts of bidder's aforesaid credentials, already utilized for becoming eligible for such package(s).

Illustration *(An illustration is inserted below as per Amendment No. 23.10)*

All the technical bids, received in the tender, shall be opened and evaluated for all the packages. The technical bids for a bidder shall be evaluated in the order of package serial numbers, starting from Package-1. While evaluating the technical bids, the package wise technical experience and financial capacity of a bidder shall be taken as consumed, before evaluating its bids for next package. Thus, the bid in the next package shall be evaluated only if sufficient technical experience and financial capacity is left available and shall be considered responsive, if the bid meets all the eligibility requirements.

The information regarding total turnover and total technical experience of each consortium member along with turnover and technical experience to be consumed against a particular package (out of total turnover & experience) shall be provided by the bidders along with the undertaking in the Bid Form (Section-VI).

In case of any conflict in information provided by the bidder in the Annexure of the Bid Form, evaluation shall be done, as given in the following illustration:

The criteria for evaluation where multiple bidders submit their bids in consortiums, is explained in following illustration:

If a company is consortium partner in multiple consortiums, then each consortium will be considered as a separate bidder and both technical and financial qualifying requirement shall first be taken into consideration in the Consortium participating in Package 1 and then subsequent packages. The remaining qualifying parameters shall be considered for subsequent consortiums.

If a company is part of only one consortium, then its full eligibility parameters shall be used and balance requirement shall be met from the company which is partner in multiple consortiums. In case both the companies are consortium partners in more than one consortium, the eligibility requirements shall be used on proportionate basis.

A. Experience criteria

Suppose a company A has experience of 15000 Kms, a company B has experience of 5000 Kms, a Company C has 1000 Kms experience and a Company D has 1000 Kms experience.

Scenario-1 (only one consortium partner has formed different consortium for different package):

In scenario-1 type of cases (decided after opening of all package technical bids), the capacity of the company (bidding in different consortium) will not be counted in the first (higher rank package) consortium, till other consortium partner are able to meet out the eligibility criteria.

A has formed two consortiums X and Y with B and C respectively i.e. $X = A+B$ and $Y = A+C$.

Now suppose X participates in Packages 1,3,5,7,9,11,13,15 and Y participates in Packages 2,4,6,8,10,12,14,16.

Then first the eligibility of the Consortium participating in package-1 will be determined which is $12000+2000*4=20000$ Kms subject to max 15000 Kms to participate in pkg no 1,3,5,7,9,11,13,15.

Therefore, the remaining eligibility for Consortium Y shall be only $15000+5000-15000$ as derived from consortium X + C (1000) =6000 (Also as this is not more than experience of company B <5000> + C <1000>, so consortium Y will be restricted to experience of 6000 Km only) which means the bid of Consortium Y shall be opened only for the first two packages of Category 2 i.e. Package 10 and 12 only.

Scenario-2 (more than one consortium partner has formed different consortiums for different package):

In scenario-2 type of cases (decided after opening of all package technical bids), the capacity of all the consortium partners (as more than one company of the consortium is bidding in different consortiums) will be counted proportionately in each package (starting from higher ranked package).

A has formed two consortiums X and Y with B and C respectively i.e. $X=A+B$ and $Y=A+C$. While B has also formed a consortium Z with D i.e. $Z=B+D$

Now suppose X participates in Packages 1, 3,5,7,9,11,13,15 and Y participates in Packages 2,4,6,8,10,12,14,16 and Z participates in packages 4&14.

Then first the eligibility of the Consortium X participating in package 1 will be determined which is $12000+2000*4=20000$ Kms subject to max 15000 Kms to participate in pkg no 1,3,5,7,9,11,13,15. The consumed experience parameters in this case for A & B shall be $15000*(15000/20000) = 11250$ Kms and $5000*(15000/20000) = 3750$ Kms respectively. Therefore, the remaining eligibility for Consortium Y shall be only $(15000-11250) + 1000 = 4750$ Kms which means the bid of Consortium Y shall be opened only for the first package of Category 2 i.e. Package 10 only and the remaining eligibility for Consortium Z shall be only $(5000-3750) + 1000 = 2250$ Kms only and the bid of Consortium Z shall be opened only for the first package of Category 2 i.e. package 14 only.

B. Financial criteria

The financial eligibility shall also be worked out on similar lines. However, Lead and other member(s) of a consortium bidder shall first meet the minimum requirement of turnover as defined at Sr. No.-3 of the Table-A of Eligibility criteria (Section-IV-A)

6. BSNL reserves the right to blacklist a bidder for a suitable period in case he fails to honour his bid without sufficient ground.
7. BSNL reserves the right to offer counter offer price(s) against the price(s) quoted by any bidder.
8. **Clarifications:** The bidders may seek clarifications prior to the last date and time of seeking clarifications through E-mail. The template for seeking clarifications through email is enclosed. The bidder may submit queries in the specified template in .xlsx format and send the email to <<<_mohammad@bsnl.co.in & sanjay.vatsa@bsnl.co.in>>>. Queries received in any other format or sent to any other email id or received after the last date and time of seeking clarifications, as specified in Detailed Notice Inviting tender clause17, will not be addressed by BSNL. As this is an Electronic Tender, so queries received in physical form / hard copy / letter format etc. will not be considered by BSNL. The clarifications should be sought for commercial conditions and technical conditions separately. The clarifications sought without any mention of the clauses of the tender document/ clause no of GR(s) may not be considered.

Template of seeking clarifications from BSNL

<i>S. No.</i>	<i>Section No.</i>	<i>Clause No.</i>	<i>Page No.</i>	<i>Brief Description of the Clause</i>	<i>Query Submitted By (Company Name)</i>	<i>Query / Clarification sought for</i>

Hint for filling the template:

- i. S. No. Fill 1, 2, 3, in serial order for each query
- ii. Section No. Fill Section No. in Roman e.g. I, II, III, IV, V, VI, VII, VIII, IX, X or XI
- iii. Clause No. Fill exact clause No. e.g. II.1 (a), III.1.1, IV.B.1 (i) (a)
- iv. Page No. Fill Page No. of the clause as printed on the tender document
- v. Query Submitted by (Company Name) Name of the company seeking clarification
- vi. Query / Clarification sought for Brief Query of the bidder.
- vii. Only one query may be sought in one row. Please use separate rows for each

query even if the queries are related to same clause.

9. Any clarification and amendment, if any, issued by BSNL in response to any query raised by prospective bidders or otherwise shall form an integral part of Bid Documents.
10. The bidder must comply with all tender conditions. Clause by Clause compliance for the tender document shall be submitted by the bidder along with the No deviation certificate. Every page of the same shall be signed and written as complied against each clause. The copy of the clarifications/ corrigendum shall also be submitted by the bidder duly signed on every page along with compliance against each clause. [Section wise NIL deviation statement with declaration "Fully complied without deviation" shall also be acceptable. Similarly, a NIL deviation to all clarifications & amendments issued, with statement "Fully complied without deviation" shall be submitted by the bidders\).](#) (*Amendment No.23.1.2*)
11. The Bid shall be liable to be rejected, if any of the above clauses are not complied by the bidder.
12. This tender is governed with the integrity pact, Performa is attached as Section XIV.

SECTION-IV-B: SPECIAL (COMMERCIAL) CONDITIONS OF CONTRACT (SCC)

1. Project Background

BharatNet is a project funded by Universal Service Obligation Fund (USOF), Department of Telecommunications (DoT), with an aim to provide high speed broadband connectivity to all inhabited Gram Panchayats (GPs), villages across India. The network infrastructure under this project shall be a national asset and accessible on a non-discriminatory basis to all eligible service providers to enable them to provide services in rural areas.

1.1. Phase I – Network Implementation

- a) The implementation was done under Central Public Sector Units (CPSU) led model by BSNL, PGCIL and RailTel.
- b) Under this implementation model, the network infrastructure was deployed by leveraging BSNL's existing Optical Fibre Cable (OFC) from Block to Fibre Point of Interconnect (FPOI) and laying incremental underground OFC from FPOI to GP location.
- c) The network architecture was based on linear topology where GPON based electronics infrastructure was deployed across Block and GP location for middle mile network connectivity.

1.2. Phase II – Network Implementation

- a) The project is presently being implemented under different models such as CPSU, BBNL and State-led model.
- b) Under this implementation model, the connectivity is being done by laying end to end OFC from Block to GPs location.
- c) CPSU and BBNL led model: - The network architecture was based on linear topology where GPON based electronics infrastructure was deployed across Block and GP location for network mid-haul connectivity
- d) State led model: - The network architecture based on GPON (linear topology for three states) and IP-MPLS (ring topology for five states) based electronics infrastructure was deployed across Block and GP location for network mid-haul connectivity.
- e) Mix of media – aerial and underground fibre, Satellite and Radio has been used with more than 5% of the Phase II GPs, villages connected on Satellite, mainly in North-East/ hilly Region.

2. Scope of the Work

To implement the middle-mile network for BharatNet program across selected Packages as per Table-A of Section- I consisting of

2.1 Construction: To build network infrastructure across remaining Gram Panchayat (GP) and Block locations.

2.2 Upgradation: To upgrade the existing network infrastructure from linear to ring topology across GPs and Block locations.

- 2.3 Operation and Maintenance: To operate and maintain the existing and the newly deployed network infrastructure as per the defined SLA.**
- 2.4 Establishment of State NoC : To establish NoC , to connect the complete network installed or maintained by the PIA for monitoring , supervision and O&M to meet the SLAs**
- 2.5 Network and Service Provisioning: To enable retail, enterprise and wholesale services as per the requirement of BSNL across the Contract Period.**

The scope of work for the Project Implementation Agency (PIA) shall cover across the defined 'Packages' as per the details in Section-V (Schedule of Requirement). It is to be noted that number of Gram Panchayats (GPs) in a Package as mentioned in Section-V is indicative, and PIA shall undertake the Scope of Work across all Gram Panchayats (GPs) identified post survey and approved by BSNL.

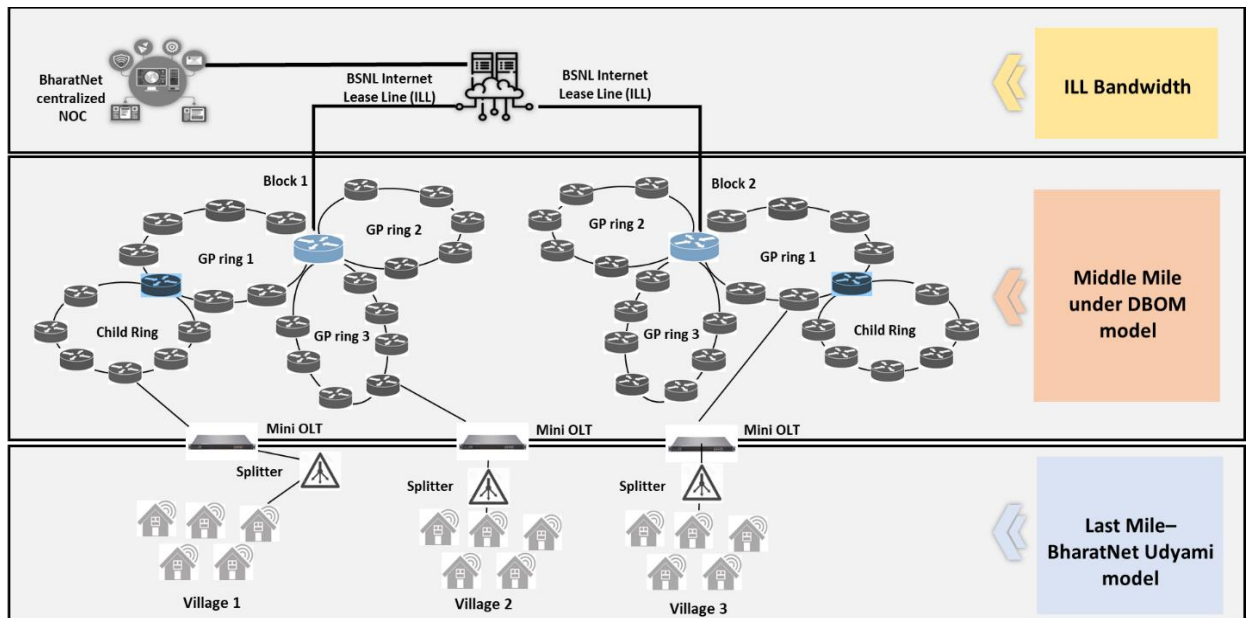
3. Detailed Scope of Work:

3.1. Construction and Upgradation of the Network

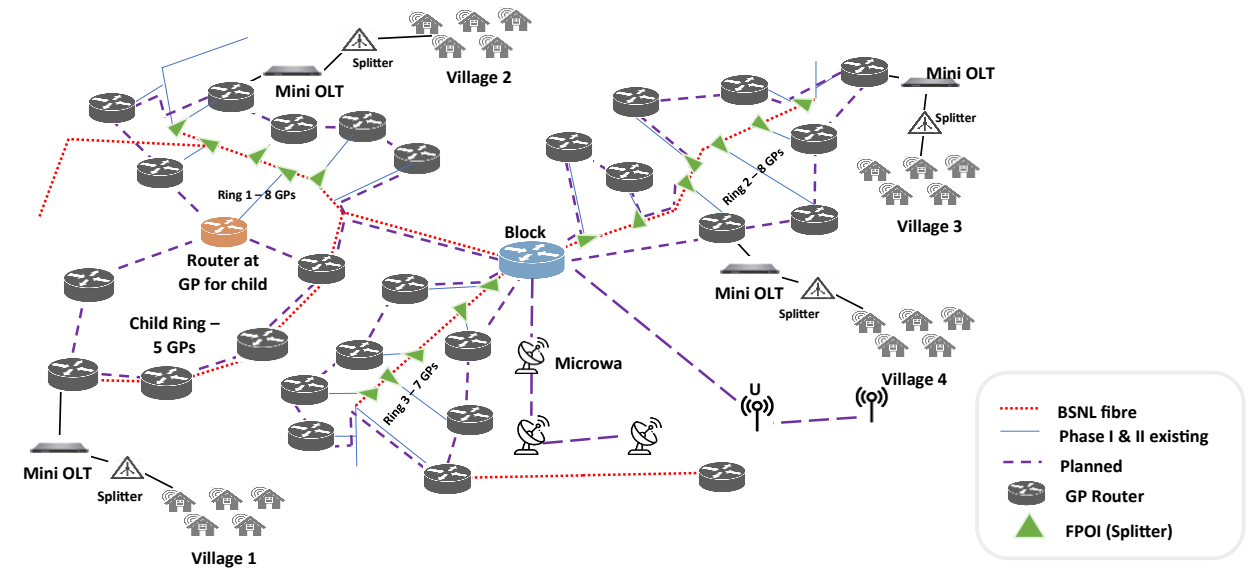
3.1.1. Ring architecture using IP-MPLS:

Project Implementation Agency (PIA) shall be responsible for survey, planning, design, supply, installation, end-to-end integration, and commissioning of newly deployed and upgradation of existing network infrastructure including Optical Fibre Cable (OFC) network (underground and aerial). Primarily, the PIA shall plan OFC construction through Underground laying. However, wherever, the same is not possible, the next alternative shall be ADSS OFC laying preferably using existing electricity infrastructure. The same shall be approved by BSNL based on recommendation of IE with appropriate justification and constraints for underground laying. In case it is not feasible to lay the OFC (either underground or ADSS), the PIA shall represent the same to the IE. The IE after verifying with the field conditions shall submit the same to BSNL. BSNL will take a final decision for deployment of alternate technology to connect such GPs based on the recommendation of IE and/or its field unit report. However, post n/w integration, the FLM of such GPs shall also be the responsibility of the PIA including its integration with State- Network Operation Centre (S-NOC). The PIA shall be responsible for connectivity across all Gram Panchayat (GP) in accordance with Section-V (Schedule of Requirement) and ensure upgradation of the existing network infrastructure into ring topology with IP-MPLS network. The GPs already connected on Satellite media under BharatNet Phase-II project shall also be planned for connectivity on OFC network. The PIA shall deploy new network infrastructure in BharatNet middle mile scope or may leverage existing network of BharatNet or existing TSP/ ISP/ IP-1 license holders (as detailed in Para-3.6 below), for providing connectivity from Blocks to Gram Panchayat (GP) except for the provision as specified in clause No. 3.6 (a) iii..

A simple schematic of the proposed network architecture is as given below:



Additional schematic diagram of the proposed network architecture under clause 3.1.1 (Ring architecture using IP-MPLS): (Amendment No.14)



Based on the network infrastructure to be deployed under this project, all permissions shall be obtained by the PIA, as required under Applicable Laws, relevant Applicable Permits, license(s), authorisation(s) and permissions from Department of Telecom / Government of India/ State Governments.

3.2. Making Over the Network to PIA by BSNL:

3.2.1 Handover/ Takeover of the Existing BharatNet Phase-I & Phase-II Networks: (Amendment No. 10.1.1)

In accordance with the Bid Document, BSNL shall hand over the Existing Network to the PIA, through its existing O&M agencies (FMA/PMA), within a maximum time period as per below table (Table X.1) from the agreement signed date, in "good condition" (optical power is in

the range -8 dBm to -25 dBm). The existing O&M agencies (FMA) shall handover the network Block wise, for those blocks, where at least 50% GPs are having optical power as specified above. The PIA shall take over all the GP locations of the block and will be responsible for O&M of the taken over OFC network as well as FLM of GPON equipment including logistics, replacement of faulty GPON/ SPV equipment, spares management as well as MPLS routers commissioned in replacement of GPON in the Block/GP. The existing FMA/PMA agency will be making over the rest of the OFC network of the block to PIA in “good condition” (optical power is in the range -8 dBm to -25 dBm) progressively.

Table X.1: Timelines to handover existing network

Sr.	Milestones	Timeline
1	Existing network handover completion of 25% or more GPs (Locations)	T*+1 month
2	Existing network handover completion of 50% or more GPs (Locations)	T + 2 months
3	Existing network handover completion of 75% or more GPs (Locations)	T + 4 months
4	Existing network handover completion of 90% or more GPs (Locations)	T + 5 months
5	Existing network handover completion of 100% GPs (Locations)	T + 6 months

*T is Appointed Date i.e. date of signing of Agreement between PIA and BSNL.

Note:

1. If at least 50% GPs of a Block are having -25dB or better optical power, the PIA shall take over the OFC network of up GPs and equipment of all the GPs of the Block (excluding the damaged routes being attended/ to be attended by the PMA). The FMA/PMA shall make over remaining GP wise OFC network on achieving -25dB or better optical power to the PIA.
2. The Milestone wise % GPs to be taken over by the PIA as mentioned in Table X.1 above are not restrictive. If more number than specified number of GPs against any milestone are having -25dB or better optical power and the PIA is willing to take over some or all such GPs and/or associated OFC network, the PIA shall be allowed to take over the same (complete block) from the existing PMA/FMA. Even if the PIA is willing to take over OFC network of the GPs whose optical power is below -25dB, it will be allowed to take over the same.
3. However, after six (6) months from appointed date, the entire network shall be deemed to be madeover to the PIA on as is where is basis.
4. In those blocks, where complete OFC network of the block is taken over by PIA and all the GPs are not up, on date of such taking over, the PIA has to make additional 5% GPs of the block as operational every month after 2 months from such taking over date, till all the GPs are made operational. A penalty of Rs. 5,000/- per month per GP shall be levied and deducted from the O&M invoice, for such shortfall of achieving 5% addition in operational GP count of the block, every month from 4th month of taking over date.

The GPs becoming operational as per NoC report, will be counted for AMC payments from date of becoming operational.

5. In case, the GP of taken over block is made operational by PIA, by laying the OFC on the approved route (after survey) for completion of the ring, (even if the ring is not completed, due to non-repair of the existing OFC route for that GP), The GP will be counted as operational (will be counted in 5% addition for the month and AMC payments).
6. PIA will be able to claim 50% of the OFC construction work in such cases. Remaining payment of OFC construction shall be made only after the ring completion and as per the milestone defined in **Clause-12.1.h of Section-IV-B.**
7. In all such operational GP cases, the SLA will stand started immediately after GP becomes operational.
8. O&M Payment for Non-functional routes after handover: Payment shall be made only for the routes which are made operational by PIA.

3.2.2 **Existing Infrastructure:** Site of the Existing Network shall include an inventory of existing network infrastructure across Blocks, Gram Panchayats (GPs) and Villages along with laid OFC infrastructure. The indicative information is described in Table A.1 & Table A.2

Table A.1: Asset Summary – Package

Licensed Service Area / State	No of Blocks	Total GPs (Connected on OFC)	Total OFC laid (Kms)	OLT installed (Nos.)	ONT installed (Nos.)

Table A.2: Block / Gram Panchayat (GP) count under Package

Licensed Service Area/States	Total Blocks	GPs already created		GPs for Upgradation	GPs To be Connected	Total GPs to be connected in Ring Topology
		Phase I	Phase II			

3.2.3 **GP End Equipment:**

- (a) The Network shall be made over Block wise with the GPs whose optical power is -25 dB or better at the GP end ONT. The same shall be ensured by the outgoing FMA/PMA. The details of the equipment i.e. ONT, CCU, Battery (with replacement Date), Solar Panel, Enclosure, Earthing, and Splitter etc. will also be provided.
- (b) The PIA shall be given access to NMS, GIS, so as to see the status and seek clarification, mention any observation in the HOTO memo.

- (c) The PIA shall upkeep the equipment even after the Router at the GP is installed. The ONT along with SPV may be used for providing/ continuing the FTTH connection at the GP/ School, if approved by BSNL. If the same is provided through BharatNet Udyami, the PIA shall make over the same to the BharatNet Udyami under similar HOTO memo with a copy to BSNL.

3.2.4 Block End Equipment:

- (a) The OLT along with make model, configuration, cards and PON diagram shall be made over by BSNL to the PIA. The PIA shall be responsible for FLM of the same till the network is transferred to the MPLS router.
- (b) After transfer of network to the new equipment, the PIA shall make over the OLT to BSNL.

3.2.5 OFC Network:

- (a) The OFC network corresponding to the GPs whose optical power is OK (-25 dB or better) and made over to the PIA by the outgoing FMA/PMA shall be transferred to the PIA for O&M on as is where is basis. The complete L-14 diagram mentioning the routes shall be signed by the FMA/PMA, PIA and BSNL. Details of temporary restoration etc. shall also be marked. The PIA, if required, can mention its observations in the HOTO memo.
- (b) The responsibility of attending the faults in the damaged OFC routes is with the outgoing FMA/PMA. The PMA/FMA shall progressively make over such GPs whose optical power is made available (-25dB) to the PIA with details of the routes marked on the L-14 (already available with the PIA). The equipment of such GPs shall be made over by the outgoing FMA or BSNL FT.
- (c) However, in cases, where, from the Date of first GP make over to the PIA, the outgoing FMA/PMA fails to make over some GPs within 3 months, the PIA shall be bound to take over such GPs also. The PIA shall get the restoration charges as per the predefined rates discovered in the existing PMA contract of BSNL (**as per TABLE-2 of Pre-defined Rates in Section-VII**).
- (d) Any section; which is in damaged condition or temporarily restored; shall be clearly mentioned in the HOTO memo. The PIA shall be paid for permanent restoration of such sections, as per clause-13.3. (*Amendment No. 10.1.2*)
- (e) PIA shall be responsible for First Line Maintenance (FLM) of the network elements both at Block and GP level, till the network is transferred to the MPLS router.

3.3. Upgradation of Existing BharatNet Infrastructure

As part of the upgradation, the following activities shall be performed:

- a) Upgrade existing BharatNet middle mile network to make it robust, redundant and carrier-grade.

- The PIA shall replace the existing GPON equipment with IP-MPLS routers (Access/Aggregator)
 - The existing OFC network shall be upgraded from linear to ring topology
- b) PIA shall integrate the existing (Phase I & II) GPs and newly covered GPs (to be created) under BharatNet middle mile network

PIA shall conduct a detailed survey to cover all the GPs in a circle by forming GP rings and child rings. These rings may consist of existing (Phase I & II) GPs and newly covered GPs (to be created) under BharatNet middle mile network

- c) PIA shall integrate existing BharatNet infrastructure with NOC as required to be implemented under the project.

PIA shall integrate entire BharatNet infrastructure existing (Phase I & II) and newly created with the EMS and NMS to be deployed in State NOC (to be created as part of this project). Further the NMS of State NOC shall be integrated with the NMS of centralized BharatNet NOC

3.4. Site Survey and Planning

The PIA shall conduct an exhaustive video-based site and route survey based on an optimal/shortest path to connect Gram Panchayat (GP) and Block as defined under the scope of work for construction and upgradation of network. All the videos during Survey shall be taken using Mobile APP provided by BSNL, if available. Else, the PIA shall take the videos as per the specifications in clause No. 3.7 of Section-IV-B, which shall be uploaded in the BharatNet GIS platform in the CNOC. PIA shall perform the following activities for site survey and planning: *(Amendment No. 10.2.1)*

- a) BSNL shall provide the GIS details for site and route data of the Existing Network to the PIA on as is where is basis.
- b) The PIA shall deploy a GIS based planning tool for desktop planning. The tool based on the Geo coordinates of the Block and the GPs shall provide the initial optimal path of the connectivity using road data. The PIA shall use such initial plan for physical site survey.
- c) PIA shall conduct an actual Geographic Information System (GIS)-based survey for the area under scope of work.
- d) The PIA shall record with videos, constraints about the changes in the desktop routes proposed based on physical survey. I.E. and BSNL may use such evidences for approval of the design and BoQ. The access of such GIS based planning tool shall be given to the IE and BSNL also. *(Amendment No. 10.2.2)*
- e) The PIA shall ensure that the GIS based file formats should be compatible with BharatNet GIS platform. Furthermore, sharing and integration of GIS data under this project with the afore-mentioned platform shall be the responsibility of the PIA and BSNL shall provide reasonable assistance in the same.
- f) During the survey, the PIA shall consider connectivity till Gram Panchayat (GP) based on the optimal path for fibre layout covering maximum population en-route.
- g) The PIA shall provide all the relevant drawings such as network diagram, L-14, As Build

Diagram (ABD), related for the Development Works and/or the Upgradation Works for New Network and Existing Network to BSNL and its designated agency. The network diagram shall include both High- and Low-Level Design (HLD & LLD).

- h) The PIA shall create/update the relevant engineering drawings/design in case of future upgradation, ensure updation of GIS platform and other relevant systems as required by BSNL.
- i) All engineering drawings/design and documents shall be created, updated and maintained by the PIA on its system/tool or portal and shall be accessible to BSNL throughout the Contract Period. All these will eventually be handed over to BSNL and will become property of USOF, DoT.

3.5. Network Design

- a) The PIA shall connect all Gram Panchayat (GP) into ring topology with IP-MPLS aggregation/ access routers as per the technical specification in this document across the State/UT in accordance with Section-V (SOR) and as per the scope of work through OFC connectivity.
- b) The PIA shall design a redundant and robust OFC network infrastructure connecting all GPs, based on ring architecture/ topology. The number of GPs in a GP ring (as per figure in clause 3.1.1 above) shall normally be eight (8) and maximum up to ten (10).

In case, more than 10 (ten) GPs are necessitated to be connected in a ring as per survey, the same shall be implemented after justification and recommendation by the I.E. and approval by BSNL. *(Amendment No. 28.2)*

- c) The PIA can also plan child rings (as per figure in clause 3.1.1 above) in case the creation of GP ring from Block is not feasible due to distance from block or any other reason. The PIA shall conduct a detailed survey and prepare the report in consultation with IE for each case and submit it to BSNL for approval of such Child Rings.
- d) Depending on the non-feasibility of the ring architecture deployment, PIA may recommend to BSNL to deploy suitable network architecture (linear) other than ring architecture in a GP/ GPs. If ring architecture is not techno-commercially feasible, BSNL shall approve the same based on the recommendation of the PIA and IE on case-to-case basis. *(Amendment No. 10.16)*

e) Alternate Technology Implementation

- i. Wherever, the U/G or ADSS OFC laying is not possible, the PIA shall submit a note to the IE detailing the constraints. The Independent Engineer (IE) shall examine the same and if the same is found to be correct, the IE shall recommend in speaking justification to BSNL. BSNL BharatNet BA Head, based on the recommendation of the IE shall forward the same to BSNL HQ who will approve the same to be implemented through Alternate Technology.
- ii. However, the deployment on Alternate Technologies shall be permitted for not more than 2% GPs in the Circles of UP East, UP West, Bihar, Haryana, Punjab, for not more than 4% GPs in the Circles of Rajasthan, Madhya Pradesh, West Bengal and for not more than 6% GPs in the Circles of Kerala, Karnataka & Assam. Similarly, the deployment on Alternate Technologies shall not be permitted for more than 20% GPs in the circles of HP & Uttarakhand and 25% GPs in the circles of J&K, NE1 & NE2.

In case of exigencies, if the PIA justifies connectivity of GPs on Alternate Technology beyond the above-mentioned state wise limits, then with the recommendation of IE, PIA can submit such cases to BSNL. BSNL in consultation with USOF reserves the right to approve the use of Alternate Technology for connecting GPs beyond the mentioned limits. *(Amendment No. 10.3.1)*

- iii. The PIA shall work out the possible Alternate Technology solutions in consultation with I.E. and submit the report, duly recommended by the I.E., through the BharatNet BA Head to BSNL HQ. BSNL HQ shall approve such cases for implementation.
 - iv. In case the alternate technology is decided as Unlicensed Band Radio (UBR) or Digital Microwave (DMW), the PIA shall supply, install & commission the same as per the technical specifications mentioned in Section – IV (C) at point no. 2.IX & 2.X with pre-defined rates mentioned in Section – VII.
 - v. For other cases, a separate tender shall be floated by BSNL on behalf of USOF, DoT for implementation of alternate technology in such GPs. The PIA shall be bound to facilitate/ coordinate such implementation through agency selected by BSNL on behalf of USOF, DoT and integration of the same with State NOC. The PIA shall also allow installation of EMS and/or any equipment in State NOC for integration with State NOC/ Central NOC. No space and Infra charges shall be payable to the PIA for the same.
 - vi. The FLM of such alternate technology equipment shall also be in the scope of the PIA. The PIA shall be paid @ Rs. 1,000 per month/ link for FLM for first 5 years and thereafter @ 1300 per month per link for next 5 years. In case of Hilly Circles (J&K, Uttarakhand, HP, NE1 and NE2), these rates shall be Rs. 1,500 per month/ link for FLM for first 5 years and thereafter @ 1800 per month per link for next 5 years. The Schedule of FLM shall be issued by BSNL in consultation with the PIA and the alternative technology implementing agency. **Adequate spares, software updates and upgrades, L2/L3 support and Training as required to meet SLA shall be provided free of cost by the Alternate Technology provider.** The AMC charges against the alternate technology equipment shall be paid by BSNL as these are to be purchased under separate tender floated by BSNL on behalf of USOF, DoT.
 - vii. PIA has to attend the trouble tickets within 8 hours. Penalty for delay beyond 8 Hours and up to 24 hours shall be Rs. 100 per ticket. The penalty for delay in attending the tickets beyond 24 hours up to 48 hours shall be Rs. 200 per ticket. The penalty for delay in attending the tickets beyond 48 hours and upto 72 Hrs shall be Rs. 300 per ticket. Beyond 72 hrs, the penalty shall be Rs. 400 per 24 Hrs or part thereof. 10% spares will be provided to the PIA for FLM. For Hilly Circles, a further relaxation of 12 Hrs shall be given in above mentioned delays.
 - viii. There will be one EMS (Element Management System) for each Alternate Technology proposed in this RFP i.e. Unlicensed Band Radio (UBR) or Digital Microwave (DMW). EMS shall be provided by BSNL at CNOC or any other central location. *(Amendment No. 10.3.2)*
- f) The PIA shall design a robust, fault-tolerant and high-performance carrier-grade network. Further, it shall ensure availability and reliability of the network as per KPIs. The network architecture must also be deployed to meet the following:
- i. Redundancy across nodes and links (ports) to maintain higher uptime

- ii. Optimal link utilisation
- iii. Flexibility to allow easy insertion of new node/cards
- iv. From Day-1, the network shall support and enable retail, enterprise, and wholesale services as per the capabilities of the router, such as but not limited to the following:

All type of data and voice services, wireless back-haul traffic for 2G, 3G,4G and 5G services, FTTx, layer2 VPN, layer3 VPN, point 2 Multipoint VPN and VPLS, IPTV and multicast VPN, Cable TV transmission services along with other bandwidth leasing services supported any to any, one to many, many to many kind of services. The network created should have capability to establish end to end integration as per requirement up to State-Wide Area Network (SWAN) and National Knowledge Network (NKN).

In this regard, BSNL shall facilitate in provisioning of all necessary details and access for a smooth integration.

3.6. OFC Implementation

- a) The project implementation shall follow an optimal mix of underground and aerial optical fibre cable based on terrain types across the State/ UT. The implementation through aerial optical fibre cable shall only be resorted where implementation through underground OFC laying is not feasible either due to terrain or ROW approvals. All UG OFC shall be armored. This includes:
 - i. **Existing network upgradation:** GPs already connected through 48F ribbon type and 24F loose tube type fibre for underground OFC to be upgraded with the OF cable of same count of fibres across all Gram Panchayats (GPs). The PIA shall also plan and lay 24F or 48F (in replacement of BSNL leased fiber from block to FPOI) as per the requirement based on survey. Multiple FPOI in same route (from block to FPOI on existing BSNL fiber), may require 2x 24 Fiber OFC, PIA shall lay 48F OFC in such routes.
 - ii. **New network construction:** 48 Core ribbon type underground fibre and 24 core ADSS fibre to be deployed to connect all Gram Panchayats (GPs).
 - iii. In case of uncovered GPs (~47,000), The bidder shall have an option to utilize the existing optical fibre cable of any TSP/ISP/IP-1 license holders for the construction of the uncovered GPs with the following conditions:
 - The leasing of OFC shall be for the complete ring covering from Block to GPs
 - PIA shall be liable to provide end to end SLA as mentioned in Section IV B clause no.11.
 - PIA shall construct the ring by taking entire OFC cable on lease as below:
 - a. 48F OFC along with the PLB HDPE duct on lease
- or
- b. 24F ADSS OFC utilizing existing power infrastructure of State Discom

or

- c. 24F ADSS OFC **not** utilizing existing power infrastructure of State Discom
- PIA shall be fully responsible of O&M of the entire leased OFC along with all the fibres for the entire contract period
 - At end of the contract period, the ownership of complete ring consisting of the leased OFC (along with PLB HDPE duct in case of 48F UG cable) shall be passed on to USOF
 - BSNL may extend the O&M agreement for such OFC for further 10 years on the same terms & conditions
 - PIA and lesser of such OFC and duct shall enter into tripartite agreement with BSNL for the contract period with extension, if any, of O&M for the entire lifetime of the OFC
 - Payment will be made as per the price schedule (Section-VII) as mentioned below and as per payment milestones defined in clause 12.1(i):

S.N.	Category	Capex +Opex for 10 years
1	48F OFC along with the PLB HDPE duct on lease	1.6 times of X2 (Item no. 1b of Price Schedule)
2	24F ADSS OFC on lease	1.6 times of X3 (Item no. 1c of Price Schedule)

NOTE:

In case of leasing of 24F ADSS OFC **not** utilizing existing power infrastructure of State Discom where the Lessor had erected its own poles, or utilizing existing power infrastructure of State Discom on lease basis, then BSNL shall pay ROW charges @ Rs. 200 per pole per Annum during the entire contract period in addition to lease payment as at Sl No. 2 above.

- b)** The PIA shall submit Block wise site survey reports to the Independent Engineer (IE) for certifying that the same is in line with the guidelines mentioned in this RFP. Based on such certification by IE, BSNL BharatNet BA Head in the circle shall approve the same. Format of Survey report is attached at Annexure-X.
- c)** Based on the approved site survey report and network design, the PIA shall be required to initiate OFC implementation and comply with specifications and standards, as per Section-IV-C.
- i. PIA shall also be responsible for supply, delivery, storage, warehousing and handling of optical fibre cable along with fittings and requisite items such as HDPE PLB duct, FDMS, joint enclosures, route markers, etc.
 - ii. PIA shall perform all activities required for end-to-end implementation of underground and aerial OFC, within the stipulated time. In case of 48F Ribbon type Optical Fibre

Cable, one ribbon of 6 Core shall be terminated in the FDMS at GP. Remaining ribbons shall pass through. *(Amendment No. 10.4)*

- iii. For the routes, where ADSS is approved as implementation design, the PIA may leverage existing power distribution poles for stringing, jointing, live line installation and commissioning of optical fibre cable from the nearest Block to Gram Panchayat (GP) using appropriate pole clamping and accessories.
- iv. PIA shall perform end-to-end testing of the OFC laid till Gram Panchayat (GP) in accordance with good industry practice, specifications and standards, and acceptance testing template for quality assurance.
- d) The Right of Way (RoW) for the project shall be granted as per the existing agreement with the State Government and facilitated by BSNL through introduction letters for creation and upgradation of new and existing network respectively during the construction period.
- e) During the Operation & Maintenance, the PIA shall also be facilitated RoW by BSNL, only for replacement and repair of existing fiber deployed to maintain the new and existing network.

3.7. Videography:

- 3.7.1 Videography for all the works like trenching, fibre laying, splicing etc shall be conducted by PIA. The Video Recording (with Date/ Time stamping and GPS coordinates) of the OFC laying and Ducting works by the PIA shall be done in following phases as under-
 - 3.7.1.1 Ducting - Video recording of Open Trenches is to be done using a Vertical Measuring Stick (Known as Measuring Staff in Civil Engineering Terms) at every 50 (Fifty) Mtr intervals. The depth reading in the Staff from top of the duct should be clearly recorded. In case of HDD (if the PIA is not using the machine recorded depth and produce the depth data), the depth of Entry & Exit pits should be Video recorded from top of the duct. The Couplers, Plugs and End Caps wherever required as per E.I. should also be captured in the video. Protection used as per E.I. in case of Low Depth should also be Video Recorded.
 - 3.7.1.2 OFC Blowing/ Pulling - The OFC blowing process should be Photographed (geo tagged with time stamp) clearly showing the drum and fibre meter reading details.
 - 3.7.1.3 Splicing- The splicing should be Photographed (geo tagged with time stamp) clearly showing that all 24F/48 F have been spliced and arranged in cassette.
 - 3.7.1.4 Man Hole/ Cable Chamber- The Cable Chamber of MH base should be Photographed (geo tagged with time stamp) clearly showing the base plate of 50 mm thickness, RCC joint Chamber and Top Cover as per E.I. The cable loop also to be video recorded – showing start and end readings.
 - 3.7.1.5 Route Markers- Route Markers should be Photographed (geo tagged with time stamp).
- 3.7.2 All Videos/ Photographs (geo tagged with time stamp) shall be submitted /uploaded with a unique location related name in a folder with file descriptions clearly indicating each of the above activities like Ducting, Blowing, Splicing, MH/CC & RM.
- 3.7.3 The MP4 Video should have 3 windows running concurrently for following views-

- (a) Window 1 – Physical work being carried out with Lat/ Long and Date/Time stamp
 - (b) Window 2 – Location of the activity on Google Map.
 - (c) Window 3 – KMZ/KML file with chainage, OFC route, Depth, Offset from road centre & Lat/ Long of Joint pits etc.
- 3.7.4 Each Video file should be of at least 2 minutes time duration capturing works being done for 40 Mtrs in case of Open Trenching and one shot in case of HDD. The size of each Video file should not be more than 30MB so that the same can be sent through mobile/mail etc.
- 3.7.5 The speed of movement of the camera while recording the Video should be maximum 20Mtr/Minute.
- 3.7.6 All Video recordings should be done in day light time without rain, fog, mist etc. Wherever, the video recording is not possible, photographs should be taken at every 10 meters with the approval of BSNL.
- 3.7.7 The nomenclature of the files should be in the following format:-
 XXXX_YYYYY: 12345_67890: Work
 XXXX is the Route Abbreviation as per the Work Order
 YYYYY is the Circle+District+Block Abbreviation as per the Work Order
 12345 is the Chainage of start point of Video Recording
 67890 is Chainage of end point of Video Recording
 Work- OT Ducting- OTD, HDD, OFC Blowing- OFB, Splicing- OFC, MM/CC, RM etc.
- 3.7.8 Block end should be Chainage '0' and GP end should be taken as the last Chainage.
- 3.7.9 The Backend team of the PIA should merge all the files of a section of 40 meters in succession or HDD shot and send to BharatNet BA team of the Circle for review / verification of works and GIS NOC Delhi for linking the same with GIS.
- 3.7.10 The payments of the works as per payment schedule mentioned in the tender shall only be done if the videos /photographs (geo tagged with time stamp) of the same as per this SOP are submitted to both BharatNet BA team of the circle and GIS NOC Delhi.
- Note:** GPS enabled Camera/mobile phone, that can record Video with live tracking of LAT LONG (GPS Coordinates) and Date/ Time Stamping shall be used by the PIA. Video output resolution should not be less than 720dpi.

3.8. State- Network Operations Centre (S-NOC) Implementation

- a) PIA shall be responsible for establishing of an S-NOC for managing the existing (Phase-I & II, to be upgraded) and new network (to be created) in each State. The PIA shall be responsible for the deployment of all requisite hardware, software, and manpower for monitoring, helpdesk, troubleshooting, etc.
- b) The scope shall also include design, site preparation, supply, installation, testing, commissioning, documentation, operations and maintenance of NOC along with workforce deployment, training, etc.
- c) The NOC shall be capable to perform key functions but not limited to i.e. fault

management, performance management, configuration management and security management etc.

- d) The passive infrastructure deployed should be certified by BSNL TSEC/TEC TAC/BIS/ISI, whichever is applicable.
- e) PIA shall connect the NOC or its relevant platform created under this project to BSNL's point of integration for NOC i.e. Business Exchange Gateway (BEG).
- f) PIA shall submit details such as APIs', protocols, version, attributes etc. to BSNL. Once, the information has been shared at detailed level, both PIA and BSNL shall complete integration of NOC within 90 days from agreement signed date.
- g) Further, the PIA shall perform end-to-end testing of the NOC in accordance with good industry practice, specifications and standards, and acceptance testing template for quality assurance.
- h) **State NOC Space and Infra Charges:** The PIA shall take on lease space for State NOC (*Approximately 2500 Sq. ft. for Category-1 (1A & 1B) and Approximately 2000 Sq. ft. for Category 2*) in BSNL exchange or any other building of BSNL. The PIA shall pay rental as decided by FRAC constituted by BSNL Circle CGM. The PIA shall be responsible for interior and other infra requirement. It shall install a sub-meter for sharing the Electricity charges with BSNL or it may take a separate electricity connection, install E/A and/ or Solar System. The charges for the same shall be payable by PIA to BSNL as decided by the FRAC. The PIA shall raise the same for reimbursement in the quarterly invoices against OPEX.
- i) The State NOC created under this project shall be integrated with BharatNet Delhi & Bangalore NOC.
- j) The S-NOC shall enable all the eMS to be integrated with Central NOC to fetch the required parameters directly.
- k) **Provisioning of OLTs or any other services in State NOC.** The PIA shall give rights and access of State NOC to Central NOC or any other person/ agency authorized by Central NOC for provisioning of OLT or any other equipment/ services.
- l) **Data Communication Network (DCN) Charges-** The DCN links for connectivity of Block routers to State NOC and State NOC to Central NOC shall be provided by BSNL for which PIA shall not be charged. The charges of DCN links shall be raised by BSNL directly to USOF.

3.9. Electronics Installation

- a) The PIA shall supply and install network solution or electronics infrastructure for the successful creation/ upgradation of a robust, redundant and carrier-grade network to support and enable retail, enterprise, and wholesale services.
- b) It shall also be responsible for supply of new electronics infrastructure and its accessories to perform end to end implementation of the same across the network.

- c) Adequate power back-up infrastructure shall be provided by the PIA to ensure network availability as per defined KPIs.
- d) Further, the PIA shall perform end-to-end testing of the electronics infrastructure in accordance with good industry practice, specifications and standards, and acceptance testing template for quality assurance.
- e) PIA shall be responsible for integration of existing BSNL Block OLT with Block router or any nearby available node created/to be created.
- f) PIA shall prepare and maintain asset records listing the assets at site locations required for the performing the O&M and the same shall be shared with BSNL every quarter.
- g) KPIs shall be monitored and reported by the PIA to BSNL on daily/ weekly/ fortnightly/ monthly /quarterly basis, as required.
- h) In case of any defect, deficiency or deterioration in the project, poses a hazard to safety or risk of damage to property, the PIA shall promptly take all reasonable measures for eliminating or minimizing such danger.
- i) **Provisioning Mini OLTs:** BSNL on behalf of USOF, DoT is procuring mini OLTs through a separate tender to be installed at the GP. The PIA is required to make provision for housing the same in the rack (cabinet) being provided by it as per technical specifications. Normally, the size of the Mini OLT is 1 RU. The PIA shall allow the power to the OLT to be tapped from the Power System being procured at the GP location. The PIA shall also allow the installation/testing/FLM of OLT to be carried out by the OLT OEM/vendor as and when required. The PIA will also facilitate testing by the BNUs, whenever required, to ensure desired connectivity/ uptime to all the FTTH customers of the housed OLT. The PIA shall configure and integrate the Mini OLTs provided by BSNL or BNUs with the MPLS network for last mile connectivity
- j) **Modification in the Ring Architecture to meet increased Bandwidth Requirement:** Initially each ring is be designed for 10Gbps with around 8-10 nodes. However, if there is a requirement subsequently to increase the capacity due to increased bandwidth requirement, additional ring shall be created splitting the nodes using spare fibres and spare ports at the Block router. If required, additional Block router may need to be installed at the Block for which separate payment shall be made as per the finalized itemized rates.
- k) PIA shall provision the bandwidth for the services mentioned in this document. The PIA shall also build up the dark fibre on end-to-end basis for provisioning the same for commercial use or providing village connectivity. PIA shall get Rs 3500/- per joint to operate any OFC joint in the made over network for the first time only for a particular joint, for the purpose of attending a fault for providing the dark fibre. This cost shall include all the material supply and services i.e. localization of fault, digging of pit, supply of Splice Closure, Splicing, testing and back filling. However, if instructed by BSNL for

construction of Joint Chamber as per E.I, additional payment @ Rs 4000/- per Joint Chamber shall also be provided.

3.10. Last Mile Connectivity-

The PIA shall provide the Last Mile Connectivity to the Village from the nearest GP for provisioning of FTTH connection in the villages by BSNL at the quoted/ finalized price as per Sr. No. 12 of the Price schedule. The rates to be quoted by bidder at Sr. No. 12 shall include both CAPEX and OPEX charges (for 32 quarters). Following guidelines/ technical specifications shall be followed by the PIA: - *(Amendment No. 27.1)*

- (i) The PIA shall use 6F Overhead OFC as per TEC GR as mentioned in the table of TEC GRs in Annexure-A of section- IV-C. *(Amendment No. 10.5.1)* Last Mile connectivity shall be implemented with 6F Aerial Drop Cable. However, the TEC GR mentioned for 12F/ 24F (as per S.N.-3 of the table in Amendment# 12.1) is applicable for 6F cable also. *(Amendment No. 23.1.4)*
- (ii) The OFC shall be laid using existing Electricity poles with required accessories. TEC GR Standard No.: TEC 87060:2017 including its latest amendment, if any, may be referred.
- (iii) The payment, if any, to the electricity authority shall be done by BSNL.
- (iv) Wherever, such electricity poles are not available/used, the PIA is required to erect wooden/ G.I. poles at the required intervals so that the OFC withstands normal climatic disturbances.
- (v) The PIA is required to terminate such OFC at an appropriate location in the village in a minimum 16 pair FTB and at the GP FDMS/FTB from where further FTTH connections can be provided by the BNU, either with a new mini-OLT or using splitters and the mini-OLT installed at the GP. (the cost of FTB is included in the connectivity charges of Rs 80/- per meter)
- (vi) The PIA shall also be liable to maintain the above arrangement till the completion of the contract period.
- (vii) Payment of 40% of the quoted /finalized price shall be made after successful commissioning of first FTTH connection. *(Amendment No. 27.1)*
- (viii) Payment of 7.5% of the quoted/ finalized price shall be made every year, during next 8 years, after the completion of Financial Year in which the first FTTH connection is provided. This payment shall be made quarterly as 1.875% only, on achievement of quarterly SLA of 95% or better for such connectivity, However, the payment will be reduced as per table below, if 95% uptime in the quarter is not maintained. No payment will be made for the quarter, if the uptime for that village connectivity is below 65%. *(Amendment No. 27.1)*

S. No	SLA	Quarterly Payment as percentage of the quoted/ finalized price
1	=>95%	1.875 %
2	=>90% and <95%	1.7%
3	=>85% and <90%	1.4%

S. No	SLA	Quarterly Payment as percentage of the quoted/ finalized price
4	>75% and <85%	1.0%
5	=>65% and <75%	0.5%
6	<65%	Nil

- (ix) The O&M payment to the PIA for the concerned Block shall not be released, till all such villages for which the work orders in the block have been issued are provided with connectivity within 30 days of the work order. A penalty of Rs 100/- per day of delay beyond 30 days shall be levied, unless the exemption is given by BSNL on case-to-case basis with proper justification for the reasons beyond the control of the PIA. Maximum penalty for delay in connectivity to the village shall be capped at 12% value of the O&M invoice for each quarter for that Block. Further, BSNL, on behalf of USOF, shall have the right to get the work done at the risk and cost of the PIA in case work is not completed in 100 days. **(Amendment No. 10.5.2)**
- (x) Wherever the existing electricity poles are not available; the PIA shall erect a 7 Meter RCC pole. Payment of the **quoted/ finalized price**, as per Sr. No. 13 of the Price schedule, shall be made for such RCC Poles, including supply, installation and O&M for the entire contract period, on uploading of the video as per specifications. The PIA shall have to replace such poles damaged for any reason whatsoever during the contract period without any additional cost to BSNL. **(Amendment No. 27.2)**
- (y) For the Acceptance Testing of such last mile implementation, only the quality of the OFC, its termination at both the ends and measurement of optical power shall be done. The construction practice shall not be part of acceptance testing as the PIA shall be responsible for O&M of the entire end to end construction during the entire contract period.
- (xi) If the implementation through OFC is not feasible, the PIA can plan the implementation using UBR at the **quoted/ finalized price, as per Sr. No. 16 of the Price schedule, or procured / supplied by BSNL through other tender**. However, if required, the PIA can use the poles as specified in Sub-Clause (x) on cost basis along with other terms and conditions. **(Amendment No. 27.3)**
- (xii) The villages, where last mile connectivity is not feasible either using OFC or UBR, the same shall be descoped after recommendation of IE and approval of BSNL.

- (xiii) The entire **quoted/ finalized price of Last Mile Connectivity** is split in the ratio of 68:32 against CAPEX: OPEX charges. Thus, 1% of the price shall be paid per quarter, as OPEX of that quarter and remaining 0.875% shall be paid against CAPEX out of total 1.875%, mentioned in sub-clause (viii). If BSNL orders the Last Mile Connectivity to a village, after two years or later, from the appointed date, the left-over balance of the CAPEX part shall be paid in the last quarter of the contract period. It may be noted that this payment will be made after deduction of penalties over the contract period, if any. Thus, total payment over the entire contract period i.e. till termination or closure shall be 68% (as CAPEX) + 1% multiplied by number of quarters of completed O&M, (minus penalties). *(Amendment No. 27.1)*
- (xiv) In case of implementation of Last Mile Connectivity through OFC, the cable length shall be measured through OTDR for payment purpose. The point-to-point distance between GP and village shall also be calculated using GIS coordinates (Lat/Long) for verification. If, the OTDR measured length is more than the GIS length by 20% or more, IE/ BSNL shall do the due diligence before making the payment based on OTDR length. This measurement (based on OTDR) is only for Last Mile OFC. Payment for Construction, O&M etc. (under middle mile network) shall be made as per actual route length based on rodo-meter (as per FootNote-1 under Price-sheets). *New subclauses (x to xiv) added (Amendment No. 10.2.2)*

3.11. Earthing at G.P. location: *(Amendment No. 26.2)*

The PIA shall provide Chemical Earthing at the GP locations without any extra cost, as per specifications approved by BSNL, with following details:

- i. Item : Chemical earthing as per RDSO specifications RDSO/SPN/197
- ii. Earthing Rod : Length 3.0 Meter (Minimum)
 - : Copper Coating 250 Microns (Minimum)
 - : Dia 17 mm
 - : Engraving UL mark/ Name of the Manufacturer/ Batch No.
- iii. Back Fill Material : Resistivity 0.2 Ohm mtr. (max)
 - : Packing in 10 Kg with Batch No. printed on Bag
- iv. Size of the Earth Pit : Top -- 285 MM
 - : Bottom -- 200 MM
 - : Height --190 MM

4. Measurement

- (i) **Measurement Book.** The measurement books are to be maintained by the PIA. The entry shall be made in ink. No entry shall be erased. If a mistake is made, it should be corrected by crossing out the incorrect words or figures and inserting the corrections, the corrections thus made shall be initialed & dated by the bidder. The measurement books shall invariably be consulted at the time of making final payments to the bidder.
- (ii) Method of recording of nomenclature of items: Complete nomenclature of items, as given in the agreement need not be reproduced in the measurement book for recording the measurement but corresponding item code as provided, shall be used.
- (iii) The measurements of various items of work shall be taken and recorded in the measurements book. The measurements shall be taken and recorded by bidder which will be countersigned by the authority appointed by BSNL and/or IE. The PIA shall be directly responsible for supervision of work and for accuracy of 100% of measurements. The IE will be responsible for conducting Acceptance Test (A/T) check of measurements at different locations on sample basis. The PIA shall re-do the work, wherever, the IE finds deviation from the entries in MB by the PIA or BSNL at any subsequent stage during contract period. During subsequent inspection by BSNL or any other agency, **in case the sample measured data does not match with the measurement book entry up to a lesser depth of 5cm, penalty (equal to amount of difference of payment , so reduced due to lesser depth) shall be levied in addition to the reduction of payment due to lesser depth as per the approved formulae on each such default instance on the payment due for the link** (waiver of penalty, if warranted, shall be decided by BSNL on case to case basis) . The spirit is to ensure correct recording in the measurement book by PIA. BSNL, on behalf of USOF, reserve the right to get the work done at the risk and cost of the PIA in case of lesser depth cases.
- (iv) **Method of measurement.** The measurement of the work shall be done activity-wise as and when the item of work is ready for measurement. The methods of measurement of various items are enumerated as under:
 - **Measurement of Depth of Trenches.** The cable route shall be divided into a number of segments each of maximum 200 Meters length bounded by identifiable landmarks at both the ends of the segments. If landmarks are not available, length of segment may be maintained at 200 Meters. The measurement of depth shall be recorded at each point of measurement (POM) in the measurement book in Meters in the multiples of 5 cms. For example 97 cms will be recorded as 95 cms and 103 cms as 105 cms. The points of measurements shall be at a distance of 10 Meters starting from 0 (Zero) Meter. For example, if the length of segment is 75 Meters, the POMs shall be at 0 M, 10 M, 20 M, 30 M, 40 M, 50 M, 60 M, and 70 M. The last POM shall be at 75th M to be recorded against residual POM. Normally the workers tend to dig shallow trenches due to effort involved. As standard depth of the trench is important for future life and protection of cables, this tendency has to be discouraged.
 - **Measurement of lengths and profiles of strata and protection.** The measurements of length of trenches are on running Meter basis, irrespective of type of soil encountered while digging. The type of protection utilized (item code – wise) to include RCC Half Round and Full Round Pipe, DWC HDPE Pipe, GI Pipe, MS Weld

Mesh etc in a segment shall be recorded in the measurement book in the sheet provided for this purpose.

- **Measurement of length of cable.** The length of cables laid in trenches, through pipes and through ducts shall be measured by use of OTDR for the purpose of accuracy of the identification of cuts during O&M. **The payment for such laying/trenching as per price schedule shall be made as per the RODO Meter readings and not as per the OTDR readings.** The length should be cross-verified with the marking of lengths on the cables. The lengths shall be recorded in sheet provided in the measurement book.
- **Measurement of other items.** The measurement/ numerical details of other items shall be recorded in the sheets provided for respective items viz.
 - Digging of joint pit/manholes and preparation of chambers along with details of its dimensions and location.
 - Fixing, Painting and sign writing of route/joint indicators.
 - Termination of Cable in equipment room and no. of joints.
 - Record splice loss details for each joint.
- The bidder shall sign all the measurement recorded in the measurement book. This will be considered as an acceptance by the bidder, of measurements recorded in the MB. In case bidder fails to attend at the measurements or fails to countersign or to record the difference within a week, than in any such events the measurements taken by IE shall be final and binding on the bidder and the bidder shall have no right to dispute the same. In case of any difference of opinion in the measurement book between IE and the bidder, same shall be mutually discussed and agreed before making it final.
- Measurement of the work of cable for calculation of laying /trenching will be taken equal to the length of the pipe/ duct (as measured in the RODO meter) through which the cable has been pulled and not the total length of the cable pulled through pipe/duct.
- **Uploading of Depth Photographs:** The IE responsible for verification of MB shall take the photographs of the depth measurement being done at every 100 m in case of open trench work and at the entry / exit points in case of HDD method using BharatNet GIS App and upload the same on GIS platform.
- Compilation of the Measurement Book needs to be on real time basis while the work is being carried out.
- The details noted by the Contractor in the notebooks will be entered in the proper MB format in the computer on weekly basis and shared with BSNL. These shall be checked by IE progressively so that as soon as the work of the route is complete, the MB is also ready.
- Depth AT and other tests/ observations to be done while the work is being executed. The PIA should ensure proper recording of all the details like drum Nos, duct roll numbers and length of shots etc.

5. **Rates payable in case of laying at less depth**

- (i) The nominal depth of OFC laying in plain area/ soft soil is 165 cm and that in the hilly area is 120 cm.
- (ii) The minimum depth allowed in plain area/soft soil will be 100 cm and that in the hilly area will be 30 cm.
- (iii) Depth below 100 cm in plain/soft soil and 30 cm in hilly area will be allowed under exceptional circumstances with the approval of CGM concerned.
- (iv) The payment, in case of less depth, shall be done as under: *(payment tables including illustrations as per Amendment No. 20)*

• **In Plain Area**

S. N o.	Depth (with relaxation) ['d' in cm]	Protection as per EI	Cost of protection (Rs per mtr)	Payment without protection (%)
1	$d \geq 165$	No Protection	--	100%
2	$165 > d \geq 150$	No Protection	--	$(d/165) * 97\%$
3	$150 > d \geq 120$	No Protection	--	$(d/165) * 93\%$
4	$120 > d \geq 100$	DWC	65	$(d/165) * 85\%$
5	$100 > d \geq 60$	GI*	550	$(d/165) * 76\%$
		CC*#	6000 per Cubic M	
6	$60 > d \geq 30$	RCC#	8000 per Cubic M	$(d/165) * 76\%$

* Any one protection can be used

rates are in per Cu Mtr

• **In Hilly Area**

Sl No .	Depth(with relaxation)	Protection as per EI	Cost of protection (Rs per mtr)	Payment without protection (%)
1	$d \geq 120$	No Protection	--	100%
2	$120 > d \geq 100$	No Protection	--	$(d/120) * 97\%$
3	$100 > d \geq 80$	No Protection	--	$(d/120) * 93\%$
4	$80 > d \geq 50$	DWC	65	$(d/120) * 85\%$
5	$50 > d \geq 30$	GI*	550	$(d/120) * 76\%$
		CC*#	6000 per Cubic M	
6	$30 > d$	RCC#	8000 per Cu M	$(d/120) * 76\%$

* Any one protection can be used

rates are in per Cu Mtr

- 'd' shall be rounded off to the nearest multiple of '5' (five).
- In case of depth between 100 Cm to 60 Cm in plain terrain and 50 cm to 30 cm in hilly terrain, the protection of G.I. pipe or CC (1:2:4) needs to be done for 25Cm*25Cm encasing the PLB.
- In case of depth 60 cm to 30 cm in plain and '< 30 cm' in hilly area protection of RCC (1:2:4) needs to be done for 25 cm*25 cm with 12 SWG G.I. mesh of 50 mm*100 mm size.

- The DWC, CC and RCC protection will be retained in EI the rest protection like RCC pipes will be removed from EI.

Note: - There will be no additional payment for any other items except material i.e. DWC/ GI pipe.

Illustration:

1. **In case of less depth for plain area:** given that the standard depth required is 165 cm and the rate approved is Rs. X/- per meter for the standard depth. For a depth (d) of 101 cm, the rate shall be worked out as below:

The depth (d) shall be rounded off to 100 cm. Then, the payment shall be calculated as under:

$$= \left(\frac{100}{165} \right) * \left(\frac{85}{100} \right) * X$$

2. **In case of less depth for hilly area:** given that the standard depth required is 120 cm and the rate approved is Rs. X/- per meter for the standard depth. For a depth (d) of 103 cm, the rate shall be worked out as below:

The depth (d) shall be rounded off to 105 cm. Then, the payment shall be calculated as under:

$$= \left(\frac{105}{120} \right) * \left(\frac{97}{100} \right) * X$$

6. Inspection and Acceptance Testing

During the Project, BSNL shall have the right to inspect, test and audit the network infrastructure and modalities across processes to construct, operate and maintain the network till Gram Panchayat (GP) during construction and operation period i.e. throughout the lifecycle of the project.

For determining that the Development Works and/or the Upgradation Works conform to the Agreement, the IE shall require the PIA to carry out or cause to be carried out tests, at such time and frequency and in such manner as may be specified by the IE from time to time in accordance with Good Industry Practice, Specifications and Standards, and Acceptance Testing Template for quality assurance. These tests would include testing of all the installed electronics and passive infrastructure along with its ancillary items deployed under construction and upgradation of the network infrastructure as per the scope of work. This shall also include all network links along with testing of network traffic from the Block to Gram Panchayat (GP), and further to NOC implemented / leveraged for this project and BharatNet Delhi and Bangalore NOC.

The PIA shall perform and facilitate the following with regards to testing activities:

a) Supply of products/ material or network infrastructure

- i. During the Contract Period, the PIA shall obtain from Original Equipment Manufacturers (OEM), the relevant certificates or documents with relevant test results, certifying that the product / material supplied for the Project conforms to the Specifications and Standards and design requirements as per provisions set forth in Section-IV-C (Special Technical Conditions). The records of relevant certificates shall be maintained by the PIA throughout the Contract Period.
- ii. Submit the same to BSNL and the IE within 7 days of receipt of such certificates or documents from OEMs.
- iii. In case the product / material supplied for the Project does not conform to the Specifications and Standards or is deficient in terms of relevant certificates / documents / test results, as inspected by BSNL or IE, then the costs to be incurred on any replacement of such product / material shall be borne solely by the PIA.

b) Deployment of products/ material or network infrastructure

- i. The acceptance testing (A/T) of the New Network and upgradation of Existing Network shall be carried out as per the Acceptance Testing Schedule issued by QA and Inspection Circle of BSNL which can be accessed on line from the website of QA and Inspection Circle of BSNL. As validated by the IE, such tests along with Acceptance Testing Template shall be designed in conformance with the provisions set forth under Section-IV-C: (Special Technical Conditions), Specifications and Standards and Good Industry Practice.
- ii. The PIA shall, no later than 30 (thirty) days prior to the likely completion of the construction, notify the IE and BSNL of its intent to subject the infrastructure to tests.
- iii. Further, no later than 10 (ten) days prior to the actual date of tests, the PIA shall furnish detailed inventory and particulars of all works and equipment forming part of the Project to the IE and BSNL.
- iv. In the event of the PIA and the IE failing to mutually agree on the dates for conducting the tests, the PIA shall fix the dates by not less than 10 (ten) working days' notice to the IE, and in the event the IE delays the tests hereunder, BSNL shall ensure that tests are completed in time either by the IE or any substitute thereof.
- v. The PIA shall progressively self-conduct and perform Preliminary Acceptance Testing (PAT) for network infrastructure being created as per the scope of work.
- vi. All tests shall be conducted in accordance with Acceptance Testing Template duly approved by BSNL at the cost and expense of the PIA. The IE shall undertake the tests only when all the Gram Panchayat (GP) offered for testing are visible in the NOC.
- vii. Once the PIA performs the PAT, it shall offer network infrastructure within a Block subject to minimum 10% Gram Panchayat (GP) completed and pinged from the Central NOC or visible in SNOC, for testing purposes to the IE for Final Acceptance Test (FAT).

Inspection work for FAT within a Block shall be offered only after completion of PAT of the route and site location by the PIA.

- viii. The schedule for such testing shall be based on a project plan and the timelines for the same shall be agreed between IE and PIA. In case of any changes in the schedule or plan, PIA shall notify the IE, 10 (ten) working days prior to the scheduled date.
- ix. In pursuance of the provisions of this Agreement, the IE shall conduct visual and physical check of the infrastructure at Blocks and Gram Panchayat (GP) and central locations (i.e. NOC) to determine that all works, equipment and services forming part thereof conform to the provision of this Agreement and the detailed scope of work as defined in the Section-IV-B and Section-V (SoR).
- x. The IE shall perform tests of offered Gram Panchayat (GP) aggregated at Block level in accordance with Good Industry Practice, Specifications and Standards, and Acceptance Testing Template. Sample sites and its routes to be checked shall be decided by the IE.
- xi. The PIA shall facilitate the IE in conducting the tests as per approved Acceptance Testing Template and/or as per directions of the IE. All reasonable facilities and assistance like testing instruments and other test devices including access to drawings and other details shall be furnished, by the PIA to the IE and BSNL.
- xii. The cost of all associated works regarding testing as per the scope of work such as digging pits at sample sites for connectivity across Gram Panchayat (GP), its restoration, and arrangement of testing instruments such as OTDR etc. shall be borne by the PIA.
- xiii. The IE may also decide to witness, or participate in, any of the tests to be undertaken by the PIA for its own quality assurance in accordance with Good Industry Practice, Specification and Standards, and in such an event, the PIA shall cooperate with, and provide the necessary assistance to, the IE for discharging its functions hereunder.
- xiv. Result of IE's inspection and audit shall only be valid for Gram Panchayat (GP) which were offered for testing under a Block. If PIA offers a Block for inspection more than once, IE and BSNL reserve the right to include or exclude the test of previously completed Gram Panchayat (GP) as well.
- xv. The overall result(s) of the FAT conducted by IE/ BSNL shall be indicated as "Satisfactory" or "Unsatisfactory" as judged at the time of inspection on merits of each case. The results of the test shall be jointly signed by the authorised personnel of the PIA and IE. In case of classifying the work as "Unsatisfactory", the PIA shall highlight the reason for non-compliance as per the Specifications and Standards set forth under Section-IV-C and Good Industry Practice along with design requirements under the scope of work. The results of the FAT conducted shall include submission of all relevant documents such as measurement book, Acceptance Testing Template report etc. Further, "Unsatisfactory" cases shall be communicated to the PIA by the IE/ BSNL for its rectification.

- xvi. During a FAT, if more than 10% discrepancies across site route or locations across Gram Panchayats (GPs) are observed within a Block which may be attributed due to negligence on the part of the PIA, under such circumstances, the FAT may be rejected. Further, the PIA shall get the work redone in a time bound manner and re-submit FAT report compliance, upon which IE/ BSNL shall have to recheck the offered Gram Panchayat (GP) and may also extend the sample size of site route or locations across Gram Panchayats (GPs) for discrepancies and record its observations. However, if the discrepancies are less than 10% within a Block, then IE/ BSNL shall provide a provisional acceptance and issue a Provisional Acceptance Certificate as per provision set forth in this Section.

However, the issuance of Provisional Acceptance Certificate shall be subjected to the visibility of Gram Panchayat (GP) in the Network Operations Centre (NOC). In such an event, the Provisional Acceptance Certificate shall have appended thereto a list of outstanding items signed jointly by the Independent Engineer and the PIA (the “**Punch List**”); provided that the Independent Engineer or BSNL shall not withhold the Provisional Acceptance Certificate for reason of any work remaining incomplete if the delay in completion thereof is attributable to BSNL.

c) Rectification of defects and deficiencies

- i. The PIA is obligated to rectify the outstanding item or Punch List in a time bound manner to receive a Final Acceptance Certificate on the same as per provision set forth in this Section (IV-B.6.b.xvi). In this process, the PIA shall comply with the timelines of the construction milestone and shall be responsible for delays on the re-work on its scope.
- ii. In case any inspected or tested components/site route fail to conform to the Specifications and Standards and design requirements as per provisions set forth in Section-IV-C, the PIA shall either replace the rejected components or make all alterations necessary to meet specification/ requirements, without any additional cost to BSNL.
- iii. If any equipment or any part thereof is found to be defective or fails to fulfil the requirements as per provisions set forth in Section-IV-C, BSNL shall give notice to the PIA setting forth details of such defects or failure and the PIA shall at their own cost make the defective equipment good or alter the same to make it comply with the requirements forthwith, within a period not exceeding one month of the initial report. These replacements shall be made by the PIA free of all charges at site and route locations.
- iv. Further, in the entire process the IE/ BSNL shall make a report of inspections (the “**Inspection Report**”) performed as a part of FAT. The Inspection Report shall state defects or deficiencies, if any, with reasonable details and reference to the Specifications and Standards and design requirements as per provisions set forth in Section-IV-C. IE shall send a copy of the Inspection Report to BSNL and the PIA within

7 (seven) days of such inspection and upon receipt thereof, the PIA shall rectify and remedy the defects or deficiencies, if any, stated in the Inspection Report. Notwithstanding the foregoing, such inspection or submission of Inspection Report by the IE shall not relieve or absolve the PIA of its obligations and liabilities hereunder in any manner whatsoever.

- v. Based on the Inspection Report or the defect and deficiencies observed in the Project, the IE/ BSNL shall verify whether remedial measures have brought the Development Works and/or the Upgradation Works into compliance with Specifications and Standards and design requirements as per provisions set forth in Section-IV-C.
- vi. The procedure for closure of defect and deficiencies as reported shall be repeated until such Development Works and/or the Upgradation Works conform to the Specifications and Standards and design requirements as per provisions set forth in Section-IV-C. Further, it is agreed that the tests pursuant to this shall also be undertaken in addition to and independent of the tests carried out by the PIA for its own quality assurance in accordance with Applicable Laws, Applicable Permits and Good Industry Practice. It is also agreed that a copy of the results of such tests shall be sent by the PIA to the IE forthwith. The costs to be incurred on any test which is undertaken for determining the rectification of any defect or deficiency in the Development Works and/or the Upgradation Works shall be borne solely by the PIA.
- vii. Upon successful completion of tests, the IE/ BSNL shall issue the Completion Certificate, as the case may be, in accordance with the provisions of this Section (IV-B.6.b.xvi).
- viii. If the IE/ BSNL certifies to BSNL and the PIA that it is unable to issue the Completion Certificate or Provisional Acceptance Certificate, as the case may be, because of events or circumstances on account of which the tests could not be held or had to be suspended, the PIA shall be entitled to re-schedule the tests and hold the same as soon as reasonably practicable.

d) In pursuance to clause- IV-B.6.c.vii above, the Completion Certificates/ A.T. Certificates will be issued 'site wise' in case of Acceptance testing of equipment and 'Ring wise' for Network commissioning. (Amendment No. 10.7)

7. Operation and Maintenance (O&M)

PIA shall undertake the responsibility for Operations & Maintenance (O&M) of the Existing Network including the existing leased OFC of BSNL (all the fibres in the cable, although only one fibre is used in BharatNet) till the same is replaced with the new laid network, incremental OFC laid under BharatNet & First Level Maintenance of GPON equipment (OLTs, ONTs and Solar Photo Voltaic Systems at the GPs) and New Network. All expenditure required to perform O&M of the Existing Network and New Network shall be the responsibility of the PIA.

The O&M of the network shall be carried out as per the Key Performance Indicators (KPIs)

provided. The PIA shall be required to commence O&M for newly connected individual Gram Panchayats (GPs) immediately after the date of commissioning and from the date of handover in case of existing BharatNet network.

- (a) The PIA shall be solely responsible for ensuring network uptime and performance along with providing comprehensive support during the entire Contract Period for the network created/upgraded till village level.
- (b) This shall also include the establishment of governance framework, and escalation procedures & matrix for network and customer support service on 365 x 24 x 7 basis.
- (c) As part of the maintenance, PIA shall be required to maintain the upkeep of the medium of connectivity, restoration of services, any other maintenance job required to meet the redundancy and KPIs.
- (d) PIA shall extend access of the Network Management System or other equivalent systems along with network performance reports on a mutually agreed basis to BharatNet Delhi and Bangalore NOC.
- (e) The services provided shall adhere and conform to applicable security policies and guidelines issued by DoT/TRAI/GoI.
- (f) PIA shall prepare and maintain asset records listing the assets at site locations required for performing the O&M and the same shall be shared with BSNL every quarter.
- (g) The PIA shall be responsible and bear costs for replenishment and upgrade of all active and passive infrastructure including all ancillaries required for smooth executions and operations & maintenance of project across the Contract Period.
- (h) KPIs shall be monitored (after 6 months from taking over) and reported by the PIA to BSNL on daily / monthly / quarterly basis, as required. Based on the performance of the network in the prior quarter, the penalty shall be computed as per the Clause-11 of Section-IV-B and shall be payable by the PIA.
- (i) In case of any defect, deficiency or deterioration in the Project poses a hazard to safety or risk of damage to property, the PIA shall promptly take all reasonable measures for eliminating or minimising such danger.
- (j) PIA may deploy a dedicated fault resolution team at the Block level or at any suitable place for effectively management of network.
- (k) The PIA shall insure all the equipment at GP for theft, damages due to fire, flood, earthquake, storm etc for the entire project duration.
- (l) **Periodic Maintenance**
 - (i) The periodic maintenance of the network shall be done based on the schedule
 - (ii) The corrective maintenance of the network shall also to be done for ensuring the network availability/ uptimes as per the KPIs.

8. Capacity Augmentation

- (a) The PIA shall replace/ upgrade the SFP based on the demand/ requirement during the contract period on payment basis.

- (b) The PIA shall provide the required spares and service support for the supplied equipment in the Project. In case of any solution/ equipment reaching End of Life (EoL) during contract period, the PIA shall be responsible for its replacement with equivalent / higher specifications.
- (c) In case of installation of products / material on account of capacity augmentation or replacement / repair the same shall be subject to Preliminary Acceptance testing conducted by the PIA.

9. Network and Service Provisioning

- (a) The network shall enable retail, enterprise and wholesale services as per the requirement of BSNL.
- (b) PIA shall provide all necessary support and facilitation to BSNL and designated service provisioning agencies for provisioning and monitoring of services from NOC.
- (c) The PIA shall ensure service assurance and accounting for all provided services from the network.

10. Project Completion Schedule

During Development Period, the PIA shall comply with the requirements set forth in this clause for each of the Project Milestones and the Scheduled Completion Date (the "Project Completion Schedule"). Within 15 (fifteen) days of the date of each Project Milestone, the PIA shall notify BSNL of such compliance along with necessary particulars thereof.

The PIA shall complete the Project as per following Project Milestones (the "Project Milestones") during the Development Period:

10.1 Project Milestone-I

- i. Project Milestone-I shall occur on the date falling on the 180th (one hundred and eightieth) day from the Appointed Date (the "Project Milestone-I").
- ii. Prior to the occurrence of Project Milestone-I, the PIA shall have completed the Commissioning of individual Rings and GPs should be visible in central NOC or in EMS not less than 10% (ten per cent) of the total number of GPs in the Package.

10.2 Project Milestone-II

- i. Project Milestone-II shall occur on the date falling on the 360th (three hundred and sixtieth) day from the Appointed Date (the "Project Milestone-II").
- ii. Prior to the occurrence of Project Milestone-II, the PIA shall have completed the Commissioning of individual Rings and GPs should be visible in EMS not less than 30% (thirty per cent) of the total number of GPs in the Package.

10.3 Project Milestone-III

- i. Project Milestone-III shall occur on the date falling on the 540th (five hundred and fortieth) day from the Appointed Date (the "Project Milestone-III").

- ii. Prior to the occurrence of Project Milestone-III, the PIA shall have completed the Commissioning of individual Rings and GPs should be visible in EMS not less than 50% (fifty per cent) of the total number of GPs in the Package.

10.4 Project Milestone-IV

- i. Project Milestone-IV shall occur on the date falling on the 720th (seven hundred and twentieth) day from the Appointed Date (the “Project Milestone-IV”).
- ii. Prior to the occurrence of Project Milestone-IV, the PIA shall have completed the Commissioning of individual Rings and GPs should be visible in EMS not less than 75% (seventy-five per cent) of the total number of GPs in the Package.

10.5 Project Milestone-V

- i. Project Milestone-V shall occur on the date falling on the 900th (nine hundredth) day from the Appointed Date (the “Project Milestone-V”).
- ii. Prior to the occurrence of Project Milestone-V, the PIA shall have completed the Commissioning of individual Rings and GPs should be visible in EMS not less than 90% (ninety per cent) of the total number of GPs in the Package.

10.6 Scheduled Completion Date

After all the Blocks are declared commissioned, after the Project Milestone-V (Commissioning of individual rings and not less than 90% GPs should be visible in S-NOC and C-NOC), the Schedule Completion Date shall be the 1095th (one thousand and ninety fifth) day from the Appointed Date.

Project Completion shall include complete integration of all equipment with EMS/ S-NOC & C-NOC along with updation of all the necessary documents (Licenses/ Manuals/ OEM agreements and support, Commissioning memo’s & AT reports, operations/ maintenance & safety instructions etc.) and of all the assets in C-NOC after installation and commissioning of all the rings & S-NOC with minimum 95% of the total numbers of GPs in the project as envisaged in the tender.

Delay in project completion shall attract the penalty as per LD clause. However, as per field requirements, project can be extended or short closed for the left-over GPs. *(Amendment No. 10.8)*

10.7 Timelines for initial survey: *(Amendment No. 26.3)*

The PIA shall conduct the initial survey as per survey milestones, mentioned in the table below:

Survey Milestone No.	Period for completion of initial survey	No. of GPs to be completed (percentage of total GPs in Package)
I	T0 + 3 months	5%
II	T0 + 6 months	15%
III	T0 + 9 months	40%
IV	T0 + 12 months	95%
• T0: Appointed Date		

Any delay in above-mentioned timelines for initial survey shall attract a penalty of Rs. 100/- per shortfall GP per week or part thereof.

There shall not be any relaxation in the timelines for Project Milestones, as mentioned above in clause-10 of Section IV-B, on account of the survey timelines mentioned herein.

11. Service Level Agreement hereinafter referred as SLA and penalties:

11.1. Construction Phase

- (i) All the Gram Panchayats (GPs) should be connected as per the scope of work defined and Project Completion Schedule. The Penalties applicable for not meeting the Milestones are as below:
- (ii) Should the PIA fail to achieve the defined Project Milestone within the period prescribed in Clause-10 above, BSNL, without prejudice to other remedies available to it shall be entitled to recover, as agreed, liquidated damages (LD) as follows:
 - a) at a sum equivalent to 0.5% of the value of incomplete GPs as per milestone for each week of delay or part thereof for a period up to 10 (TEN) weeks, and thereafter
 - b) at the rate of 0.7% of the value of the incomplete GPs as per milestone for each week of delay or part thereof for another 10 (TEN) weeks of delay. (LD is capped at 12% of package cost).
 - c) The Value of incomplete GP for the purpose of calculation of LD shall be taken as equal to the Total Project Cost (PO Value excluding O&M charges) divided by the number of GPs as per SOR for the package (*Amendment No. 10.9.1*)
 - d) **L.D. on subcontracted works:** If the achievement of a milestone is delayed due to any sub-contracted work, the applicable penalties/ LD shall be twice the penalties mentioned in clause-11 of Section IV B. (LD is capped at 24% of package cost). (*Amendment No. 26.4*)
- (iii) Non-completion of the targets of any Project Milestone even at the occurrence of the next Project Milestone shall render the PIA liable to any or all of the following sanctions:
 - a) Forfeiture of its performance security,
 - b) Imposition of penalty, and/ or
 - c) Short- closure of the contract in part or full and/ or termination of the contract for default.
- (iv) For the Project Milestone-I only (clause-10.1 of section-IV-B), the project milestone period (180 days, as per RFP) shall be up to 180 days from the appointed date or up to 120 days from the date of FWO issued by BSNL, whichever is later.
- (v) There will be a relaxation in the penalty/ L.D. during construction phase only in terms of grace period according to the achievements up to a certain extent, as mentioned below:

- (a) **For Project Milestone-I only:** If the PIA has completed 90% work against Project Milestone-I within the assigned timelines as per tender, there will be a grace period of 60 days for remaining work i.e. up to 10% of the 1st milestone. There will be no penalty during this grace period of 60 days for Project Milestone-I. In case, incomplete work is more than 10% of target, the grace period shall not be available and the Liquidated Damages shall be applicable as per tender.
- (b) There will be a further extended grace period of 30 days (beyond 60 days grace period) if only up to 5% work against 1st milestone is incomplete. In case, incomplete work is more than 5% of target, the extended grace period shall not be available and the Liquidated Damages shall be applicable as per tender.
- (c) Beyond the extended Grace period of 30 days, as per “(b)” above, Liquidated Damages shall be levied from the original target date of Project Milestone-I, as per clause- “(iv)” above.
- (d) **For Project Milestone-II:** If the PIA has completed 90% work against the Project Milestone-II within the assigned timelines as per tender, there will be a grace period of 30 days for remaining work i.e. up to 10% of the targeted work. There will be no penalty during this grace period of 30 days for the Project Milestone-II.
- (e) No **grace** period/ extended grace period shall be available beyond Project Milestone-II. Liquidated Damages shall be levied from the original target date of respective Project Milestones. *(two new sub-clauses under sub-clause-11.1 are inserted at No.- 11.1.(iv) & (v) Amendment No. 10.9.2)*

11.2. Operation and Maintenance Phase

Following table depicts the penalty to be deducted, depending on network uptime. The penalties for Operation and Maintenance provided below shall be applicable as listed in the table below:

11.2.1. SLA for the O&M of the existing made over network (BSNL Leased OFC, BharatNet incremental OFC and GPON equipment (OLTs, ONTs, SPVs), till the commissioning of IP-MPLS routers and new Rings:

SLA Parameters			
Sr. No	Parameter	Permissible Range	Remarks
1	Block wise all GPs-UP Time	≥98%	Based on availability from NOC. Exclusions only due to Force Majeure clauses, OLT power down and Electric connection unavailability.
2	GP down due to OFC Cut	One event of a GP going down due to OFC Cut in a month shall be allowed for upto 40% GPs in a Block	

(Amendment No. 10.10.1)

Note:

1. Successful bidder shall follow BSNL in house Trouble Ticket Module for capturing the fault status which will in turn be used for SLA calculation through the SLA module.
2. SLAs to be calculated Block wise and penalties to be imposed on monthly basis on O&M charges of the block network .
3. PIA shall ensure above SLAs else the corresponding penalties will be imposed.
4. GPs down time due to Block being down due to Power issues /media failure or equipment failure not attributable to PIA only to be excluded from SLA.
5. Wherever Electricity Connection is not available in the GP – Exclusion of down time after discharge of battery set shall be allowed in SLA provided the battery is in healthy condition and proper backup and charging system is functional. Wherever electric connection is available in GP but not in the building- The PIA can shift the equipment. If no suitable building is available, BSNL has to coordinate with State Authorities for getting Electricity connection. Till it is provided, down time during power unavailability to be excluded from SLA.
6. The shutdown taken for maintenance of fibre by PIA shall be excluded from SLA. However, such shutdown time in a month for a link can not be more than 8 hours. Further, there should not be more than 1% of links taken for shutdown in a month.
7. If electric supply is not available and the battery is unable to take load such down period of Block / GP will be excluded from SLA.
8. No exclusion except above or force majeure cases.
9. The PIA and IE shall take the OTDR traces, jointly, on a fort-nightly basis, from the Block and/ or GP ends, for all the cases where SLA relaxations are sought by the PIA till RFMS deployment is not completed to achieve the automatic measurement. (Amendment No. 10.10.1)

Penalties (Amendment No. 10.10.2)

S. No	Measurement Criteria	Definition	Quarterly Target	Penalty as %age of Quarterly O&M Payment for the GP
1	Network Availability at GP	Availability of GP	≥98%	No Penalty
			≥ 95% < 98%	Proportionate Penalty
			≥ 90% < 95%	Twice the Proportionate Penalty
			< 90%	3% additional penalty on account of each 1% reduction in uptime

Note 1: * At 98% availability, the penalty is zero and from 98% to 95% availability, penalty will be proportionate to SLA availability. For example, for availability of 97.56 %, it will be rounded off to single digit after decimal i.e. 97.6 and penalty will be 98-97.6=0.4%.

Note 2: SLA will be calculated Block wise (i.e. all the GPs under AMC connected to the Block) month wise.

Note 3: One event of a GP going down due to OFC Cut in a month shall be allowed for upto 40% GPs in a Block. A penalty shall be levied @ Rs. 200 per event beyond this and an incentive of Rs. 200 per GP shall be given to the PIA for count of GPs beyond 80% GPs in a block without a fibre cut in a month in the Block.

Note 4: There will be a performance-based relaxation in the penalties mentioned in the Table above for the period of one year from the appointed date. The relaxation will be as

below:

S. N.	Period	Average block wise GPs availability/ Up Time	Rebate on Penalty
1	Up to 6 Months	$\geq 85\%$	No Penalty
		$< 85\%$	Rebate of 60% of the applicable penalty up to 75% uptime and 40% rebate in case of below 75% uptime
2	6 to 12 months	$\geq 90\%$	No Penalty
		$< 90\%$	Rebate of 40% of the applicable penalty up to 80% uptime and 20% rebate in case of uptime below 80%.
There shall be no relaxation beyond one year from appointed date and the penalty shall be applicable as mentioned in the Table of Penalties.			

11.2.2. SLAs for Network Availability for S-NOC:

Measurement Criteria	Definition	Quarterly Target	Penalty as %age of Quart. Payable O&M payment of the State NoC network
Network Availability at NOC	All network equipment (Servicing affecting) installed and commissioned at S-NOC including but not limited to, core routers, switches, Firewall, IPS, EMS, NMS etc.	$\geq 99.9\%$	No Penalty
		$\geq 99.5\% < 99.8\%$	Proportionate Penalty
		$\geq 99\% < 99.5\%$	Twice the Proportionate Penalty
		$\geq 95\% < 99\%$	Thrice the Proportionate Penalty
		$< 95\%$	Five times the Proportionate Penalty

11.2.3. SLAs for Network Availability at Block level for Ring topology:

S. No	Measurement Criteria	Definition	Quarterly Target	Penalty as %age of Quarterly O&M Payment of the Block
1	Network Availability at Block level**	Availability of Block router (aggregation)- in ref to power infra and router hardware/software outage	≥99.5 %	No Penalty
			≥97.5 % to <99.5 %	Proportionate Penalty
			≥95.0 % to <97.5%	Twice of Proportionate Penalty
			<95.0%	1% additional penalty on account of each 0.25% reduction in uptime

11.2.4. SLAs for Network Availability at GP on Ring:

S. No	Measurement Criteria	Definition	Quarterly Target	Penalty as %age of Quarterly O&M Payment for the GP
1	Network Availability at GP	Availability of GP router (access)	≥98%	No Penalty
			≥ 95% < 98%	Proportionate Penalty
			≥ 90% < 95%	Twice the Proportionate Penalty
			< 90%	3% additional penalty on account of each 1% reduction in uptime

** The definition for equipment availability is common for all network equipment i.e. availability in Block, (Aggregation) and Gram Panchayat (Access) level Network equipment availability for a Quarter is defined as total time (in minutes) in a Quarter - total down time (in minutes) in a Quarter excluding planned network downtime during that Quarter. The network is considered available when all the services in full capacity are available. However, the downtime of GP router due to downtime of Block router shall be excluded from the downtime of GP router for SLA/Penalty purpose.

- Network Availability (%) = (Total minutes during the Quarter – Planned downtime during the Quarter – Unplanned downtime minutes during the Quarter) *100 / (Total minutes during the Quarter- Planned downtime during the Quarter)
- Planned downtime: details related to the planned downtime shall be agreed with BSNL and shall be communicated well in advance. The downtime of the Block and GPs commissioned during the implementation phase shall be calculated on pro-rata basis.

- Measurement Tool: Reports from NMS (OSS) duly approved by BSNL or its appointed agency. PIA shall submit Quarterly reports on the performance and adherence to the SLAs while the penalties shall be charged on quarterly basis.

Penalty Calculation Illustration:

Suppose upto 98% availability, the penalty is zero and from 98% to 95%, the penalty is proportionate, 95 to 90%, the penalty is twice the proportionate and below 90%, it is thrice the proportionate. Then, the maximum penalty in slab 98%-95% shall be 3%, slab 95%-90% shall be 3%+10%=13%. Illustrations of penalty calculation under different availability

- If the availability is 97.56 %, it will be rounded off to single digit after decimal i.e.97.6 and penalty will be $98-97.6=0.4\%$.
- If the availability is 92.43 %, it will be rounded off to single digit after decimal i.e.92.4 and penalty will be $3\% + 2*(95-92.4)\%=8.2\%$.
- If the availability is 82.67 %, it will be rounded off to single digit after decimal i.e.82.7 and penalty will be $3\% + 10\% + 3*(90-82.7)\%=34.9\%$.
- If the availability is 61 %, the penalty will be $3\% + 10\% + 3*(90-61)\%=100\%$.
- The penalty shall never be more than 100%

11.2.5. SLA Exclusion for upgraded/ newly created Network:

- electricity and manual switching off the equipment.
- To address these issues, the following steps are to be taken by the PIA-
- To separate out the power connection from other utilities (like fan, bulb etc) in such a way that the BharatNet equipment is not switched off whenever someone switches off other utilities during, night, weekend, holiday etc.
- Wherever, the daily average availability of electricity is less than 8 Hrs, it is presumed that the Battery may not get fully charged and be able to run the equipment continuously. Such sites may be captured at the survey stage itself and 1 Kw Solar Panel may be provisioned for such sites. However, the same needs to be approved by BharatNet BA Head.
- Above arrangement shall leave little chance for asking SLA exclusion due to Electricity issues.
- PIA shall ensure availability of alternative power arrangements, where electricity is not available beyond 12 hours in a GP. *(Amendment No. 10.11)*

11.2.6. Service provisioning by PIA from S-NOC (As per services mentioned in the sub-clause no. "3.5.(f).iv" of Section-IV-B) *(Amendment No. 10.12):*

S. No	Measurement Criteria	Definition	Target	Penalty
1	Service Provisioning	Provisioning and monitoring of services from S-NOC	Up to 48 hours	No Penalty
			> 48 hours	INR 10,000 per day

11.2.7. MTTR and No. of OFC cut/Block /month:

S. No	Measurement Criteria	Definition	Target	Penalty
1			Up to 8 hours	No Penalty

S. No	Measurement Criteria	Definition	Target	Penalty
	Mean Time To Repair (MTTR) for Fibre in Ring		> 8 hours upto 24 hours	INR 500 per additional hour
			More than 24 hours	INR 1,000 per additional hour
2	No. of OFC cut/Block /month	One cut if the OFC Route KM in the block is ≤ 50 ;	N cuts if the OFC Route KM is $> 50(N-1)$ and $\leq 50N$	NIL
		Two cuts if the OFC Route KM in the block is > 50 and ≤ 100 ;		
		N cuts if the OFC Route KM is $> 50(N-1)$ and $\leq 50N$	Above N cuts/fault/month or part thereof	INR 1,000/- per cut/fault

Mean Time To Repair (MTTR) shall be monitored on the time taken between logging of complaint against the network and its closure.

Measurement Tool: Reports from Ticketing Tool approved by BSNL or its appointed agency. PIA shall submit Monthly reports on the performance and adherence to the SLA while the penalties shall be charged on Quarterly basis.

11.2.8. DEPLOYMENT OF FRT (*Amendment No. 10.13*)

(a) Minimum Resources to be deployed in a FRT Team (suggested):

- (1) Technician for splicing & measurements.
- (2) Manpower for surveillance, liaison, and patrolling (one man for about 70-80 kms beat). However, the bidder has to deploy extra manpower for as and when needed during any work or other agencies work in the section.
- (3) Un-skilled manpower for trenching etc.
- (4) OTDR for measurement at 1310, 1550 and 1625nm.
- (5) 1 km length dummy fiber spool
- (6) Fusion splicing machines (ribbon and single fibre) with cleavers.
- (7) Optical laser source power meter
- (8) Cable fault locator / Electronic locator system for armored/unarmored OFC.
- (9) Vehicle for transportation of men, machines, and stores.
- (10) Communication Gadgets: as required.
- (11) Tool/ Tackles kit.

(b) Deployment of FRT:

- (i) The FRT team needs to be deployed based on RKM to be maintained in a Package. One (01) FRT team with the composition mentioned above need to be deployed for every 250 RKM of the network under O&M.
- (ii) The tracking of FRT team and associated manpower as mentioned above shall be done through manpower tracking application of the FRT Team Leader provided by the PIA/ BSNL.
- (iii) 5% of monthly O&M payment for a package shall be deducted in case the average availability (on monthly basis) of FRT, in the Package, is less than 80% of the required number of FRTs. The deduction will be 10% if the availability of FRTs in the package is below 60% in any month.

Illustration: Suppose in a Package, the network to be maintained is around 1000 RKM, then the number of FRT teams to be deployed shall be four (4). The FRT teams should be available for 80% on an average i.e. out of 120 FRT team-days, 96 FRT team-days shall be trackable for that month.

If the average availability in a Package in a month is below 80% (below 96 FRT team-days), then 5% of O&M charges for the month for the package will be deducted in addition to the SLA deductions. Further, if the average availability in a month is below 60% (below 72 FRT team-days), then 10% of O&M charges for the month for the package will be deducted in addition to the SLA deductions.

- (iv) To monitor the availability of FRTs for penalty calculation as mentioned above, BSNL shall provide mobile based GIS application to the PIAs.
- (v) In case PIA deploys its own mobile based GIS application to monitor the movement of FRTs for operation and maintenance, BSNL may allow the integration of the same with BSNL's GIS App for penalty calculation, eliminating the need for FRTs to update their attendance in two separate applications.

11.3 In case of any issue impacting project progress and SLAs, as defined in the RFP, due to the reasons beyond control of the PIA; the PIA shall report the same in the online message board which shall be provided by BSNL. BSNL & IE shall respond to the issues raised by PIA on the message board itself. *(Amendment No. 10.9.3)*

12. Payment of Bid Project Cost

12.1. Upon receiving request from PIA, BSNL on behalf of USOF, DoT shall make an advance payment (the "Advance Payment"), upto 10% (ten percent) of the capex value of the bid Project Cost, for mobilisation expenses and for acquisition of equipment.

- a)** Mobilization Advance will be non-interest bearing for the specified term.
- b)** The PIA shall submit an additional Bank Guarantee of 110% of the Mobilization Advance valid up to 60 days after the Construction Completion Date.
- c)** Initial Mobilization advance upto 10% of the capex value shall be adjusted in 8 (eight) equal quarterly instalments. The first instalment shall be adjusted in the 9th month (from the month of disbursement of the advance) from the due payments, second instalment in the 12th month, 3rd instalment in the 15th month and so on. The PIA can avail, a further Mobilization Advance of up to 5% (five percent) of the capex value of

the bid project cost, on the Completion of Project Milestones II. The second mobilization advance shall be adjusted in 6 (six) equal quarterly instalments starting from 6th month from the date of disbursal of the advance. Similarly, further third Mobilization Advance of up to 5% (five percent) of the capex value of the bid project cost may be additionally availed, after the completion of Project Milestones IV. The third mobilization advance shall be adjusted in 4 (four) equal quarterly instalments starting from 4th month from the date of disbursal of the advance. However, on completion of the last milestone, 100% advance pending will be adjusted in the invoices to be paid. In case of delayed adjustment of mobilization advance due to non-completion of Project completion Milestones (including grace period), penal interest shall be charged for the delayed period @ SBI MCLR rate per Annum. In case of non- completion of work, penal interest shall be charged for the entire period starting from the date of disbursal of such advance till the date of adjustment/ deposit with BSNL. For Mobilization Advance taken with GST, the amount of GST shall be returned/ adjusted in full by the PIA within 18 months from date of disbursal of advance, or the milestones due within 18 months; whichever is earlier. **(Amendment No. 10.14.1)**

- d)** In case of non-adjustment of advance, in the prescribed period, the PIA will deposit the payable amount in next 30 days with interest, otherwise BSNL on behalf of USOF, DoT reserves the right to invoke the PBG for recovery of principal and interest.
- e)** The PIA can request for mobilization advance after signing of the agreement between BSNL (on behalf of USOF, DoT) and PIA.
- f)** Bid Project Cost shall be due and payable to the PIA in installments during the Development Period
- g)** Upon receiving the invoices after completion of works as under from the PIA, duly certified by the Independent Engineer, BSNL shall disburse, within 45 (forty five) days of the receipt of each such invoice, installments as mentioned below:

h) For GPs planned in a Ring: (Amendment No. 10.14.2)

S. No.	Milestone	% of Payment	% of Cumulative Payments
1a	Commissioning of electronic equipment (router) at Block (visible in S NoC or validated through C-NOC by IP ping)	75% of Block equipment cost	-
1b	Commissioning of electronic equipment (router) at GP* (visible in S NoC or validated through C-NOC by IP ping)	75% of GP equipment cost	
2	Commissioning of at least 90% electronic equipment (router) of a ring (at least 90% GPs in a ring) (visible in S NoC or validated through C-NOC by IP ping)	5% of equipment cost (Block and GP)	-
3	Commissioning of individual rings as specified in Sl No. 2 (visible in S NoC or validated through C-NOC using eMS) **	80% of OFC construction cost***	80%

S. No.	Milestone	% of Payment	% of Cumulative Payments
4	90% GPs of respective Block visible in S-NOC	10% of equipment and OFC construction cost	90%
5	At-least 90% GPs of 90% Blocks are completed (visible in S NoC)	5% of OFC construction cost	95% of OFC construction cost + equipment cost as per Note-iv below
6	Completion of project with or without short closure	5% of OFC construction cost #	100% of OFC construction cost + equipment cost as per Note-iv below

* GP shall be considered commissioned only when corresponding block has already been commissioned.

**PIA can claim, payment of 80% of milestone 3 above for OFC construction as per actual completed portion (node to node) for the ring in a block in case the ring is not completed due to reasons beyond the control of PIA like issues from State Government (including RoW), provided all the GPs are up & in working condition and number of such GPs (working but not in ring) is less than 20% of the total required GPs against the payment milestone.

*** including the claimed amount of OFC construction, if any, as per clause 3.2.1 of section IV B

Except for equipment mentioned in note iv below.

Note:

- i. PIA shall raise an invoice in the name of USOF, DoT on monthly basis for the completed work
- ii. Payment of the above-mentioned milestones shall be done in the sequential order
- iii. The payment against milestone 2 and 3 for the GPs planned in spur shall be released by considering such GPs as part of the ring.

The 10% payment of all the electronic items namely- Router at GP, Router at Block, digital microwave, UBR, all the equipment at State NOC, RFTS, the Racks, UPS/Power Plant, Battery, as specified at Sl. No. 3 to 11 of Price Schedule and items at Sl. No. 16 to 21 in the table of pre-defined rates, shall be made on completion of warranty of one year for these equipment

i) Payment for construction and maintenance of the uncovered GPs using existing optical fibre cable of any TSP/ISP/IP-1 license holders on lease (as per clause 3.6.(a).iii of section-IV-B):

- 20% of the due amount for the leased cable (As per Table in clause 3.6.(a).iii of section-IV-B) shall be paid after commissioning of all the GPs in the ring connected through the leased OFC.
- Remaining amount shall be paid in the quarterly installment of 1.5% of total amount (As per Table in clause 3.6.(a).iii of section-IV-B),

- The minimum commitment period for such quarterly payment from BSNL shall be up to 7 years.
- The maximum period for which the 1.5% quarterly payment to be done, shall not exceed 10 years. After 10 years period, the assets of 24/48 F OFC, as the case may be, shall be transferred to USOF at nominal price of Rs. 1.00 per Km.
- Balance 20% of due payment (As per Table in clause 3.6.(a).iii of section-IV-B) shall be made on successful handover of such OFC along with duct to USOF.
- The PIA shall transparently maintain all the fibres (live and dark) of such leased OFC on end-to-end basis for entire duration of the contract. The SLA and penalty for live fibres as well as fibres leased out by BSNL shall be same as for GP as defined in Clause 11.2.4 and 11.2.7. If any unused dark fibre is not available for >95% during a quarter, the proportionate payment (of 1.5% quarterly payment) shall only be paid for these fibres, which are available.
- All the SLA penalties as defined in clause 11.2.4 in respect of ring created on leased OFC will be applicable to quarterly amount (1.5% quarterly payment) .

j) Payment for S-NOC development shall be due and payable to the PIA in installments during the Development Period, as below:

Sr. No.	Milestones	Proposed payment schedule
1	Physical Infra Readiness & Delivery of S-NOC material > Readiness of civil, electrical infrastructure > Delivery of hardware, software applications and licenses	30% of S-NOC cost
2	Installation and commissioning (AT completion) of S-NOC along with at least integration of 10% GPs	30% of S-NOC cost
3	Integration with BharatNet NOC (C-NOC) at New Delhi & Bengaluru	15% of S-NOC cost
4	Completion of Project	15% of S-NOC cost
5	After the completion of 1 year Warranty	10% of S-NOC cost

13. O&M Payments:

13.1 All O&M Expenses in the form of quarterly payments shall be due and payable by BSNL on behalf of USOF, DoT , as per the yearly O&M Cost as under , Similarly for fiber on lease , the O&M payment is already clubbed in the quarterly payments , thus any O&M Expenses in excess of such O&M (incase of PIA constructed fiber) or quarterly (for fiber on lease) payments shall be borne solely by the PIA. For avoidance of doubt, it is clarified that the quarterly payments for such fiber on lease and PIA constructed fiber will be treated separately being on different routes , thus the quantity under the scope of PIA shall be as per actual only and no overlapping , of fiber on lease and fiber construction by PIA , will be allowed on any route .

13.2 O&M payment will be paid GP wise after completion of every quarter, based on the SLAs (averaged over a block, counting only GPs under AMC) during the O&M phase. The O&M charges shall be worked out as a fixed percentage of CAPEX for a particular financial year. For the existing OFC network, notional CAPEX shall be worked out based on the RKM length

of the taken over OFC network by the PIA multiplied by the rates as mentioned in the AWO, as below:

- (a) for 24F OFC: Unit Price of item at S. No.- 1a of the Price Schedule of RFP (marked as 'A').
- (b) for 48F OFC: Unit Price of item at S. No.- 1b of the Price Schedule of RFP (i.e. 1.1 times of 'A').
- (c) for 96F OFC: 1.2 times the cost of 24F OFC (mentioned at (a) above).
- (d) for 288F OFC: 1.35 times the cost of 24F OFC (mentioned at (a) above)

NOTE: The damaged routes shall not be considered for calculation of AMC and AMC payment on notional CAPEX basis. *(clause 13.2 including note as per Amendment No. 10.15.1)*

- 13.3 Any section which is in damaged condition or temporarily restored shall be clearly mentioned in the HOTO memo. For permanent restoration of such damaged sections/ temporary restored sections, the PIA shall be paid as per the predefined rates (as per TABLE-2 of Pre-defined Rates in Section-VII) or 90% of the present tender approved rate, whichever is lower, for the work up to 10% of the total taken over incremental OFC RKM (FPOI to GP).

In case, such permanent restoration work is required to be taken up beyond 10% of the total taken over incremental OFC RKM, the PIA shall be paid at 90% of the present tender approved rates, in place of predefined rate, for the work carried out beyond 10%.

The replacement of damaged sections can be any section from Block to GP. *(clause 13.3 as per Amendment No. 10.15.2)*

13.4 O&M cost during Project execution Phase

- A. The O&M cost per GP (for network having equipment under warranty) for a quarter shall be worked out as under-

[CAPEX of the commissioned works (except the OFC taken on lease as per clause 3.6.(a).iii and electronic items under warranty out of items as mentioned in Note-iv of Para-12.1.h above) as on the last day of the previous quarter + notional CAPEX of the made over OFC network] / No. of GPs under O&M on the first day of the quarter * R[year wise as per Para-13.5 below].

- B. After the completion of warranty of 1 year for the electronics items (as mentioned in Note-iv of Para-12.1.h above), the O&M cost for those GPs where the warranty is already over, the O&M cost shall be worked out as under-

[CAPEX of the commissioned works as on the last day of the previous quarter + notional CAPEX of the made over OFC network] / No. of GPs under O&M on the first day of the quarter * R[year wise as per Para-13.5 below]

- 13.5 **O&M Rate (Year wise):** Percentage O&M rate for the year after commissioning shall be as per below table. Year 1 in the table below shall be financial year in which the first ring in the package is commissioned. Year 2 shall be next financial year and so on.

Year	1	2	3	4	5	6	7	8	9	10
OPEX to be paid as % of the CAPEX /notional CAPEX (R)	5.5	5.5	5.5	5.5	5.5	6.5	6.5	6.5	6.5	6.5

NOTE:

Beyond 10th year, the equipment which is not EoSL (End of Support Life), can be continued along with the network for O&M as per decision of USOF/ BSNL and also with the consensus of PIA. The OPEX payable after 10th year will be enhanced annually by 4% (i.e. 11th year will have OPEX of 6.76%, 12th year will be 7.02% and so on) till the continuity of the O&M of the network by PIA. *(clause 13.5 including note as per Amendment No. 10.15.3)*

- 13.6 Further, with regards to the payment of O&M Payments to the PIA, BSNL shall pay 75% (seventy five per cent) of the invoice amount within 45 (forty five) days of receiving a demand from the PIA along with invoice and necessary particulars. Remaining 25% (twenty five per cent) payment shall be made to the PIA by BSNL after due audit / verification, within 90 days of receiving a demand from the PIA along with invoice and necessary particulars.
- 13.7 The PIA shall be responsible for maintenance, including FLM of the made over GPON network, comprehensive O&M of OFC network, MPLS network, associated infrastructure, replacement of any OFC damages up to 200 meters length damaged in a single stretch, within AMC cost /charges including material & services. However, if the OFC route damages are unavoidable and are of more than 200 m and have been intimated to the IE or BSNL before crossing 200 m, the PIA shall get the separate work order from BSNL for replacement of damaged section. The PIA shall be paid, for such replacement of damaged sections after getting firm work order for the same from BSNL, the cost of material and services @ 70% of the approved rates for the project (The same is approximately the cost of the material in full and 50% of the Cost of Services). PIA may coordinate for raising demands from agencies requiring shifting of cables, if applicable, before taking approval for such replacement of damaged sections. In such case, the PIA will also be required to restore the GP using OH OFC on temporary basis within 12 Hrs, else, SLA penalty will be applicable.
- 13.8 The PIA shall identify and notify the sections of made over OFC network which have become lossy and need replacement during the contract period to the IE/BSNL for replacement. After getting approval from BSNL, the PIA shall submit the estimate along with BOQ for such replacement. After getting the firm work order, the PIA shall replace such section at the approved rates finalized based on quoted rates as per PO. In such cases also, the PIA will also be required to restore the GP using OH OFC on temporary basis within 12 Hrs, else, SLA penalty will be applicable.

14. Note:

- (1) In case any associated component is required not covered in the BoM, PIA shall provide the same to complete the work without any extra cost.

- (2) The PIA shall be required to follow the Technical Specification & Testing Parameters as mentioned in **Annexure A, Annexure-B, Engineering Instructions (EI) (Annexure C) and Annexure D.**
- (3) Any deviation from the standard EI, shall be liable for penalty as per clause 6 & 11.
- (4) In case there are any changes in the standard engineering instructions, PIA may be asked to execute the work as per the latest engineering instructions.
- (5) During the process of execution, the PIA shall be responsible for resolving all the disputes arising out of damages caused to the public utilities and infrastructure of private operators/ public including payment of compensation, if any.
- (6) **13.2 to 13.8 is not applicable for fiber on lease routes , once the first lease in payment of 20% becomes due and claimed by PIA -as per 12.1 (i) above)**

15. Quality Assurance and Testing *(whole clause {excluding clause 15.10 and table mentioned under clause 15.10} as per Amendment No. 9)*

15.1 Indigenous Equipment:

- 15.1.1 The supply of Equipment manufactured indigenously shall be accepted only after Quality Assurance tests are carried out by the QA circle, as mentioned in Para-15.1.2 below. For other items which do not have TEC GR, QA shall be done based on a test schedule submitted by the Successful Bidder and approved by BSNL. However, for branded IT items such as computers, laptops, servers and computer peripherals that are supplied by ISO certified companies, BSNL, at its discretion, may accept the testing and quality certificate of such companies in lieu of QA requirements and copy of the same shall be submitted to the BharatNet BA Head of relevant Circle at the time of supply of these Equipment and to the Inspection Circle for verification while offering for acceptance testing. The relaxation of QA requirement, if necessary, shall be given by BSNL on a case-to-case basis.
- 15.1.2 In case of supply of Indigenous equipment, for Routers to be installed at Blocks & GPs and RFMS, the Bulk QA testing shall be carried out, as under:
 - (i) If the actual supply experience is up to 5 times the maximum supply experience, required for eligibility criteria, as per the certificate provided in accordance with clause-2.11.(i) of Section-IV-A *(as per clause- 2.11.(ii), in case of Class-I & Class-II local suppliers)*, the Bulk QA testing shall be done on 20% of the quantity to be supplied. Similarly, if the actual supply experience is between 5 to 7 times the maximum supply experience, required for eligibility criteria, Bulk QA testing shall be done on 10% of the quantity to be supplied and if the actual supply experience is more than 7 times the maximum supply experience, required for eligibility criteria, Bulk QA testing shall be done on 5% of the quantity to be supplied. *{see illustration-1, below}*
 - (ii) In case of failure of any component during the Bulk QA testing-
 - (a) Complete lot shall be deemed as rejected. The same lot shall be offered again for Bulk QA testing by the concerned OEM.
 - (b) The offered quantity shall be equal to that of the rejected lot. For such re-offered lot (post rejection), Bulk QA testing shall be done on the 100% offered quantity.

- (c) For all the further offered lots (post rejected lot), Bulk QA testing shall be done on the 10% more quantity than the prescribed quantity as in sub-clause-(i) above (i.e. 20%, 10% or 5%, as the case may be).
- (d) As mentioned at para- (a) & (b) above, for all the re-offered lot (post rejection), Bulk QA testing shall be done on 100% offered quantity.
- (e) After each rejected lot, Bulk QA testing shall be done on 10% more quantity than the previous successfully tested lot, as mentioned at para- (c) above.

{see illustration-2 below}

- (iii) The PIA/ respective OEM shall make the suitable arrangements in India for such Bulk QA testing of such imported items.

15.2 Imported Equipment:

15.2.1 The supply of imported equipment (except Block & GP Rccxouters and RFMS) shall be accepted only if it is accompanied with Factory Test Reports (FTR)/ certifications of various performance parameters required as per relevant TEC GR & Technical Specifications mentioned in this tender together with environmental test as per BSNL QA document QM333 with bulk testing certificate from QA, BSNL. Any imported equipment not accompanied by the Factory Test Reports/ certifications of various services, features, facilities and performance parameters as per relevant TEC GR & Technical Specifications in RFP together with environmental testing certificate as per QA document QM-333 shall not be accepted. For the IT equipment such as Routers (except Block & GP Routers and RFMS), servers etc. supplied by ISO certified companies, the PIA shall seek for any specific relaxation, if necessary, along with reasons, on QM333 requirements from QA Circle before supplies are made which will be considered by QA circle and decision of the same will be binding. The Factory Test Reports and certification with relaxed parameters are to be submitted along with the supplies.

15.2.2 In case of supply of imported items, in addition to FTR as mentioned, the bulk testing shall also be required. For Routers to be installed at Blocks & GPs and RFMS, the Bulk QA testing shall be carried out, as under:

- (i) If the actual supply experience is up to 5 times the maximum supply experience, required for eligibility criteria, as per the certificate provided in accordance with clause-2.11.(i) of Section-IV-A, the Bulk QA testing shall be done on 20% of the quantity to be supplied. Similarly, If the actual supply experience is between 5 to 7 times the maximum supply experience, required for eligibility criteria, Bulk QA testing shall be done on 10% of the quantity to be supplied and if the actual supply experience is more than 7 times the maximum supply experience, required for eligibility criteria, Bulk QA testing shall be done on 5% of the quantity to be supplied. *{see illustration-1, below}*
- (ii) In case of failure of any component during the Bulk QA testing-

- (a) Complete lot shall be deemed as rejected. The same lot shall be offered again for Bulk QA testing by the concerned OEM.
- (b) The offered quantity shall be equal to that of the rejected lot. For such re-offered lot (post rejection), Bulk QA testing shall be done on the 100% offered quantity.
- (c) For all the further offered lots (post rejected lot), Bulk QA testing shall be done on the 10% more quantity than the prescribed quantity as in sub-clause-(i) above (i.e. 20%, 10% or 5%, as the case may be).
- (d) As mentioned at para- (a) & (b) above, for all the re-offered lot (post rejection), Bulk QA testing shall be done on 100% offered quantity.
- (e) After each rejected lot, Bulk QA testing shall be done on 10% more quantity than the previous successfully tested lot, as mentioned at para- (c) above.

{see illustration-2 below}

- (iii) The PIA/ respective OEM shall make the suitable arrangements in India for such Bulk QA testing of such imported items.

Illustration-1: *If the requirement is 2,500 routers in a package against which the bid has been submitted by a bidder. Thus, the required experience is of 750 (30%) routers as per clause 2.11.(i) of Section-IV-A (or 10% as per clause- 2.11.(ii), in case of Class-I & Class-II local suppliers). For any OEM, having actual supply experience up to 3,750 routers, as per the experience certificate(s); the Bulk QA testing shall be done on 20% of the quantity to be supplied i.e. 500 routers. Similarly, for an OEM with actual supply experience of 3,750 to 5,250; the Bulk QA testing shall be done on 250 routers and; for an OEM with actual supply experience of more than 5,250, the Bulk QA testing shall be done on 125 routers.*

Illustration-2: *An OEM qualify (as per actual experience and required supply) for 20% Bulk QA testing and equipment is to be offered in 10 lots. If the 3rd lot is rejected, the same lot shall be re-offered and 100% quantity shall be tested for Bulk QA. For 4th lot onwards, Bulk QA testing shall be carried out on 30% of offered quantity. Further, if 7th lot is rejected, 100% quantity of re-offered 7th lot shall be tested. For 8th lot onwards, Bulk QA testing shall be carried out on 40% of offered quantity and so on.*

- 15.3 The supply of equipment/stores/services shall strictly adhere to the package discipline as described in the Purchase/Work Order. A particular item mentioned in SoR would deem to have been received in full only if all the parts/ components, installation material etc. are supplied as a package during Scheduled Delivery Period.
- 15.4 All equipment supplied shall be new products only and no refurbished equipment shall be supplied in any case.
- 15.5 In case of any Quality issue, the PIA shall be required to replace the defective/inferior material, in full, by good material duly passed by QA.
- 15.6 A quality manual describing the QA system shall be submitted along with the bid, which should include the details about the component quality assurance and quality system practices, including data on critical components.
- 15.7 The PIA shall obtain approval from CGM (BharatNet), BSNL Corporate Office for all the passive items to be supplied under the contract (MAF and TSEC/ QF-103 for passive items

are not required to be submitted along with bid). The bidder shall submit a request enclosed with valid MAF (in the format as per tender) and copy of TSEC to CGM (BharatNet), BSNL CO, New Delhi for approval of an OEM.

- 15.8 **QA Charges:** The PIA shall get the QA done for all the material to be used for which specifications have been defined. The successful bidder shall pay the required QA charges (1% of the material cost) to BSNL QA Circle and will get the reimbursement of the same from BSNL on submission of the invoice for the same. BSNL will fix notional cost for the material for calculation purpose of the QA charges for the materials for which cost not taken as separate line item in the price schedule.
- 15.9 TSEC of imported items shall be done as per the BSNL QA circle's prevailing guidelines on QA for imported items. *(clause 15.1 to 15.9 as per Amendment No. 9)*
- 15.10 The PIA shall have valid Type Approval Certificate (TAC) from Telecom Engineering Centre (TEC), New Delhi or Technical Specification Evaluation Certificate (TSEC) from Quality Assurance Circle, BSNL, Bengaluru, against the respective technical specifications of this RFP, before commencement of the supply. The requirement of TSEC for various items to be used for execution of the project are mentioned in the Table below: *(clause 15.10 and Table as per Amendment No. 21)*

S. No.	Material name	TSEC (Required/ Not Required)
1	24F loose tube type armoured optical fibre cable	Required
2	48F ribbon type armoured optical fibre cable	Required
3	PLB HDPE telecom duct (40/33mm)	Required
4	24F Metal Free Aerial Optical Fibre Cable (24F ADSS)	Required
5	Joint Enclosure (48F and above)	Required
6	SJC/BJC (24F)	Required
7	Fibre Distribution Management System Type I at Block location	Required
8	Fibre Termination Box/FDMS Type-IIIA & IIIB – 48F at GP locations	Required
9	Rack at Block locations	Required
10	Rack at GP locations	Required
11	IP-MPLS Router at Block location	Required
12	IP-MPLS Router at GP location with accessories	Required
13	Remote Fibre Monitoring System (RFMS) including necessary hardware and software with accessories	Required
14	Power System with backup provisions at GP locations with provision of MPPT Card including solar panels	Required
15	Power System with backup provisions at GP locations with provision of slot for MPPT Card BUT excluding MPPT Card & solar panels	Required
16	Lithium-Ion Battery of 2400 VAH to be used	Required

S. No.	Material name	TSEC (Required/ Not Required)
17	Installation Accessories and fixtures of Self-Supporting Metal free Optical Fibre Cable	Required
18	Poles for ADSS Fiber Laying	Not Required
19	Route/Joint indicators	Not Required
20	SFP 100G (with 40km / 80km) pluggable	Not Required
21	SFP 10G (with 10km/40km/80km) pluggable	Not Required
22	SFP 1G with 10km pluggable	Not Required
23	SFP 10G with 10Km pluggable	Not Required
24	SFP 1G with 10 km pluggable	Not Required
25	Civil works including site preparation and partitioning works , false flooring, false ceiling, etc.	Not Required
26	Electrical works including light fixtures, cabling, panels + earthing etc.	Not Required
27	Silent DG set with AMF panel	Not Required
28	Air conditioning for NOC, UPS, BMS, Meeting, electrical rooms, etc.	Not Required
29	40 kVA online UPS (with SNMP)	Not Required
30	Access Control System (RFID + Biometric, smart cards)	Not Required
31	Racks (Integrated Air conditioning and climate monitoring system covering entire Racks/suite/Isle/Data Centre only)	Not Required
32	IP camera with intelligent monitoring system including software & internal storage	Not Required
33	70" LED TV	Not Required
34	Structured cabling (OFC and Cat6)	Not Required
35	Workstation furniture and fixtures including chairs	Not Required
36	Fire Detection System	Not Required
37	NOC Router	Not Required
38	Core Switch	Not Required
39	Access Switch	Not Required
40	Aggregation Switch	Not Required
41	Primary SAN storage for application & DB	Not Required
42	SAN Switch	Not Required
43	Secondary Storage (As per requirement, to be assessed by PIA)	Not Required
44	Blade Chassis/Rack servers (including AAA) (As per requirement, to be assessed by PIA)	Not Required
45	Workstation computers (i5 2.5 GHz processor, 8 GB DDR4, 1 TB HDD with 19.5 Full HD Monitor Key Board & Mouse with all other accessories as per requirement; 1xDVI output, 2xHDMI Output, 1xVGA Output)	Not Required
46	IP phones	Not Required
47	IP PBX	Not Required
48	Video wall display, Controller, Video wall Management	Not Required

S. No.	Material name	TSEC (Required/ Not Required)
	Software & Accessories	
49	Backup and archival solution	Not Required
50	NMS/OSS Solution	Not Required
51	Helpdesk solution	Not Required
52	End point protection software	Not Required
53	Centralized Access Control system software	Not Required
54	Firewall (1+1)	Not Required
55	NIPS (1+1)	Not Required

NOTE: If any item is not covered in the table above, the TSEC applicability shall be decided by BSNL, as per prevalent guidelines of the BSNL QA circle.

16. RIGHT OF WAY

- 16.1.** The Right of Way for the Project shall be granted as per the existing agreement with the State Government and facilitated by BSNL through introduction letters for creation and upgradation of New Network and Existing Network respectively during the Development Period.
- 16.2.** Based on network survey and design, or any other activities it may deem necessary, the PIA is permitted to apply and obtain the Right of Way for the Project from the State Government and other agencies from the Appointed Date.
- 16.3.** The PIA shall, at its own expense, apply for and obtain the Right of Way for the Project which shall include making and filing applications, paying associated costs related to RoW approval, liaising with Government Instrumentalities and agencies etc. for which PIA may engage suitable consultants. The PIA shall pay the ROW charges to be paid to the ROW agencies, if the same is upto Rs 50,000/-. The PIA shall claim the reimbursement of the same from BSNL. If the amount is more than Rs 50,000, PIA shall have the option either to pay to the ROW agency and seek reimbursement from BSNL along with normal bills or ask BSNL to pay directly to the ROW agency. The similar arrangement shall be applicable during the whole contract period for O&M also.
- 16.4.** The PIA shall not be required to pay Right of Way access charges for the Project during the Contract Period to the State Government (s) or its agencies. Further, any other costs associated with the Right of Way which are beyond the scope of the agreement between the State Government and DoT/ USOF/ BSNL shall be reimbursed by BSNL, subject to submission of valid proof of payment by the PIA. This includes applicable charges for Right of Way from Government Instrumentalities regulating forest land, railway lines, defence areas, highways, oil and gas pipelines or any other agencies or departments.
- 16.5.** Further, it is being expressly agreed and understood that DoT/ USOF/ BSNL or the State Government shall have no liability whatsoever in respect of survey carried out or work undertaken by the PIA on or about the Site (Route) of the New Network and Existing Network pursuant hereto in the event of Termination or otherwise.

- 16.6.** BharatNet BA Head shall relax the penalties on delay due to ROW permissions with proper justification. No penalty shall be levied due to delay in RoW due to any reason whatsoever if the same is not solely attributable to the PIA.
- 16.7.** Reinstatement charges based on the standard SOR rates of the District/ State authorities, if any, shall be payable by BSNL either to the respective authority or shall be reimbursed to the PIA, if paid by the PIA after the same is approved by BSNL. However, the delay on account of delayed payment/ non-payment of such reinstatement charges shall be on account of the PIA and no LD waiver for such delay shall be granted.
- 16.8.** It is expressly agreed that the license granted hereunder with respect to Right of Way for the Project shall terminate automatically and forthwith, without the need for any action to be taken by BSNL to terminate the license, upon the Termination of this Agreement for any reason whatsoever.
- 16.9.** It is hereby clarified that the provisions of this Clause shall apply mutatis mutandis for any additional Right of Way that may be required for the Project in accordance with the provisions of this Agreement, and upon procurement thereof, such Right of Way shall form part of the Project, as the case may be.

Note :- Installation of poles shall be at public land only. (Clarifications and amendments post doubt clearing workshop dated 17th May,2024)

17. MONITORING OF THE PROJECT

17.1. Project progress reports

During the Development Period, the PIA shall, no later than 7 (seven) days after the close of the mutually agreed upon time period, furnish to BSNL and the Independent Engineer report(s) on the progress of the Development Works and the Upgradation Works, in the agreed format, and shall promptly give such other relevant information as may be required by the Independent Engineer/BSNL. The PIA shall also develop a graphical user interface for reporting of data and for providing information on the Development Works, Upgradation Works and the operation and maintenance of the Project Assets to BSNL and the Independent Engineer.

17.2. Inspection during Development Phase

During the Development Period, the Independent Engineer shall have the right to inspect and audit the network infrastructure and make a report of such inspection (the “**Inspection Report**”). The Inspection Report shall state defects or deficiencies, if any, with reasonable details and reference to the Specifications and Standards. Independent Engineer shall send a copy of the Inspection Report to BSNL and the PIA and upon receipt thereof, the PIA shall rectify and remedy the defects or deficiencies, if any, stated in the Inspection Report. Notwithstanding the foregoing, such inspection or submission of Inspection Report by the Independent Engineer shall not relieve or absolve the PIA of its obligations and liabilities hereunder in any manner whatsoever.

17.3. Inspection during O&M Phase

The IE shall perform Six Monthly inspection/ audit of the network and its elements during the O&M Phase for each KPI and constructed OFC. The O&M Phase shall be concurrent with

the Development Phase for the network under O&M. The schedule of the same shall be jointly finalized by PIA/ IE and shall be approved by the concerned BharatNet BA Head, The schedule should be prepared and agreed in such a manner that the same is spread over across the whole year. The Inspection Report shall state defects or deficiencies, if any, with reasonable details and reference to the Specifications and Standards. Independent Engineer shall send a copy of the Inspection Report to BSNL and the PIA and upon receipt thereof, the PIA shall rectify and remedy the defects or deficiencies, if any, stated in the Inspection Report within 30 days. Notwithstanding the foregoing, such inspection or submission of Inspection Report by the Independent Engineer shall not relieve or absolve the PIA of its obligations and liabilities hereunder in any manner whatsoever. The IE shall assess liabilities of the PIA and include the same in the report, The IE shall submit the report in parts on a mutually agreed periodicity so that the PIA is able to rectify/remedy the defects/deficiencies on a continuous basis. The PIA shall intimate the rectification of the defects/deficiencies done to the IE. The IE shall re-inspect the same and shall mention the same in the Annual report,

17.4. Tests

17.4.1. For determining the conformity of Development Works and/or the Upgradation Works and/or the O&M works to the Agreement and Specifications and Standards, the Independent Engineer shall require the PIA to carry out or cause to be carried out tests, at such time and frequency as may be specified by the Independent Engineer from time to time in accordance with Good Industry Practice, Specifications and Standards, and Acceptance Testing Template for quality assurance. On or before the Appointed Date, BSNL and PIA will mutually agree on the tests that will be undertaken for the acceptance of the network created. The Independent Engineer shall participate in at least 10% (ten per cent) of the number of such tests as would normally be undertaken in accordance with Good Industry Practice, Specifications and Standards, and Acceptance Testing Template. The PIA shall facilitate the Independent Engineer in conducting the tests as per approved Acceptance Testing Template and/or as per directions of the Independent Engineer. The Independent Engineer shall prepare the test report and shall submit same to BSNL. Provided however, that the Independent Engineer may, instead of carrying out the tests specified hereunder, at its option decide to witness, or participate in, any of the tests to be undertaken by the PIA for its own quality assurance in accordance with Good Industry Practice, Specification and Standards, and in such an event, the PIA shall cooperate with, and provide the necessary assistance to, the Independent Engineer for discharging its functions hereunder.

17.4.2. In the event that results of any tests conducted, establish any defects or deficiencies in the Development Works and/or the Upgradation Works and/or the O&M works, the PIA shall carry out remedial measures within 30 days and furnish a report to the Independent Engineer in this regard. The Independent Engineer shall verify that such remedial measures have brought the Development Works and/or the Upgradation Works and/or O&M works into compliance with Specifications and Standards, and the procedure under Clause 17.4.1 shall be repeated until such Development Works and/or the Upgradation Works and/or O&M works conform to the Specifications. For avoidance of doubt, the tests

pursuant to this Clause 17.4.1 shall be undertaken in addition to and independent of the tests carried out by the PIA for its own quality assurance in accordance with Applicable Laws, Applicable Permits and Good Industry Practice. A copy of the results of such test shall be sent by the PIA to the Independent Engineer forthwith. The costs to be incurred on any test which is undertaken for determining the rectification of any defect or deficiency in the Development Works and/or the Upgradation Works and/or O&M works shall be borne solely by the PIA.

17.5. Delays during development

If the PIA does not achieve any of the Project Milestones or the Independent Engineer shall have reasonably determined, based on the progress reports submitted by the PIA, that the rate of progress of Development Works and/or Upgradation Works is such that Construction Completion Date or the relevant Project Milestone under the Project Completion Schedule respectively, is not likely to be achieved by the Scheduled Completion Date, it shall notify the PIA to this effect, and the PIA shall, within 15 (fifteen) days of such notice, by a communication inform the Independent Engineer in reasonable detail about the steps it proposes to take to expedite progress and the period within which it shall achieve Construction Completion Date the relevant Project Milestone under the Project Completion Schedule, as the case may be.

18. INDEPENDENT ENGINEER

18.1. Appointment of Independent Engineer

BSNL on behalf of USOF, DoT shall appoint an agency substantially the independent consultant through a separate RFP (the “**Independent Engineer**”). The appointment shall be made no later than 60 (sixty) days from the date of the PO and shall be for the Construction and O&M Period. On expiry or termination of the aforesaid appointment, BSNL shall appoint an Independent Engineer for a further term of 3 (three) years and such procedure shall be repeated after expiry of each appointment.

18.2. Authorized signatories

BSNL shall require the Independent Engineer to designate and notify to BSNL and the PIA up to 2 (two) persons employed in its firm to sign for and on behalf of the Independent Engineer, and any communication or document required to be signed by the Independent Engineer shall be valid and effective only if signed by any of the designated persons; provided that the Independent Engineer may, by notice in writing, substitute any of the designated persons by any of its employees.

18.3. Dispute resolution

If either Party disputes any advice, instruction, decision, direction or award of the Independent Engineer, or, as the case may be, the assertion or failure to assert jurisdiction, the Dispute shall be resolved in accordance with the Dispute Resolution Procedure as in term of clause 19 of Section III.

18.4. Interim arrangement

In the event that BSNL does not appoint an Independent Engineer, or the Independent Engineer so appointed has relinquished its functions or defaulted in discharge thereof, BSNL shall have full powers, in the interim, to designate and authorize any person to

discharge the functions of the Independent Engineer, save and except that such person shall not exercise any functions relating to review, comment, approval or inspection for and in respect of the Independent Engineer, and such functions shall be discharged as and when an Independent Engineer is appointed. Provided, however, that nothing contained in this Clause 18.4 shall in any manner restrict the rights of BSNL to enforce compliance of the provisions of this RFP.

18.5. Roles and functions of the Independent Engineer

18.5.1. Overview of the roles of Independent Engineer:

- a) Validate the high and low-level network design proposed by the PIA and recommend for approval to BSNL.
- b) Inspect the Project and report any lapses, defects or deficiencies in project implementation to BSNL and PIA.
- c) Perform acceptance testing of the network infrastructure and validate its conformance with Specification and Standards.
- d) In the event of any dispute, mediate and assist BSNL and PIA in arriving at an amicable settlement.
- e) Review and validate penalties in case of PIA default during construction and O&M phase including non-compliance network performance/ SLAs and QoS parameters.
- f) During handover period, validate transfer of relevant records, and reports pertaining to the Project to BSNL.
- g) Validate associated tasks required to perform with Environment, Health and Safety(EHS) compliances.

Moreover, phase-wise detailed scope of work for independent engineer is mentioned in the following sub- sections.

18.5.2. During Conditions Precedent/ Pre-Planning Phase:

Validation of fulfilment of BSNL's and PIA's obligations during Condition Precedent (to be executed after signing of Contract Agreement). This includes the following but not limited to:

- a) Review existing network handover to the PIA with respect to PIA timeline for handover.
- b) Review and validate completeness of project execution and Operation & Maintenance (O&M) manual along with asset lifecycle management manuals, as required.
- c) Review if PIA submit approval request to BSNL on the use of linear architecture on case-to-case basis.

18.5.3. Planning and Design Phase:

- a) Perform technical scrutiny of survey reports on GIS map.
- b) Review and validate network design, upgradation proposal of existing network, initial project plan.
- c) Review and validate the route length and Bill of Quantity (BOQ) required for optical fibre cable, IP-MPLS equipment, power equipment and other accessories requirement.

- d) Review and validate the adequacy of space and power requirements for passive and active network elements for GP, Block and State Network Operations Centre (S-NOC).

18.5.4. Implementation Phase:

- a) Perform Material inspection for BOQ Quality and raise deviations/ discrepancies if any.
- b) Validate network infrastructure deployed items such as electronics, electrical, fibre etc. as per specifications and standards and design requirements.
- c) Perform audit for installation and commissioning of active equipment on site location to ensure best practices are being followed.
- d) Perform acceptance tests across Gram Panchayat (GP) and route based on agreed test schedules with stakeholders.
- e) Inspect and validate the integration of PIA's S-NOC (covering BharatNet existing network for upgradation and new network for creation) with BharatNet Delhi and Bangalore NOC.
- f) Validate network infrastructure and issue provisional and final completion certificate to the PIA.
- g) Validate closure of open punch points with PIA, in coordination with BSNL.
- h) Review and assess applicable penalty for not achieving Project milestone
- i) Validate completeness of inventory / asset database records during the Construction Period
- j) The Independent Engineer shall perform all other duties and functions specified in the RFP.

18.5.5. Operations and Maintenance Phase:

Validation of fulfilment of PIA's obligations during operation period. This includes obligations such as disbursement of O&M Payments and validation of network performance SLAs in conformance with project and regulatory guidelines. This includes but not limited to the following:

- a) Review and assess applicable penalties for non-compliance to SLAs and QoS parameters.
- b) Validate compliance over O&M obligations to support Authority on disbursement of quarterly payment as per the provision of the Contract Agreement (MSA).
- c) Verify and validate completeness of inventory / asset database records during the operations period.
- d) Validate and assess penalty for default on obligation of serving non-discriminatory access to BharatNet services.
- e) Validate in case of PIA default during O&M phase.
- f) Assess, validate and approve requirements for change request extending scope of work.
- g) Six Monthly Inspection and Audit of the Network and compliance of rectification of

defects/ deficiencies by the PIA.

- h) The Independent Engineer shall perform all other duties and functions specified in the RFP.

18.5.6. Handback Phase:

Validation of fulfilment of BSNL's and PIA's obligations in the event of termination and transfer or handover of Project.

- a) Validate the inventory and Project's assets being managed and handed over by the PIA to BSNL.
- b) Validate transfer of relevant records, and reports pertaining to the Project to BSNL.
- c) The Independent Engineer shall perform all other duties and functions specified in the RFP.

19. Exit Management Plan

19.1 This Clause sets out the provisions that will apply when the contract has expired or when the contract is terminated.

19.2 Exit Management Plan- The PIA shall ensure continuing provision of the services throughout the transfer process or until the cessation of the services.

19.2.1 Plans for the communication with such of the PIA's staff, Bidders, customers and any related third party as are necessary to avoid any material detrimental impact on BSNL's operations as a result of undertaking the transfer;

19.2.2 Plans for provision of contingent support to BSNL and replacement Bidder for a reasonable period after transfer.

19.3 The PIA shall draft the Exit Management Plan annually to ensure that it is kept relevant and up to date.

19.4 Each Exit Management Plan shall be presented by the PIA to and approved by BSNL or its nominated agencies.

19.5 Payments during the Exit Management period shall be made in accordance with the Terms of Payment Schedule.

19.6 Exit Management plan shall be furnished in writing to BSNL or its nominated agencies within 90 days from the date of issue of Purchase Order. However, if PIA is not able to provide a Exit Management Plan within 90 days from the date of issue of Purchase Order, PIA is bound to follow exit management plan finalized by BSNL specified in next section.

19.7 Making Over the Network by PIA to BSNL or any agency appointed by BSNL

19.7.1 Handing over the Networks

On termination of the contract, the PIA shall get 3 months' time period to make over the network to BSNL or its appointed agency.

Table : Timelines to handover the network

Sr.	Milestones	Timeline
1	Network handover completion of 25% GPs and Blocks (Locations)	T*+4 weeks
2	Network handover completion of 50% GPs and Blocks (Locations)	T + 6 weeks
3	Network handover completion of 75% GPs and Blocks (Locations)	T + 9 weeks

Sr.	Milestones	Timeline
5	Network handover completion of 100% GPs and Blocks (Locations)	T + 3 months

*T is the date of the notice issued by BSNL.

19.7.2 Existing Infrastructure:

Site of the Existing Network shall include an inventory of existing network infrastructure across Blocks, Gram Panchayats (GPs) and Villages along with laid OFC infrastructure. The indicative information is described in Table A.1 & Table A.2

Table A.1: Asset Summary – Package

Licensed Service Area / State	No of Blocks	Total GPs (Connected on OFC)	Total OFC laid (Kms)	Block Routers installed (Nos.)	GP Routers installed (Nos.)

Table A.2: Block / Gram Panchayat (GP) count under Package

Licensed Service Area/States	Total Blocks	GPs already created		GPs for Upgradation	GPs To be Connected	Total GPs to be connected in Ring Topology
		Phase I	Phase II			

19.7.3 GP End Equipment:

- The Network shall be made over Block wise with the GPs. The details of the equipment i.e. Routers, SFPs, UPS/SMPS cards, Rack, Battery, Mini OLT, Solar Panel, Earthing, FDMS etc will be provided.
- The status of the equipment as per NMS shall be noted and made over.
- The physical status of equipment and battery OCV with replacement date shall be mentioned in the HOTO memo.

19.7.4 Block End Equipment:

- The Routers along with configuration, cards and Ring diagram shall be made over by the PIA.
- The details of the equipment i.e. Routers, SFPs, UPS/ SMPS cards, Rack, Battery, FDMS etc will be provided.
- The status of the equipment as per NMS shall be noted and made over.
- The physical status of equipment and battery OCV with replacement date shall be mentioned the HOTO memo.

19.7.5 OFC Network:

- The complete ABD/L-14 diagram mentioning the routes shall be signed by the PIA, IE and BSNL or its appointed agency.
- Any section which is temporarily restored shall be clearly mentioned in the HOTO memo.

19.7.6 **S-NOC:** The complete inventory and Status of Active Infrastructure, eMS, Passive Infrastructure along with the OEMs details, Licenses, MAFs, agreements with OEMs, Spares etc shall be made over.

19.7.7 All the network diagrams of Active infrastructure, passwords, keys shall be made over.

19.7.8 The Source code of the applications for which there is no support shall be arranged by the PIA and handed over to BSNL.

19.8 Transfer of Assets:

19.8.1 The PIA shall hand over all documents, manuals, SOPs to BSNL without any cost to BSNL.

19.8.2 The PIA shall handover the relevant documentation/ information about existing infrastructure handed over to him (of BharatNet phase I and II) specified in the handover/ takeover section of this RFP

19.8.3 In case of contract being terminated by BSNL, BSNL reserves the right to ask PIA to continue running the project operations for a period of 3 months after termination orders are issued. The other liquidated damages and SLA would be applicable during this period.

19.8.4 Upon service of a notice following provisions shall apply:

- a. Payment to the outgoing PIA shall be made to the tune of last set of completed services /deliverables, subject to SLA requirements.
- b. The outgoing PIA will pass on to BSNL and/or its nominated agency, the subsisting rights of any products on terms not less favorable to BSNL/ its nominated agency, than that enjoyed by the outgoing PIA.

19.9 Cooperation and Provision of Information

During the exit management period:

19.9.1 The PIA will allow BSNL access to information reasonably required to define the then current mode of operation associated with the provision of the services to enable BSNL to assess the existing services being delivered;

19.9.2 Promptly on reasonable request by BSNL, the PIA shall provide access to and copies of all information held or controlled by them which they have prepared or maintained in accordance with this contract relating to any material aspect of the services. BSNL shall be entitled to copy of all such information. Such information shall include details pertaining to the services rendered and other performance data. The PIA shall permit BSNL or its nominated agencies to have reasonable access to its employees and facilities as reasonably required to understand the methods of delivery of the services employed by the PIA and to assist appropriate knowledge transfer.

19.9.3 There should be a proper handing over/taking over of outgoing and incoming PIA. The fibre parameters should be at least as good as or better condition (optical power is in the range -8 dBm to -25 dBm at GP location) than these were at the time of taking over the sections by outgoing maintenance team.

19.9.4 On completion of the contract, the OTDR measurement shall be carried out on all spare fibres to ascertain the condition of cable, which should be same or better than the condition of the cable taken over by the contract at the beginning of the contract period. In case there is an increase in the number of fibre events at the time of handling over vis-à-vis the number of events at the time of taking over, the cost of rectification will be deducted from the final bill of the outgoing team, the security amount held may also be forfeited. Besides this, OFC route drawings handed over to the PIA at the time of award of work shall be updated fully and submitted to BSNL, both in Hard and Soft copy as given by BSNL incorporating the various changes occurred during the contract period.

19.9.5 PIA is liable to provide the details of the equipment i.e Router, UPS, Battery (with replacement Date), Solar Panel, Rack, Enclosure, Earthing, etc at the GP end

19.9.6 PIA is liable to handover the Block equipment along with make model, configuration, cards and Ring/PON diagram

- 19.9.7 The PIA shall return or destroy any data or copies thereof that were provided or generated during the access period. BSNL may request written confirmation of such actions.

19.10 Confidential Information, Security and Data

The PIA will promptly on the commencement of the exit management period supply to BSNL the following:

- 19.10.1 Information relating to the current services rendered and Purchased and performance data relating to the performance of Sub-PIAs in relation to the services;
- 19.10.2 Documentation relating to Project's Intellectual Property Rights;
- 19.10.3 Documentation relating to sub-PIAs (if any);
- 19.10.4 All current and updated data as is reasonably required for purposes of BSNL or its nominated agencies transitioning the services to its replacement Bidder in a readily available format nominated by the BSNL;
- 19.10.5 All other information (including but not limited to documents, records and contracts) relating to the services reasonably necessary to enable BSNL or its nominated agencies, or its replacement Bidder to carry out due diligence in order to transition the provision of the services to BSNL or its nominated agencies, or its replacement Bidder (as the case may be).
- 19.10.6 Before the expiry of the exit management period, PIA shall deliver to the BSNL all new or up-dated materials from the categories set out in Schedule above and shall not retain any copies thereof, except that the PIA shall be permitted to retain one copy of such materials for archival purposes only.

19.11 Transfer of Certain Contracts

On request by BSNL the PIA shall effect such assignments, transfers, licenses and sub-licenses as BSNL may require the same in the name of BSNL or its nominated agency in relation to any equipment lease, maintenance or service provision contract between PIA and third party licensor, vendors, and which are related to the services and reasonably necessary for the carrying out of replacement services by BSNL or its replacement Bidder.

19.12 Rights of Access to Premises

- 19.12.1 At any time during the exit management period, where Assets are located at the PIA's premises, the PIA will be obliged to give reasonable rights of access to (or, in the case of Assets located on a third party's premises, procure reasonable rights of access to) BSNL and/or any replacement Bidder in order to make an inventory of the Assets.
- 19.12.2 PIA shall also give BSNL or any of its nominated agency or any replacement Bidder right of reasonable access to the PIA's premises and shall procure BSNL or any of its nominated agency and any replacement Bidder rights of access to relevant third party premises during the exit management period and for such period of time following termination or expiry of the Contract as is reasonably necessary to migrate the services to BSNL, or a replacement Bidder.

19.13 General Obligations of the PIA

- 19.13.1 The PIA shall provide all such information as may reasonably be necessary to effect as seamless a handover as practicable in the circumstances to BSNL or its replacement Bidder and which the PIA has in its possession or control at any time during the exit management period.
- 19.13.2 For the purposes of this schedule, anything in the possession or control of any PIA, associated entity is deemed to be in the possession or control of the PIA.
- 19.13.3 The PIA shall commit adequate resources to comply with its obligations under this clause.

SECTION- IV-C: SPECIAL TECHNICAL CONDITIONS

1. Relevant TEC GRs for Technical specifications of material to be supplied are mentioned in **Annexure- A**.
2. Detailed Technical Specifications of following Network components are mentioned in **Annexure-B**
 - I. Network
 - II. Routers
 - III. eMS of Routers
 - IV. State- NOC
 - V. RFMS
 - VI. Rack at Block and GP
 - ~~VII. DELETED~~
 - VIII. UPS at GP
 - IX. Unlicensed Band Radio (UBR)
 - X. Digital Microwave
3. Engineering Instructions for Under Ground Optical Fiber Cable Laying Works is attached as **Annexure-C**.
4. Technical Specification for GIS Mapping of OFC Routes is attached as **Annexure-D**.

Annexure A: Technical specifications as per TEC GR

(whole TEC GR table and notes {except mentioned otherwise} as mentioned in Amendment No. 12.1.)

TEC-GR Standards:

S. No.	Type of Material	Technical Specifications
1.	Armored Optical Fibre Cable for underground application. 24F loose tube	TEC GR Standard No.: TEC 85170:2024 with latest amendments Although in this TEC/ GR only optical fibre of G.652 D is mentioned but vendor shall have liberty to use G.657A1 also as per ITU-T recommendation. (Amendment No. 23.7)
2.	Aerial OF Cable (ADSS Cable): 48/24F ADSS on power lines	TEC GR Standard No.: TEC 85190:2022 (Type- A-I & A-II) with latest amendments if any; OFC in packages of J&K and Ladakh will be of type- A-2 Semi dry (with ice loading) and in other packages, type- A-1 Semi dry (without ice loading) (Clarification no. 3 dated 17.05.2024)
3.	12F/24F Aerial Drop Optical Fibre Cable with Installation Accessories (For Last mile applications)	TEC GR Standard No.: TEC 85200:2022 with latest amendments if any (2005 for LMC).
4.	Armored Optical Fibre Cable for underground application. 48F ribbon	TEC GR/ Standard No.: TEC 85260:2024 with latest amendment. The above-mentioned TEC Standard No. shall supersede The Technical Specifications issued vide Amendment No.- 13 dated 08.05.2024(Amendment No. 23.7)
5.	Splitters (1:2, 1:4, 1:8, 1:16)	TEC GR Standard No.: TEC 72010:2023 with latest amendments (Type to be used as per site requirement)
6.	SPV Power supply	TEC GR Standard No.: TEC/GR 66080:2016, with latest amendments if any
7.	Battery	TEC GR Standard No.: TEC 67030:2016 with latest amendments if any a. Lithium-Ion Battery of 2400 VAH to be used.
8.	Patch Cord	TEC GR Standard No.: TEC 87070:2009, with latest amendments if any. (Patch cords shall be supplied with source approval from CACT, against the relevant GR)
9.	Splice Closure for Optical Fibre Cables	TEC GR Standard No.: TEC 87080:2010 with all amendments if any. Size to be used as per

S. No.	Type of Material	Technical Specifications
		OFC used at site
10.	Fibre Termination Box	TEC GR Standard No.: TEC 87030:2010, with latest amendments if any. Fibre Termination Box Size to be used as per OFC used at site
11.	PLB HDPE Duct	TEC GR Standard No.: TEC 72030:2019 with latest Amendments if any
12.	Installation Accessories and fixtures of Self-Supporting Metal free Optical Fibre Cable	TEC GR Standard No.: TEC 87060:2017, with latest amendments if any
13.	FDMS (Indoor)	TEC GR Standard No.: TEC 87010:2007, with Amendment Dated 02.05.2012 and with latest amendments if any. Fibre termination in GP can be accommodated in a rack used for router and other equipment. 01 No. 48 fibre rack mount shelf to be used for fibre termination as per GR 87010:2017.
14.	FDMS (Outdoor)	TEC GR Standard No.: TEC 87050:2012, with latest amendments if any The No. of trays in case of 48 Fibre ribbon OFC will be 4. No. of sleeves will be 25% extra than the required joints i.e. 20 Nos.
15.	Tension/Suspension Pole Assembly Set	TEC GR Standard No.: TEC 87060:2017, with latest amendments if any
16.	MPLS Router	TEC/GR 48050:2022 with latest amendments if any or
17.	Data Storage Infrastructure	TEC GR Standard No.: TEC 49100:2015, with latest amendments if any
18.	Ethernet electrical to optical media converter	TEC GR Standard No.: TEC 48080:2014, with latest amendments if any
19.	Firewall System / NIPS	TEC GR Standard No.: TEC 49090:2023, with latest amendments if any or NDPP certified TEC GR Standard No. for NIPS:49140:2018, with latest amendments if any or NDCPP certified
20.	Lan Switch	TEC GR Standard No.: TEC 48060:2023, with latest amendments if any or NDPP certified
21.	Layer 4-7 Load Balancer	TEC GR Standard No.: TEC 48090:2015 with

S. No.	Type of Material	Technical Specifications
	Switch	latest amendments if any
22.	Network Management System	TEC GR Standard No.: TEC 48100: 2015 with latest amendments, if any
23.	UPS	TEC GR Standard No.: TEC 66140:2019 with latest amendments, if any
24.	Radio Modem in ISM band for UBR	TEC GR Standard No.: TEC 38050:2023, with latest amendment, if any
25.	EMS for UBR	TEC GR Standard No.: TEC 52006:2016, with latest amendments, if any
26.	Fibre Distribution Frames for UBR	TEC GR Standard No.: TEC 87000:2010, with latest amendments, if any
27.	Packet Microwave Radio Equipment (15, 18 and 23 Ghz) for DMW (Digital Micro Wave)	TEC GR Standard No.: TEC 36090:2022) with latest amendments if any
28.	Millimeter Wave (E-Band) Microwave Equipment for DMW	TEC GR Standard No.: TEC 36060:2022
29.	EMS for DMW	EMS-TEC-SD-IT-EMT-001/01/Mar-16
30.	Electronic Locator System	TEC GR Standard No.: 73070:2014
31.	Lithium Ion Battery for Telecom Applications	TEC GR Standard No.: TEC 67030:2024
32.	Remote Fiber Monitoring System (RFMS)	TEC 88150:2015 with latest amendment. (<i>Amendment No. 23.7</i>)

Note:

- The technical and functional specifications mentioned in this RFP are mandatory and also supersedes GR for the clauses where there is any change.
- The supply of 48F Armored ribbon type OFC will be as per GR under preparation.
- All the deliverables for the S-NOC items, mentioned in the tender, shall be as per the relevant TEC GR/ Standard, if not defined otherwise in the RFP/ Amendments. The items which are not mentioned in the tender shall be optional. (*Amendment No. 23.1.5*)
- The specifications which are explicitly mentioned in the RFP/ Clarifications/ Amendments shall be mandatory. Remaining compliances, as per relevant TEC GR, shall be optional (*Amendment No. 23.1.6*)
- TSEC for Rack (at Block & GP) shall be obtained as per Technical Specifications mentioned in the RFP (*clarifications after doubt clearing workshop*)
- The relevant TEC GR/ Standard is likely to be released before award of contract under the tender. In case the said TEC GR/ Standard is delayed, the data of Table

(regarding physical characteristics) will be provided to the successful bidders.

Annexure B: Technical specifications of Network and its Components

I. Network-

1. General requirements:

- a. The network should support successful fibre connectivity to rural areas of the country, connecting to all GPs and Villages and accessible on a non-discriminatory basis to all service providers to enable them to provide services in rural areas.
- b. The network should be built to provide the following:
 - i. Higher Network Uptime
 - ii. Complete Centralised Visibility of Network
 - iii. Segregation of Traffic and QoS in line with Industry standards
 - iv. Better Network Management (Provisioning, Activation, Fault, Performance etc.)
- c. The network should have the capability and facility for seamless integration with all other components required to build a digital backhaul.
- d. Network must support next generation architecture to support future technologies like 5G etc.
- e. Devices must support the dynamic redundancy protocol for better convergence.
- f. Network Convergence methods like Fast reroute and bidirectional failure detection must be deployed to achieve faster convergence.
- g. Network must support segregation of traffic using Virtual Routing and Forwarding (VRF).
- h. QoS enables a network to provide improved service to selected network traffic. The Network must support IPMPLS QoS features.
- i. All Gram Panchayat (GP) nodes should have the capabilities to program the queues into logical queues to offer multiple services to the end customers.
- j. The mapping of QoS should be done on the basis of COS, IP prec, TOS, IP address, VLAN etc.
- k. All nodes in network must support Hierarchical Quality of Service for granular QoS.
- l. Network should have multicast capabilities and should support at all layers.
- m. High QoS, Uptime, Security, L3, L2 and Multicast Services from edge where the nodes are connected should be ensured as it will be connecting to MSOs, SP and Telcos.
- n. Packet clock , 1588 should be supported for connecting Telco.
- o. IP/MPLS NNI with telcos and other Service providers for traffic exchange at all nodes should be supported.
- p. Interoperability between OEM for non-vendor locking should be supported at all nodes. Proposed technology partner / OEM for active infra to provide an undertaking to take responsibility of ensuring interoperability with other vendors.
- q. All nodes in network must support protocol for management information sharing so that devices can discover and reach to each other.
- r. Any changes in topology should be automatically learnt by all the devices in network.
- s. No manual intervention should be required in case of any physical link failure.

- t. Scalable dynamic protocol should be supported for transferring of customer network information across all service edge devices.
- u. The network must provide detailed Change monitor or baseline deviations applications, source and destinations. The change monitor dashboard must compare changes in applications, source and destinations in terms of percentage increase/decrease for last 15 mins/ 30 mins/ one hour/ one day against historical time period of 24 hours/ 7 days/ one month etc.
- v. OEM must provide performance, throughput and features evidence. BSNL reserves the right for asking the bidder to do a PoC that validates all technical compliance as submitted in the tender document.
- w. The network must support end to end SLA guarantee with features to automate the path based on latency and Jitter.
- x. The network must support Zero Touch Provisioning capability & Automated node provisioning.
- y. Network Should have integrated capability to monitor link and services.

2. QoS Architecture

- a. Low latency Queuing should be deployed to ensure CIR guarantee to all Critical Traffic
- b. Minimum 4 Class-of-Service Model should be supported:
- c. Matching of traffic should be based on ACL, IPP, DSCP & MPLS EXP
- d. Marking of traffic Should be based on MPLS EXP
- e. Should also support weighted random early detection in the network to avoid congestion

3. Traffic Engineering Capabilities

- a. Standard based protocols to automatically map packets onto the appropriate traffic flows should be supported.
- b. Should Support transport of traffic flows across a network using IP/MPLS forwarding.
- c. Should support the determination of routes for traffic flows across a network based on the resources the traffic flow requires and the resources available in the network.
- d. Should Employ ", segment routing" in which the path for a traffic flow is the shortest path that meets the resource requirements (constraints) of the traffic flow.
- e. Should support QoS on Traffic engineering paths or LSPs.
- f. Should support Recovery of link or node failures that change the topology of the backbone by adapting to a new set of constraints.
- g. Providing bandwidth guarantee for critical real-time applications in the control plane
- h. Optimized utilization of redundant
- i. Handling of unanticipated load in the network
- j. Fast reroute to provide fast convergence for critical real-time application traffic

4. Network - MPLS VPN

All Service edge nodes in network should support:

- Layer 2 MPLS VPN

- Layer 3 MPLS VPN: Layer 3 MPLS VPN can be broadly classified in to Hub and Spoke VPN, MESH VPN, Extranet VPN, Multicast VPN
- Above specifications are minimum. Any additional feature or futuristic upgradation shall be allowed (*Amendment No. 23.8*)

II. Technical Specifications for Routers

S.no.	Parameters	Block Router	GP Router
1	Category of Router	The router/Operating System should be compliant to TEC- GR 48050:2022 dated on March 2022 or its latest amendment as per non-Chassis based Aggregation router Category XV or Chassis based Category VI. The OEM shall need to submit a copy of valid TSEC/ TAC or proof of having applied for TSEC/ TAC (BSNL registered QF-103 or TEC Form-B) at the time of technical bid submission and the final certificate before commencement of shipment <i>(Amendment No. 12.2)</i> Router should be provided with 1+1 or N +1 power supply and Fan redundancy. Power supplies and Fans should be hot swappable for high availability, to ensure that there is no outage till both (main and standby) power supplies/ fans fail. <i>(Amendment No. 12.2)</i>	The router/Operating System should be compliant to TEC- GR 48050:2022 dated on March 2022 or its latest amendment as per non-Chassis based Aggregation router Category XV. The OEM shall need to submit a copy of valid TSEC/ TAC or proof of having applied for TSEC/ TAC (BSNL registered QF-103 or TEC Form-B) at the time of technical bid submission and the final certificate before commencement of shipment. <i>(Amendment No. 12.2)</i> Router should be provided with 1+1 or N +1 power supply and Fan redundancy. Power supplies and Fans should be hot swappable for high availability, to ensure that there is no outage till both (main and standby) power supplies/ fans fail. <i>(Amendment No. 12.2)</i>
2	Quantity of each Type of Interface i.e. 100G, 10G, 1G etc	The router can be Chassis based for Type A with Control plane & Data plane redundancy but shall be of non-chassis based 1RU form-factor for Type B. Routers shall be as per requirement of chasis and non chasis router defined in GR 48050:2022 Block Routers shall be of two configuration: (1) Type A- Router should support switching capacity of minimum 800 Gbps. The router should be enabled on day 1 with the following configuration: a. 4 port of 100G (with 40km pluggable) b. 12 port of 10 G (with 40km pluggable)	The router shall be of Non-Chassis based 1RU form-factor, GP Routers shall be of two configuration: (1) Type C- Router should support switching capacity of minimum 80 Gbps. The router should be enabled on day 1 with the following configuration: a. 4 ports of 10G (with 40km pluggable) b. 4 port 1/10G (All ports should be usable for both 1G as well as 10G as per plugged SFP)

S.no.	Parameters	Block Router	GP Router
		c. 4 port of 1G/10G (All ports should be usable for both 1G as well as 10G as per plugged SFP) (2) Type B Router should support switching capacity of minimum 300 Gbps. The router should be enabled on day 1 with the following configuration: a. 2 port of 100G (with 40km pluggable) b. 8 port of 10G (with 40km pluggable) c. 4 port of 1G/10G (All ports should be usable for both 1G as well as 10G as per plugged SFP) Note: Pluggables will be as per Fiber planning	c. 4 port 1G (with 10km pluggable) (2) Type D Router should support switching capacity of minimum 40 Gbps. The router should be enabled on day 1 with the following configuration: a. 2 port of 10G (with 40km pluggable) b. 2 port of 1G/10G (All ports should be usable for both 1G as well as 10G as per plugged SFP) c. 4 port 1G (with 10km pluggable) Note: Pluggables will be as per Fiber planning
3	Wavelength, Distance criteria etc of each type of optical interface	The router should support all 100G ports for 100m, 10km, 40km & 80KM pluggable, and 10G ports for 100m, 10km, 40km & 80KM pluggable.	The Router should support 10G with 10km,40km,80km pluggable and 1GE optical port for 100m, 10km pluggable support.
4	Requirement of optional Security features	Router shall have support for DHCP snooping feature .All security requirements mandated with flag “Y” in the feature mapping table of the GR for category XV	Router shall have support for DHCP snooping feature. All security requirements mandated with flag “Y” in the feature mapping table of the GR at page-137 for category XV
5	Requirement of eMS	Single eMS of adequate capacity is to be supplied for all routers in the offered package. eMS will be as per Section 3.22 of TEC- GR 48050:2022 dated on March 2022 or its latest version.	Single eMS of adequate capacity is to be supplied for all routers in the offered package. eMS will be as per Section 3.22 of TEC- GR 48050:2022 dated on March 2022 or its latest version.
6	Requirement of eMS network as per clause 3.33.1		

S.no.	Parameters	Block Router	GP Router
7	Requirement of eMS network redundancy and network elements		
8	Category and Type of Server Required for the eMS	Single eMS of adequate capacity is to be supplied for all routers in the offered package. eMS will be as per Section 3.22 of TEC- GR 48050:2022 dated on March 2022 or its latest version.	Single eMS of adequate capacity is to be supplied for all routers in the offered package. eMS will be as per Section 3.22 of TEC- GR 48050:2022 dated on March 2022 or its latest version.
9	Type of Storage Required for the eMS		
10	Requirement of Optional eMS features		
11	Scalability requirements for the SLA Management system like no.of business customers, maximum leads per customer etc may be provided		
12	North Bound interface required towards NMS		
13	Requirement of Optional Features		

S.no.	Parameters	Block Router	GP Router
14	Clock support	Router should support NTP, Sync E, IEEE 1588v2 PTP (including G8265, G8273, G8275 profiles as applicable) and NTP. It should have internal Stratum 3E clock with holdover time of at least 4 hours.	Router should support NTP, SyncE, IEEE 1588v2 PTP ((including G8265, G8273, G8275 profiles as applicable) and NTP. It should have internal Stratum 3E clock with holdover time of at least 4 hours.
15	Ipv4 / Ipv6 Routes to be supported shall be specified for the aggregation and Core Routers among the options given	The router should have capability of minimum 2 lakh Ipv4 / 1 lakh Ipv6 routes.	The router should have capability of minimum 20k Ipv4 / Ipv6 routes.
16	Documentation requirements as per clause 10.1	The contractor shall provide following documents: a. System description documents b. Installation, Operation and Maintenance documents c. Training document d. Repair manual All technical documents shall be in English language both in CD- ROM and in hard copy. All necessary interfaces, connectors, connecting cables and accessories required for satisfactory installation and convenient operations shall be supplied. Type of connectors, adapters to be used shall be in conformity with the interfaces defined	The contractor shall provide following documents: a. System description documents b. Installation, Operation and Maintenance documents c. Training document d. Repair manual All technical documents shall be in English language both in CD- ROM and in hard copy. All necessary interfaces, connectors, connecting cables and accessories required for satisfactory installation and convenient operations shall be supplied. Type of connectors, adapters to be used shall be in conformity with the interfaces defined in
17	Additional Installation Requirements as per clause 10.2		
18	Maintenance Requirements as per clause 10.3		

S.no.	Parameters	Block Router	GP Router
		in this GR. All installation materials, consumables, and spare parts to be supplied. All literature and instructions required for installation of the equipment, testing and bringing it to service shall be made available in English language. For the installations to be carried out by the supplier, the time frames shall be furnished by the supplier including the important milestones of the installation process well before commencing the installations. Special tools required for wiring shall be provided along with the equipment. All the software updates shall be provided on continuous basis for a minimum period of 7 years or up to validity of the contract, whichever is later from the date of induction of system in the telecom network. These updates shall include new features and services and other maintenance updates. <i>(Amendment No. 25.4)</i> In the event of a bug found in the software, the manufacturer shall provide patches and firmware replacement if involved, free of cost. Compatibility of the existing hardware shall be maintained with future software/firmware.	this GR. All installation materials, consumables, and spare parts to be supplied. All literature and instructions required for installation of the equipment, testing and bringing it to service shall be made available in English language. For the installations to be carried out by the supplier, the time frames shall be furnished by the supplier including the important milestones of the installation process well before commencing the installations. Special tools required for wiring shall be provided along with the equipment. All the software updates shall be provided on continuous basis for a minimum period of 7 years or up to validity of the contract, whichever is later from the date of induction of system in the telecom network. These updates shall include new features and services and other maintenance updates. <i>(Amendment No. 25.4)</i> In the event of a bug found in the software, the manufacturer shall provide patches and firmware replacement if involved, free of cost. Compatibility of the existing hardware shall be maintained with future software/firmware.

S.no.	Parameters	Block Router	GP Router
19	Environmental Conditions- The routers shall be installed in the buildings without air conditioning where adequate ventilation may or may not be available. Therefore, the routers shall meet the Temperature and Humidity Requirements as per Category B of QM-333 standard.		

III. Technical Specifications for eMS of Routers

Server Hardware Specification

S.No	Server Hardware Specifications
1	The Server proposed shall conform to TEC Standard No.: TEC 48140:2018 or latest amendment if any (<i>old document No.- TEC/GR/IT/SRV-001/02/MAR-18</i>). (<i>Amendment No. 25.5</i>).
2	All the servers shall be DC/AC powered for Data centres.
3	The processor loading at rated capacity of the network elements shall not exceed 70% of the total processor capacity
4	Server shall be 64-bit RISC / EPIC / CISC architecture processors with minimum 8 cores in each server.
5	The server should be provided with a minimum of 2 numbers of hot plug 600GB10K RPM SAS hard disk drives
6	No of equipped cores shall be as per sizing given by the software (Application) OEM.
7	Server shall have dual redundant power supplies.
8	All servers shall be rack mounted using rack mounting kits to be supplied by the server vendor (OEM).

Storage System Specifications

S.No	Storage Hardware Specifications
1	The Storage system proposed shall conform to Entry-level storage category of TEC Specification/GR No. TEC/GR/IT/DSI-001/04/DEC-2015 or latest.
2	All Storages shall be DC/AC powered.
3	The Storage system shall be provided in RAID 5 configuration.
4	The bidder can propose the Storage as per the solution requirement, either built-in within the Server or proposed as external Storage System to meet the solution requirement.

IV. State NOC (S-NOC) *(whole State NOC section as per Amendment No. 12.3)*

1. General:

Proposed S-NOC shall be the 'heart' of the network that assists in enhancing efficiencies of operations and management of all active and passive network elements. It shall provide a holistic view of all network operations allowing monitoring, control, and automation of various functionalities at an individual system level.

2. Responsibilities of the S-NOC:

- PIA needs to survey the site; design the layout of the site including all the standard furnishings etc. to make the S-NOC operations.
- The complete BoQ of the work to be done at S-NOC needs to be submitted along with the design and approval to be taken from BSNL before start of the work.
- S-NOC shall be manned with qualified manpower for S-NOC operations. S-NOC shall be managed 24x7x365 and accordingly manpower to be planned.
- S-NOC shall act as centralized management of full-network resource and service inventory to improve utilization of in-service resources.
- The IT infrastructure at S-NOC will be in full redundancy architecture and will be provisioned with the required storage, computing, networking, security, backup, monitoring, management and help desk components.
- The S-NOC will house the OSS solution to monitor the complete IP network (all the active devices, any other SNMP enabled devices in the network, IT systems in the S-NOC) and optical network.
- S-NOC shall always be able to generate inventory report of active elements like port status, port utilization status etc. for future perspective through Network Management System (NMS).
- S-NOC shall have a centralized monitoring console displaying network topology map. It shall provide key correlation analysis for network fault processing to improve network fault processing efficiency, provide performance & trend analysis of network equipment and impact range of network fault, network usage, availability and performance for server nodes etc.
- All the EMS like router, RFMS, UBR, DMW and any other alternate technology EMS will be integrated to S-NOC NMS
- The NMS and all EMS of S-NOC will be integrated with Central BharatNet main NOC and DR NOC (C-NOC). The integration of S-NOC with C-NOC will be based on open standards. The prospective bidders should plan the deployment accordingly.

3. Functional requirements of S-NOC:

Sr. No.	Category	Functional Specification
1.	General	a. S-NOC to provide key correlation analysis for network fault

Sr. No.	Category	Functional Specification
		processing to improve network fault processing efficiency b. Provide the function of automatic service design and resource distribution c. Provide performance & trend development analysis of network equipment and impact range of network fault and supply end-to-end service quality management & control, which control network & service quality continuously and enhance customer satisfaction d. Provide Field Operation Assistance (FOA) for field engineers e. S-NOC would also maintain necessary reports like details of no. of nodes per logical links on any particular fibre route through NMS. f. Minimum 10 licenses for helpdesk solution to monitor the state network for performance and resolution of all alarms related to network to be deployed. g. Logs and other items like trouble ticket details related to invoicing and payment shall be retained for 1 year or date of invoice settlement whichever is later
2.	Key Function and Operation	a. NOC should have following key functions: i. Centralized Operation ii. Fault management iii. Network performance/ SLA management iv. Planning and Engineering v. Service management vi. Spare Management vii. RFMS management for fault management b. NOC should have following field operations activity: i. Connectivity ii. IT and Security iii. Provisioning on field
3.	Core Function	a. Core infrastructure supports for NOC: i. Next-gen firewall along with NIPS ii. Core switches for traffic aggregation iii. OSS/NMS for equipment monitoring iv. Network inventory management system v. Remote Fiber Monitoring Software (RFMS) system vi. Helpdesk (or Incident management system)
4.	Availability	a. 2 NOC core routers operating in high availability mode b. Minimum 2 core switches with high switching capacity which will be connected on mesh mode to have high availability c. All the servers like (NMS, Webserver etc) & Firewall devices will be connected to core switches
5.	Servers	a. All servers like Helpdesk, EMS, OSS, AAA, Backup etc. with necessary hardware and software
6.	Firewall Support	a. The Firewall must support application identification natively, without requiring any license/ subscription/ blade. There should not be any need to buy any license for application visibility and the

Sr. No.	Category	Functional Specification
	{Amendment # 26.5}	firewall must operate at Layer 7 natively. b. NOC must support Firewall, Application visibility and control, IPS, from day one and support for URL Filtering. c. NOC should support language like English, Hindi and regional languages for URL and IP database to fulfil web security needs d. All the servers will be kept behind firewalls e. NOC must have always on access to the firewall. The firewall should have dedicated inbuilt hardware resources for firewall access and management at all times and must be available irrespective of load. f. The NIPS and NGFW shall not be implemented in same security layer. Antivirus, Anti malware, Anti bot will have to be available at edge device. g. Performance Parameter: Next-Gen Firewall throughput must be 60 Gbps. The device must have capability of handling adequate Concurrent Sessions (TCP). IPSEC VPN throughput of 40 Gbps and SSL inspection throughput of 20 Gbps. It should be able to support http, https traffic. h. Interface Requirement: 4 X 10 G SFP, scalable to 6 x 10 G SFP i. All required transceivers as per solution design should be populated from day one j. Proposed solution must be dedicated purpose-built firewall device which enables the convergence of high performing networking and security across the security platform. k. The proposed solution must be quoted in high-availability mode with 2 appliances and active/active & active/passive modes must be supported on both IPV4 & IPV6.
7.	User Licenses	l. There shall not be any limit on user creations for accessing all the applications. However, licenses for concurrent sessions for accessing all the applications shall be at least 40 in case of packages of Category-1 (1A & 1B) and at least 25 in case of packages of Category-2
8.	Video Wall	a. The Video Wall should have configuration of 4(C) x3(R) of 70" Diagonal with Laser/RGB Laser Light Source having minimum resolution of Full HD (1920 X 1080 Resolution per cube), minimum onscreen brightness of 500 cd/m2, Dual redundant (1+1) redundancy and hot swappable power supply, video wall controller along with wall management software should be able to control all the cubes from a single logical area and should have minimum 12 HDMI/ DVI inputs.
9.	Non-IT infrastructure	To provide non-IT infrastructure including but not limited to tables and chairs for helpdesk support staff in NOC a. To provide fixtures, cable trays and racks for the server/telecom room. All structured LAN cabling for entire NOC along with necessary accessories I/O, faceplate, backbox, cable trays, jack

Sr. No.	Category	Functional Specification
		panels. b. Physical structure, ergonomically designed desk to ensure 24x7 desking solution with sufficient knee space and foot space. c. The console top / working surface should be made of MDF with high pressure laminate finish. The laminate shall be fire retardant, insulated, waterproof, scratch resistant and high hardness. d. Consoles must be of modular design, facilitating future equipment retrofits and full re-configurations without requiring any major modification to the structure or exterior elements e. The workstation shall be able to house computer equipment, Ethernet Points, Power Distribution Unit. The CPUs shall be mounted/ kept on slide out CPU trays (mounted on heavy duty slides) for ease in maintenance, all of these equipment's should be concealed from direct human view while ensuring that adequate leg space is available for the operator. f. Ergonomic chair with arm rest and castor wheels designed for 24/7 usage g. Backrest support should be tilt adjustable h. Warranty/guarantee for tables/ work stations and chairs should be for entire contract period (10 years) i. Air conditioning, earthing, fire and safety facilities to be provided by PIA as per actual requirement
10.	UPS {Amendment # 26.5}	a. NOC should be with proper building management system, civil and electrical Infra with 40 KVA UPS (1+1), 40 kVA/ 40kW 3 phase 415V, 50Hz input/ output online UPS (with SNMP) in 1+1 configuration with Li-ion battery for 60 minutes backup. Certification: ISO9001:2015.
11.	DG	a. Silent DG of 100 KVA, engine should be full authority electronic with common rail fuel system 50 degree C ambient capability. Emissions useful life of after treatment systems not less than 8000 hours. Silencer should be hospital grade & oil change interval of 750 hours/1 year. Controller should have built in AMF functionality with RS 485 interface CAN compatible.
12.	Mini Data Center at S-NoC	Mini Data Center (MDC): a. Access Control: The Mini Data Centre in the S-NOC should be fitted with suitable high security access control system. (Amendment No. 25.3) b. IP Camera: 2 nos one on the front and one rear side with software & internal storage (data storage capacity should be sufficient for minimum 30 days) c. Electrical: Raw power point will be given by user, raw DB, UPS input/output DB and associated wiring has to be done by bidder. d. Monitoring: intelligent monitoring system with an ethernet 10BaseT network connection e. Cooling: Air conditioning as per actual requirements. Separate cost saving air-conditioning solutions like PAC, in-row cooling,

Sr. No.	Category	Functional Specification
		smartrow, smart suite, smart isle etc shall be deployed for Data Centre Racks housing servers/storage/networking equipment etc to optimize OPEX. Comfort Airconditioning solution shall be provided for other areas.

Functional Requirements of items mentioned in the S-NOC BoM but minimum requirements not mentioned in the above-mentioned Table are given below-
{Complete Table in Amendment # 26.6}

Sr. No.	Category	Functional Specification
1.	NOC Router	a. The router shall be CE 2.0 certified or TEC-GR: TEC/GR/IT/TCP-006/01/AUG-16 compiled. b. The router shall support a redundant and scalable architecture, including CPUs, modular power supplies, and performance components. c. All interface modules and power supplies shall be hot-swappable and provided with 1+1 route processor, 1+1 or 1+N switch fabric and power supply redundancy. d. It shall also support minimum nonblocking capacity of 1.6 Tbps full duplex and handle minimum 256K IPv4 and 128K IPv6 routes. e. It shall have minimum ports 2*100 G, 4*40G and 12*10G and may be extended in future as per requirement. f. The router shall support multicast, routing and protocols required to run services as mentioned in clause no. 3.5 (f) of Section – IV B in RFP g. The router shall support traffic classification, congestion management, traffic conditioning, hierarchical QoS policies and various other security features to prevent network attacks and vulnerabilities h. The router shall support access control lists to filter traffic based on parameters, per-user authentication, authorization and accounting. i. Operate within a temperature range of 0 to 40 degrees Celsius and humidity levels of 10% to 90% non-condensing. j. The router shall provide wire-rate throughput on all interfaces, with sufficient optical distance to eliminate the need for additional equipment. k. The routers shall be supplied with necessary power cords, data cables, connectors, CD's, manuals, bracket accessories, wire managers and other appropriate accessories.
2	Core Switch	a. The switch shall support non-blocking Layer 2 switching and Layer 3 routing, providing 1:1/N+1 redundancy for power supplies, fan trays and fan. b. The switch shall support 24 x 10/40/100 G fiber interfaces, console port, and management interface for Out-of-Band Management. c. The switch shall support multicast, routing and protocols required to run services as mentioned in clause no. 3.5 (f) of Section – IV B in RFP d. It should support sufficient IPv4 and IPv6 routes and hardware-based load balancing, as per requirement, if not provided by any other mechanism. <i>{Amendment # 28.1}</i>

Sr. No.	Category	Functional Specification
		e. The switch shall support classification and marking, methods for identifying traffic types, and real-time traffic differential treatment and support hierarchical QoS policies. f. The switch shall support port-based authentication from Layer 2 to Layer 4, control plane protection, stringent security policies, AAA and various other security features to prevent network attacks and vulnerabilities, provided these are not addressed by any other mechanism in S-NOC. <i>{Amendment # 28.1}</i> g. The switch shall support remote login using Telnet and SSH V.2.
3	Aggregator Switch <i>{only category changed in Amendment#28.1}</i>	a. Access switch shall support non-blocking Layer 2 switching and Layer 3 routing to ensure seamless data flow across the network. b. It shall support 1:1/N+1 redundancy and reliability for critical features such as components power supplies and fans to eliminate single points of failure. c. It shall support high-speed connectivity equipped with 48 x 10/ 25G Fiber and 4 x 40/ 100G ports, enabling high-speed data transmission and scalability. d. It shall support scalable routing and capable of handling sufficient IPv4 and IPv6 routes, as per requirement. e. It shall support load balancing ensuring optimal traffic distribution and performance. f. It shall provide robust security with port-based authentication, control plane protection, and support for external AAA databases. Includes comprehensive management features like SNMP v2/v3, centralized syslog, and packet capture capabilities. g. The switch shall support multicast, routing and protocols required to run services as mentioned in clause no. 3.5 (f) of Section – IV B in RFP
4	SAN storage for application & DB <i>{only category changed in Amendment#28.1}</i>	a. SAN storage shall have provision of enterprise all-flash storage arrays for high-performance application. b. It shall ensure 99.9999% availability with SAN solutions configured for optimal and consistent performance. c. It shall implement regular backups to disk-based systems and transfer to object storage for long-term retention and it should have scalable object storage. <i>{Amendment#28.1}</i> d. It shall use enterprise SSD disks with dual parity RAID-6 for application and DB storage. e. It shall include multiple hot spares, active-active architecture, and fault-tolerant design without single points of failure. f. It shall provide a minimum of 8 point-in-time copies or snapshots with at least 20% of storage capacity allocated for snapshots. g. It shall offer centralized management software for monitoring, performance analysis, and support for various operating systems and databases. ~~a. It shall have scalable object storage with encryption and metadata-driven policies. {stands deleted as per Amendment#28.1}~~
6	San	a. The SAN switch shall comply with TEC GR No. TEC/GR/IT/DSI-

Sr. No.	Category	Functional Specification
	Switch	001/04/DEC 2015 section 3.13 or latest amendment and have a director-class, non-blocking architecture. b. Its shall be scalable to 48 ports in a single domain, with 16 Gbps full duplex ports, ensuring high throughput and low latency. c. It shall have two fibre channel switches in a high availability mode, with no oversubscription at 16 Gbps, ensuring reliability and performance. d. It shall operate at 16 Gbps and auto-negotiate to 8 Gbps/4 Gbps. All components shall be hot-swappable and field-replaceable, allowing non-disruptive maintenance. e. It shall have no single point of failure and include dual-redundant control processors, redundant hot-swappable power and cooling subsystems.
7	Blade Chassis/ Rack servers (including AAA)	a. The PIA shall optimize server and processor hardware requirements, ensuring redundancy and allowing application combinations as needed. b. It shall have 64-bit latest CPU architecture, 2.5 GHz, 512 GB RAM extendable up to 1 TB. c. It shall ensure high availability and scalability, supporting multiple partitions and dynamic resource allocation with security isolation between partitions. d. It shall support 10/20/40 Gigabit Ethernet and have at least four 8/16 Gbps fibre channel adapters with redundancy, segregating public/private traffic. e. It shall support proactive failure detection, dynamic partition migration, dual redundant power supplies, ECC cache, and pre-failure alerts, with a 20% resource headroom. f. Its shall have Independent OS images in each partition, supporting virtual IP, dynamic processor allocation, online upgrades, clustering, patch management, and volume/file system management. g. Applications shall failover to high availability servers in separate partitions, with dynamic CPU resource allocation and maintaining performance without degradation, supporting minimum 2 x 1 TB internal SSD. h. The AAA server/ appliance shall provide authentication and security policy enforcement for network users and infrastructure, supporting redundant servers and remote databases for large-scale environments. f. The AAA server/ appliance shall offer web-based interface for simplified configuration, dynamic quotas for access restrictions, and flexible administration of security policies across network devices.
8	Backup and archival solution	a. Backup software shall operate on Windows, Linux, and UNIX platforms, supporting backup and restore across all type of operating systems. b. It shall support OS, database, and virtualization software backup. c. It shall be capable of backing up data from one platform and restoring it to another. d. It shall support multiple backup frequencies (daily, weekly, monthly) and utilizes 256-bit advanced encryption for secure data backups without additional licensing costs. e. It shall provide command-line support across supported platforms and

Sr. No.	Category	Functional Specification
		features wizard-driven configuration for simplified setup and modifications. f. It shall offer firewall support, role-based access control, and cross-platform domain architecture for secure user management in multi-tenant environments. g. It shall Include deduplication, data multiplexing, hardware snapshot backups, and support for virtual platforms and databases, ensuring comprehensive backup capabilities. h. It shall Integrate with third-party Virtual Tape Libraries (VTLs) with deduplication capabilities and provides extensive web-based/GUI reporting for detailed backup management. i. It shall support scalable deployment with multiple worker/storage/media servers and allows direct data movement from clients to backup storage for efficient operations.
9	NMS/ OSS Solution	a. The OSS shall be telco-grade solution with proven scalability robust integration (SNMP and open-source APIs), and high availability on various OS. b. It shall support comprehensive eTOM coverage including next generation OSS providing Service assurance and Service fulfilment, spanning, Inventory, Discovery, Service provisioning, Service activation, Fault, Incident, Task, Device, SLA, Performance, Problem and Change management. c. Is shall provide unified GUI for network management, featuring end-to-end circuit diagrams, topology views, alarm management with root cause analysis, severity levels, and automatic ticketing. d. It shall support advanced CMDB functionality for managing active/passive inventory, custom attributes, workflow-based discrepancy resolution, and integration via standard NBIs. e. It shall provide auto-discovery of network inventory, circuits, and protection mechanisms with detailed GUI visualization and reporting capabilities. f. It shall support for auto-diagnosis, predictive analytics, service outage management, and detailed RCA with actionable alarms and SMS/email notifications. g. It shall support customizable network topology views including IP networks, device icons, and geo-location maps with interactive drill-down capabilities. h. It shall provide network diagram builder with Visio-like interface, primary/backup connection definitions, and automatic failover notifications. i. It shall provide real-time monitoring of device health, performance metrics, interface bandwidth, VLANs, and circuit levels with configurable KPIs and data aggregation. j. It shall support for Threshold Crossing Alerts (TCA), rule-based alarms, customized reports, and real-time data export in Excel format. k. It shall support End-to-end incident management with multi-channel

Sr. No.	Category	Functional Specification
		creation, automatic timestamp recording, SLA mapping, dynamic workflows, and comprehensive audit trail. i. It shall support self-service capabilities for incident tracking, knowledge article access, customer surveys, role-based access control, and integration with field service GPS tracking.
10	NIPS (1+1)	a. The NIPS appliance shall be dedicated firmware, independent from firewall or UTM functions, which means NIPS shall be purpose-built dedicated appliance. {Amendment#28.1} b. It shall support up to 60 Gbps inspection throughput. c. It shall handle up to 20 Gbps of TLS traffic inspection, supporting 10,000 new SSL connections per second and 1,00,000 concurrent SSL connections with a provision to extend up to 20% in future. d. It shall have Internal fail-over capabilities on interfaces up to 20 G to maintain network continuity during hardware failure. e. It shall defend against IPv4, IPv6, MPLS, and tunnelled traffic, including protocol/application anomalies and P2P attacks. f. It shall offer 15,000+ built-in IPS signatures, supports signature imports and allows flexible signature to enable/ disable and IP exemptions. {Amendment#28.1} g. It shall provide comprehensive protection with exploit detection, vulnerability scanning integration, layer 2 fallback, and IP reputation blocking.
11	End point security solution	a. End point protection software shall be single agent software for NGAV, EDR, Threat Hunting, Application Control, Vulnerability Protection, Firewall, and Device Control, operable without additional updates. b. Supports IPv4 and IPv6. c. Comprehensive protection against viruses, Trojans, worms, spyware, adware, and other malicious tools. d. Full malware scan with configurable exclusions and performance controls. e. Utilizes behaviour monitoring and machine learning to detect fileless attacks and unknown threats with an in-house anti-malware engine. f. Safeguards documents from ransomware, including backup capabilities. g. Automated cleanup of malware remnants and infected system elements. h. Blocks Command and Control (C&C) traffic, malicious websites, and protects against vulnerabilities with virtual patching and CVE-based rules.
12	Help desk Solution	a. The help desk solution shall be converged communication system supporting analog and IP devices on a server-gateway architecture, scalable up to 25 stations. b. It shall be SIP-based voice network with full redundancy (1:1) and support for IPv6 for futureproofing. c. It shall support ACD features include skill-based routing, customizable queuing, real-time statistics, and agent chat. d. It shall support IVR capabilities encompass voice support, HTTP/XML integration, outbound campaigns, and IVR application performance reporting. e. It shall support email integration with Exchange for queuing, routing, and agent automation, real-time supervisor reporting.

Sr. No.	Category	Functional Specification
		f. It shall provide IP Phones with monochrome display, speakerphone, headset support, SNMP/DHCP/DNS protocols, and QoS. g. It shall provide video conferencing system with H.265/H.264 support, 1080p resolution, dual monitor HDMI/DVI outputs, and cloud platform compatibility.

Note:

1. The PIA has to maintain the network for the entire contract period as per the KPIs & SLA parameters defined in the tender. The specifications / functional requirements/ dimensions mentioned in the tender for S-NOC are minimum requirement.
2. The PIA shall have to plan and deploy the hardware/ software in S-NOC to meet the SLA and O&M requirements. The PIA shall also deploy suitable security features to protect the NOC and the network from any security breaches.

4. Indicative BoM:

#	Item	UoM	Total Qty
NOC NON - IT			
1	Civil works including site preparation and partitioning works , false flooring, false ceiling, etc.	Lot.	1
2	Electrical works including light fixtures, cabling, panels + earthing etc.	Lot.	1
3	Silent DG set with AMF panel and required foundation and civil structure	No.	1
4	Air conditioning for NOC, UPS, BMS, Meeting, electrical rooms, etc.	Lot.	1
5	40 kVA online UPS (with SNMP) with 60 minutes battery backup and battery enclosure (in 1+1 configuration)	Set	1
6	Access Control System (RFID + Biometric, smart cards) to manage NOC	Lot.	1
7	Racks (Integrated Air conditioning and climate monitoring system covering entire Racks/suite/Isle/Data Centre only)	Set	1
8	IP camera with intelligent monitoring system including software & internal storage	No.	2
9	70" LED TV	No.	2
10	Structured cabling (OFC and Cat6)	Lot.	1
11	Workstation furniture and fixtures including chairs	Set	15 for Category 1A & 1B and 8 for Category 2 Packages
12	Fire Detection System	Lot.	1
NOC - IT components			
1	NOC Router	No.	2
2	Core Switch	No.	2
3	Access Switch	No.	4

#	Item	UoM	Total Qty
4	Aggregation Switch	No.	2
5	SAN storage for application & DB {Amendment#28.1}	Set	1
6	SAN Switch	No.	2
7	Secondary Storage (As per requirement, to be assessed by PIA)	Set	1
8	Blade Chassis/Rack servers (including AAA) (As per requirement, to be assessed by PIA)	Set	1
9	Workstation computers (i5 2.5 GHz processor, 8 GB DDR4, 1 TB HDD with 19.5 Full HD Monitor Key Board & Mouse with all other accessories as per requirement; 1xDVI output, 2xHDMI Output, 1xVGA Output)	No.	10
10	IP phones	No.	10
11	IP PBX	No.	1
12	Video wall display, Controller, Video wall Management Software & Accessories	Set	1
13	Backup and archival solution	Lot.	1
14	NMS/OSS Solution	Lot.	1
15	Helpdesk solution	Lot.	1
16	End point protection software	Lot.	1
17	Centralized Access Control system software for AAA server {Amendment No.- 26.9}	Lot.	1
18	Firewall (1+1)	Lot.	1
19	NIPS (1+1)	Lot.	1
20	Remote Fiber Monitoring Software (RFMS) system	No.	1
21	Network color laser printer	No.	1

Reports: Around 40 no. of reports are required to be developed by the successful bidder in consultation with the BSNL at the time of the implementation of the S-NOC. These reports shall encompass the planning, operational and MIS parameters. Further, around 10 new reports and 10 customizations of existing reports, every year shall be done free of cost by the successful bidder during the warranty/AMC period to meet any changes in the requirement. Any unused quantum of new reports shall be rolled over to the balance AMC period.

The solution shall support the ability to send SMS/ WhatsApp/e-mail alerts regarding faults as per the defined escalation matrix. SMPP port and WhatsApp business account shall be provided by BSNL on chargeable basis, cost of which shall be reimbursed in the quarterly O&M invoices.

The S-NOC shall be deemed to be commissioned after the following:

- i) Installation and commissioning of all the hardware and software sought in the S-NOC after successful Acceptance Testing
- ii) Providing the sought manpower support and the processes
- iii) Visibility of atleast 100 GP Routers and 5 Block Routers in the S-NOC confirming streamlining of the processes.

V. Remote Fibre Management System (RFMS):

Note: The equipment- RFMS and RFTS mentioned anywhere in the RFP may be referred interchangeably. (Amendment No. 12.8)

- a. EMS Server (1+1) and RTU's (Remote Test Units).
- b. The remote test unit should have 48 ports within 2U with 10W power consumption. Connectors to be LC or SC type. Connectors should be in the front panel of RTU preferably. RTU should have Dual DC power input capability/provisioning. Each Nodes, about 50% ports shall be having live or active fiber monitoring facility at 24 Ports (out of 48 Ports) and 24 Ports for dark fiber monitoring. All types of telecom traffic to be considered in case of Live Fiber monitoring.
- c. The OTDR module is required of 1650 nm (used for dark and live monitoring both) and dynamic range should be 40 dB or higher. Pulse width selectable between 6ns and 20µs and better. Event dead zone: = <1 Meter. Attenuation dead zone: 4 Meters; Optical distance accuracy: $\pm(0.75 + 0.0025\% \times \text{distance} + \text{sampling resolution})$.
- d. The system should have high availability feature with automatic switchover from active server to backup server in case of failure.
- e. System should be able to create users and manage passwords from centralized tool. It must allow to create user login, password, email and phone from the organizations directory using Lightweight Directory Access Protocol.
- f. The Administrator will be placed at NOC and manage the system. The solution should support upto 50 numbers of concurrent users having view/edit rights It should be possible for the system administrator of fiber monitoring system to see all the connected users with their IP address in a single window. All the user's activity should be stored in the database and can be displayed with the audit log function. EMS should be able to integrate with other third-party NMS via Rest API or SNMP.
- g. It should be possible that the fiber is still being monitored after a fault is detected. Users are automatically notified if the fault severity or the fault location changes. The user must be notified in case of second fiber cable cut or degradation happens along the cable route before the first cut or degradation is repaired when second cut or degradation is at a shorter distance than the first cut distance. All the changes of event above configured thresholds should be available in alarm history.
- h. The RFTS system will be able to provide alarm, alert notification, and automatic generation of customized reports to provide timely and valuable information on the fiber network health, availability, and provide historical trends of these performance indicators. This capability would be extended to Operation In-charge of each RTU location via web browser (Google chrome etc.) on mobile/tablet/laptop or any device which supports web browser

(Google chrome etc.). The RFTS system must have a mobile application operating on android and iOS for remote P2P tests.

- i. Software upgrades from the Server and client should be done remotely. Software upgrades on Remote Test Units shall be done from the server which will contact every RTU automatically for up-gradation. This can be done in bulk and at a specific time.
- j. For each monitored fiber, it should be possible to obtain fiber performance versus time. This graph should show the evolution of the fiber optic budget. The graph can be displayed for the last hour, day, week, month or year. By viewing the evolution of the fiber budget, user should immediately know whether this alarm is caused by a long term or short term effect.
- k. The system shall have a provision to tag .KMZ/.KML files to be associated to the relevant routes/ports to derive the co-ordinates of the fault or Google map link which can open in google map app which can be installed on PC/Tablet/Mobile phone.
- l. BBNL's GIS server for the entire fiber network is in-service. The RFTS system shall be linked with GIS system. All faults should be displayed on the screen of GIS. RFTS system should be able to take the GIS coordinate provided by third party GIS and incorporate in the email alert and SMS alert. The RFTS EMS vendor shall help the GIS vendor to get the RFTS EMS system integrated with the GIS system via REST API or SNMP.
- m. Integrated cable Management System for Inside and outside plant. Optical Inventory Module for logical and Physical network for port-to-port connectivity, Route search and service provisioning.
- n. The RFMS consist of eMS 1 Set and RTU as per BoM with all accessories as below
 - 1. eMS -1 Set consists of :-
 - 1.1 eMS H/W (Server/storage/firewall) with 1+0 at DC and 1+0 at DR
 - 1.2 eMS S/W (Application/ License)
 - 2. RTU -1 set Consists of :-
 - 2.1 RTU with 48 port,1650nm wavelength,=>40dB. 1 no
 - 2.2 Optical WDM Coupler, 24 nos
 - 2.3 Stop Pass Filter, 24 nos
- o. The offered solution/Make-Model should have been successfully in operation for minimum 40% of required quantities for the package for at least one year in the TSPs' network anywhere or in BharatNet in India. A certificate from the end user should be enclosed with the Bid.
- p. BSNL may use RFMS deployed by PIA to monitor north bound OFC connectivity, used for backhaul/ management for BharatNet connectivity. (*Amendment No. 12.4*)

- VI. Rack at Block and GP** (All the equipment at GP shall be AC operated while at the Block, all equipment shall be DC operated)
- 1. Outdoor/Indoor enclosure for DC Power Plant/AC UPS and Other Network Equipment,**
Bidder has to provision single multifunction enclosure at each GP and Block for both network and power supply including battery with partitions for power, battery bank and network devices, etc. Separate enclosure for different devices shall not be allowed.
 - 2. Technical Requirement:**
All enclosure panels are single walled bolttable from inside with earthing to be done on all flat parts,
 - 3. Enclosure Frame Material:**
Zinc magnesium coating with 25mm system punching in the roof and base frame plus vertical sections with two mounting levels, rolled out of a single sheet
 - 4. Enclosure Flat Parts Material:**
Enclosure flat parts material: Galvanized sheet steel 1.5mm / 2 mm thick of 120 GSM /
Front single door with 4-point locking system and rear panel bolttable from inside in single walled construction with door stay, Side panels left and right in single walled construction bolttable from inside, Rain canopy of 75mm height with projection all around, with 300 mm base plinth of 3mm thick, The enclosure flat parts to be gasketed with Outdoor Polyurethane foam gasket, the fasteners will be of SS 304 grade suitable for outdoor application.
 - 5. Dimension:**
As per site requirement with provision for minimum 20% additional space for future expansion.
 - 6. Cooling:**
The housing should be equipped with DC/AC operated cooling Axial Fans, self-starting, double ball-bearing, temperature-controlled operation via controller. Noise level maximum 65dB. The cooling fans should be on a fan tray for ease of access and easy fault identification and diagnosis. N+1 Configuration fans. Standby fan operates automatically when inside temperature exceeds 60°C OR any of the fans fails. The enclosure should also have provision to mount Outlet filters: Material: ABS/PU, For ventilation by convection size and capacity as per heat load requirement.
 - 7. Quality Certification:**
The Rack should conform to DIN 41491, DIN 41494, and IEC 297. All products/OEM should be certified according to ISO 9001, 14001, ISO45001 and IS 13252: PART 1 (2010) & IEC, 60950-1 Protection category: IP55: IS/IEC 60529: 2001. Certificate from NABL accredited lab shall be attached

8. Surface Finishing:

Powder coated with UV Resistant pure polyester RAL 7035 Matt super durable with painting thickness of 80 to 120 microns minimum.

9. Access Control and Monitoring System:

Electromagnetic spring loaded metal lock with 9 digit electronic keypad reader for front door with IP/SNMP/Web browser based control and monitoring to central NOC along with temperature, humidity, water logging, fan fail, water leakage from top, fire detection, door open/unauthorized access monitoring to manage the SLA, Enclosure, Fan and Filter, locking and Monitoring system should be from the same OEM.

There should be an eMS for monitoring major parameters including Input & Output Voltages, Inside & Outside Temperature, Humidity, Alarms, % battery back up time left. It should also be possible to control/switch on/off Non-Critical Loads/ Extra fans. The monitor & Control should be possible from State NOC as well as Central NOC. Last 24 hrs (at least) Alarm & Access events must be stored with Date & Time stamp.

The Rack OEMs may outsource the works related to GI sheet fabrication (cutting, bending, welding) including powder coating of enclosure. Remaining processes like fixing of sensors, locking system, PU gasketing, camera & all other monitoring accessories and EMS shall be done by the Rack OEM itself. All testing facilities for the rack shall be available with the factory of rack OEM only. (*Amendment No. 25.2*)

10. Temperature based fan operation – The fans will be in 5+1 configuration and 3 fans will operate when inside temperature is above 25°C, 2 more fans will start operating automatically when inside temperature exceeds 35°C. Standby fan operates automatically when inside temperature exceeds 60°C OR any of the fans fails.

11. Hidden camera – A hidden tamper proof camera will capture a snapshot every time the door is opened and continues to take snapshots at every 5 minutes for one hour and thereafter every 15 minutes until the door is closed and sends the snapshot to NOC, where it is stored for at least 15 days backup.

12. Access control system rights and protection – The password for access control system can be remotely reset by a Super User at NOC. In case of unauthorized access of cabinet or wrong password is entered, a notification will be sent to the NOC and after three failed attempts, the password will be disabled.

13. eMS for Rack Operations– The status of all the racks and all the alarms shall be available in the eMS to be supplied. The eMS shall be integrated both with State NOC and Central NOC.

14. Power supply to the Rack shall be without external ON/ OFF switch, to avoid any accidental power cut. Further, in case of requirement of smart meter, there shall be provision in the rack to install the same inside the rack only. (*Amendment No. 12.9*)

15. Installation instructions for Outdoor Rack at GP:

Wherever the PIA anticipates access issues, the rack may be planned to be installed outside the building (within the premises). In case of outdoor installation of rack at GP, the PIA shall

install the rack on a RCC plinth of minimum 2 feet height to be casted with 2 pipes - one for power and the other for OFC. The cabinet should be grouted with suitable fasteners. No additional payment shall be made for such outdoor installations. (*Amendment No. 19.3*)

Note:- TSEC for Rack (at Block & GP) shall be obtained as per Technical Specifications mentioned in the RFP. (*Clarifications & Amendments post Doubt Clearing Workshop dated 17th May, 2024*)

~~VII.~~ DELETED

VIII. Minimum Technical specifications for Uninterrupted Power Supply (UPS) System at GP (*whole sub-section VIII as per Amendment No.25.1*)

The Hybrid Uninterrupted Power Supply (HUPS) System at GP shall comply to TEC GR No 66160:2024 with ratings of various modules/ additional functional requirements as mentioned below. The additional functional requirements mentioned below will supersede the specifications in the TEC GR, in case of conflict.

1. Inverter - 0.5 KVA
2. Rectifier: 1+1 with capacity of 25 Amp each
3. Solar Charge Controller:
This unit should be pluggable in modular chassis-based design, to connect solar panels as per requirement.
4. Solar Panel:
2 Nos of solar panels with minimum 500W each as per TEC GR: 66080:2016 and latest amendments if any.
5. DSCA Unit:
DSCA Unit shall integrate with the rack for extending all the monitoring parameters to the S-NOC/ C-NOC using SNMP /RS485 protocols.
6. Battery specifications:
 - a) Capacity: 2400 VAH
 - b) Battery Type: Lithium Ion as per TEC GR No.67030:2024
 - c) BMS Technology: Active BMS
 - d) Battery Theft Prevention: Digital Interlock to Prevent Battery Misuse
 - e) BMS Interlock based on Hybrid UPS & Battery: RS485/CAN bus
 - f) Digital Interlock to Prevent Battery Misuse
 - i. Through the implementation of digital interlocking mechanisms, secure communication pathways can be established between the battery and the DSCA via an RS-485 enabled communication module / CAN protocol, or any other protocol
 - ii. The battery, equipped with an intelligent Battery Management System (BMS), will be programmed to initiate power supply exclusively upon receiving a specific signal, which the Hybrid UPS will be configured to emit.

- iii. Consequently, ensuring that the battery discharges power solely for the operation of the Hybrid UPS.
 - iv. Should there be any attempt to connect any alternative load, the battery shall be designed not to provide power.
7. The System should be installed in the rack

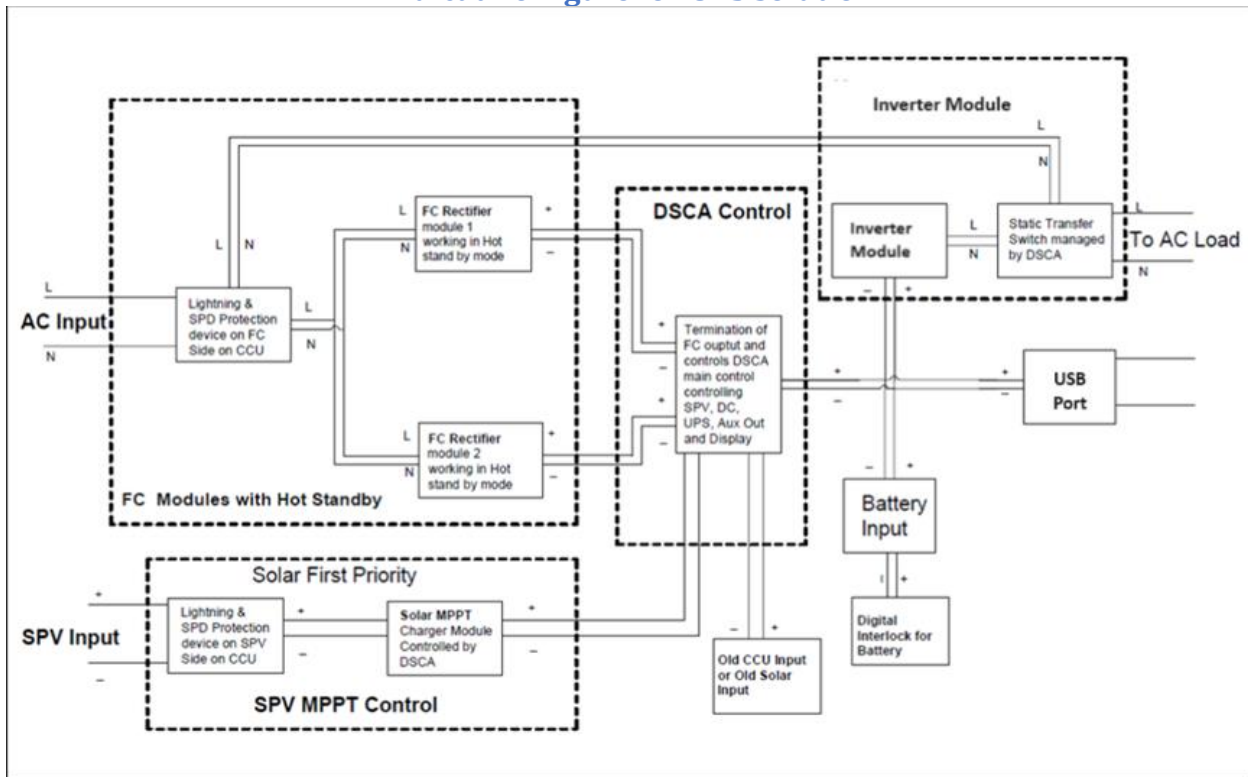
8. Other requirements:

- a) The HUPS shall have provision to integrate 12V, 60W Solar Panels already deployed in BharatNet Phase I and Phase II in combination of 1X n no of Solar Panels (n=1 to 4 depending upon internal DC voltage e.g if internal DC voltage is 48V, then n=4) at the locations where 1 KW solar panel and MPPT based Solar Charge Controller are not provisioned. The PIA shall quote for separate 1 KW MPPT Solar CCU module to connect such taken over solar panels by the PIA in the existing network, with the HUPS.
- b) The equipment on load (i.e. Router, OLT etc) should not get reset on switching of the input supply from Grid/Solar/Battery or switching from rectifier 1 to rectifier 2.

Please note:

QF-103, already obtained (before publication of these revised Technical Specifications vide Amendment No.- 25.1) against the earlier Technical Specifications (as per Amendment No.- 12.5) shall be acceptable to meet the eligibility for submitting the bid only. Successful bidders shall obtain TSEC against the latest Technical Specification, as above, before supplies.

Indicative Figure for UPS solution



(Amendment No. 12.5)

IX. Unlicensed Band Radio (UBR)

1. The Bidder shall supply, install and commission microwave links in 5.X GHz unlicensed band. The transmission equipment shall conform to latest TEC specifications/ GR: TEC/GR/R/ISM-MOD-001/04. MAR 2016 (except for those specific requirements stated in this section or those that have been outdated due to technology advances and the functional requirement has been met or exceeded) complete with Antenna, feeder and installation material. 23/25/27/29/32dbi antennae shall be used in the engineering of the links. The provision of BITE is not essential, provided other provisions like LED to broadly indicate the health of the system for split radio and LCT for full outdoor unit (FO), Ethernet port for IP connectivity to external EMS or NMS of BSNL and connectivity to local terminal [LCT/laptop] are all available.
2. The Antenna System of UBR should be Dual polarized (Horizontal & Vertical) and shall support Frequency range- 5150 to 5875 MHZ. The failure of either horizontal or vertical polarization shall not lead to failure of the system as a whole. The entire antenna supplied shall be dual polarized for the hop concerned.
3. The UBR system shall be of Full Outdoor architecture (FO). The necessary cables/accessories required for extending the bandwidth from the system to the user equipment like BBU shall be provided as part of the installation material. MCB addition, if required, at any site shall be done as part of I&C.
4. The system configuration, commissioning and monitoring shall be possible to be done using a local terminal [laptop] connected externally through standard Ethernet

- interface. One such terminal shall be supplied with every 200 hops. There shall be appropriate LCT with Browser-based user interface with GUI which shall indicate PMON/RMON to assess the performance of the system with last 7 days historical data.
5. BSNL is in the process of commissioning a nationwide network monitoring platform and it shall be possible to integrate these Digital Microwave nodes through their EMS to the upcoming platform through standard interfaces including SNMP v.1/v.2/v.3. All the required support shall be extended during warranty and AMC for such integrations.
 6. One electrical GE ports [10/100/1000 Base-T[X] type with auto negotiation] or 1 GE optical ports (1310nm, all with auto-negotiation, 5 Km range SFPs) shall be provided for FO. Applicable modulation schemes of QPSK to up to 1024 QAM with AMR shall be equipped with for achieving spectral efficiency in 5.X GHz bands.
 7. The UBR shall provide the throughput as below:
 - 7.1 The throughput for a hop distance of 6-10km shall be minimum 500 Mbps (uplink and downlink) without packet loss for 90% of such sites and remaining 10% sites can be accepted with 25% reduced throughput (375Mbps) without packet loss.
 - 7.2 The throughput for a hop distance of 10-14 km shall be minimum 400 Mbps (uplink and downlink) without packet loss for 90% of such sites and remaining 10% sites can be accepted with 25% reduced throughput (300 Mbps) without packet loss.
 - 7.3 The throughput for a hop distance of 14-18 km shall be minimum 200 Mbps (uplink and downlink) without packet loss for 90% of such sites and remaining 10% sites can be accepted with 25%reduced throughput (150 Mbps) without packet loss.
 8. All network elements handling IP shall support IPv6 addressing and routing with backward compatibility for IPv4. All equipment (Hardware, firmware, software) / services / features should be available on both IPv4 and IPv6 simultaneously (dual stack). All the network elements located within the LSA including the IPMPLS networking elements shall use only private IP address.
 9. Ethernet latency shall be < 30 Milliseconds. However, bidder shall specify the exact value for various configurations, frame size and packet sizes
 10. The MW radio shall be housed in a weatherproof casing (IP 65 compliant) designed for all weather operation and shall be preferably directly integrated with the antenna. It should be leaking proof during monsoon/snow fall.
 11. There shall be dedicated auto-tests in all the network elements and equipment required for installation, troubleshooting, Maintenance, etc.
 12. All network elements shall have the ability to upgrade software or hardware in the live system without any interruption or degradation of services. Any planned outage for major upgrade is permissible in maintenance window only, but the traffic shall be protected through stand-by systems wherever feasible.

13. It shall be possible to expand the capacity of Microwave link by adding hardware & software to a live system without any interruption or degradation of services. Further, in general, all hardware and software expansions shall be possible without any downtime. However, In case of any major upgrades which require downtime, they shall be done in the maintenance window with the approval of in- Charge of operations.
14. The UBR microwave system availability shall be at least 99.9% measured over a period of one year and accordingly each network element forming part of the system shall have much improved fault tolerance and higher reliability.
15. The software version of equipment to be supplied shall be the latest and same for all configurations and for all the sites including validation site. The hardware version to be supplied shall be the latest version and the same for all configurations and for all sites including the validation site.
16. The Bidder shall furnish, as part of the techno-commercial Bid, solution document detailing the Microwave network Equipment architecture along with dimensioning rules/tools for each of the components
17. The Frequency Support and EIRP norms shall be as per MOC (Wireless Planning and Coordination Wing) Notification 2018. Equipment type approval (ETA) shall be submitted with the technical bid.
18. There shall be Selectable channel bandwidth of 20, 40, 80,160 MHz without any SW licenses or restrictions.
19. The Radio shall support Automatic Transmit Power Control (ATPC).
20. The radio modem shall support Ethernet Features like:
 - i. Q-in-Q
 - ii. Access, Trunk, Transparent, and management VLAN
 - iii. 4 Level Priority quality of service (QoS) as per IEEE 802.11d WMM
 - iv. 9000 bytes Jumbo Frame
 - v. Both IPv4 & IPv6 IP addressing
21. The radio modem shall support Layer 2 Bridge.
22. Interference Mitigation Methods:
 - 22.1 Automatic Dynamic Channel Selection: The link should automatically select the best channel available in case the interference level in the present channel exceeds a threshold. This switch'shouldn't cause any disturbance to traffic.
 - 22.2 Dynamic Data Rate Selection: DDRS switches to the subsequent possible modulation in case of site-specific interference. Radio should support asymmetric TDD (Uplink and Downlink ratios) which should also be Dynamic or Fixed based on application needs.
23. The radio link shall have 256-bit AES encryption or higher.

24. Radio must support GPS based synchronization to avoid interference from multiple mast located in same area.
25. It should be possible to run bulk upgrades in field. Schedule upgrades should also be possible. New firmware download in radio shouldn't affect user traffic.
26. The Radio shall have inbuilt spectrum analyzer to check the result of both ends.
27. The microwave Antenna shall have a snow resistant Radom for extended temperature variants.
28. Radios should come with support for a link planning tool without any extra cost to the buyer. Link planning tool should support creating of reports including link budget and path profiles based on Google Earth data.
29. In case, any item/ service/ functionality are required for successful interworking, the supplier will have to supply the same at no additional cost. The inter-working and interoperability with all the existing network elements is the sole responsibility of the Successful Bidder.
30. The Purchaser reserves the right to specify the details of redeployment. Redeployment of such items has to be done by the supplier as per the price finalized through this tender.
31. The successful bidder shall undertake to do the necessary customization as and when required by BSNL besides providing details of the APIs data structures so as to ensure smooth integration without any cost to USOF, DoT/BSNL.
32. A soft copy of the documentation shall be supplied in each of the network elements.
33. Radio shall have DC surge immunity as per IEC 61000-4-5, Level 2.
34. Radio shall support modulation of 1024QAM or better and throughput capability of 1 Gbps or Higher.
35. Radio should support detailed Ethernet interface monitored from NMS
 - 35.1 Ethernet Tx/Rx (Data rate) counters that can be
36. Radio should support detailed Wireless interface monitored from NMS counters that can be
 - 36.1 Wireless Tx/Rx (Data rate)
 - 36.2 Wireless Tx/Rx usage
 - 36.3 Wireless drop packet
37. EMS System:

The successful bidder shall have to supply EMS for each of the Network elements supplied in the package with access provided to all circles of the concerned package. The EMS to be supplied shall conform to TEC standard EMS-TEC-SD-IT-EMT-001/01/MAR-16 or latest. It is the responsibility of successful bidder to integrate EMS

on package basis with NMS by providing standard open interfaces so as to collate the O&M reports/data/logs.

37.1 The supplied Microwave equipment shall extend all internal and external alarms to the EMS.

37.2 If all the traffic and statistical reports as required by the Purchaser are not available then necessary post processing software for off-line generation of traffic reports is also to be provided to each Circle along with necessary hardware including printer. However, sometimes, the data need to be changed due to modifications to be carried out at site, supplier has to ensure that necessary modification of the system, office and network data shall be possible to be modified at site together with re-configuration, if required. Necessary tools and commands have to be provided by the supplier for the same.

37.3 All server-based applications shall have latest servers equipped with processors having processing speed of 2.2 GHz or higher. The servers shall be of minimum 16 cores scalable to 48 cores within same chassis with minimum 256GB DDR4 RAM and minimum 48MB L3 cache memory. Scalability shall be in all the related components within the chassis and can be implemented easily without shutting it down. Partitioning of the servers is allowed for multiple applications. All the servers and storage shall be powered by DC (nominal - 48V) for the four zonal centers. The bidder shall provide full details regarding power, space, and heat dissipation for each node/platform.

37.4 The processor loading at rated capacity of the network elements shall not exceed 70% of the total processor capacity. Dimensioning of all nodes shall be done with a maximum loading of 70% for memory, signaling, CPU usage etc. Similarly, all critical storages are to be dimensioned to be occupied not more than 70% at the rated load of the Network Element.

37.5 The bidder has to necessarily supply DC powered storage & servers at all EMS locations.

37.6 All power supply units shall be in redundant mode. The Bidder shall define the redundancy provided in the system as part of the bid document. The interfaces shall be distributed at least in a minimum of two cards/modules. The definition of redundancy shall include the following and details of compliance shall be submitted as part of the Bid for every network element.

37.7 It is the responsibility of the successful bidder to integrate the above EMS supplied for the UBR Microwave link with the NMS of BSNL.

38. 4 Ports managed PoE switch with one Uplink:

38.1 The 4 Ports managed PoE switch will be deployed.

- 38.2 The PoE Switch shall be able to supply sufficient power to the UBR so as to achieve the throughput requirement.
- 38.3 The L2 LAN switch shall have full IPv4 and IPv6 support.
- 38.4 L2 Switch being procured through this tender shall be Dual Stack configurable and Non-Blocking Architecture.
- 38.5 The no. of 10/100/1000Base-T PoE interfaces or ports on LAN switches shall be as per SoR ordering.
- 38.6 The backplane Switching capacity of LAN switch shall be 10 Gbps or better and non-blocking.
- 38.6.1 IEEE 802.3ad LACP- Link Aggregation.
 - 38.6.2 IEEE 802.1AB LLDP.
 - 38.6.3 IEEE 802.1p prioritization, DiffServ/COS.
 - 38.6.4 Broadcast and Multicast Suppression.
 - 38.6.5 ACLs/filters.
 - 38.6.6 Support for Rate limiting/Queue Shaping.
 - 38.6.7 Dynamic VLAN Assignment.
 - 38.6.8 Configuration backup and restoration
 - 38.6.9 Port Mirroring
 - 38.6.10 Forwarding rate 8.93 Mpps 64 bytes
 - 38.6.11 Memory Buffer: 4 MB RAM: 1 GB Flash: 128 MB
 - 38.6.12 Jumbo frame 9.600 bytes
 - 38.6.13 MAC address 8.000 (automatic updates, two-way learning)
 - 38.6.14 Network Management L2+
 - 38.6.15 Port aggregation "LACP, Static aggregation
 - 38.6.16 PoE IEEE 802.3af/at, Supports PoE management (programable PoE, power limit, priority...)
 - 38.6.17 Power Consumption "Max 30W per port IEEE 802.3af/at Stand by <6W.
 - 38.6.18 Feeding voltage DC48 - 57V
- 38.7 Management Features:
- 38.7.1 Console Management Port on the front panel.
 - 38.7.2 Zero Touch Provisioning
 - 38.7.3 SMMP v1, v2 and v3 Support.
 - 38.7.4 SSHv2 Support.

38.7.5 Telnet Support, TFTP, FTP, SCP and SFTP client.

38.7.6 Port Mirroring.

38.7.7 Industry Standard CLI with built in Scripting tool/Event Scheduler.

38.8 Quality of Service:

38.8.1 IEEE 802.1p Priority.

38.8.2 Diff. Serv Marking /TOS/Classification/remarking.

38.8.3 Shaping and Policing.

38.9 Security Feature:

38.9.1 802.1x: Port security, Single and Multiple Authentications, MAB

38.9.2 RADIUS / TACACS+ Authentication support

38.9.3 MAC limiting per Interface/Port

38.9.4 SSH Remote Login

38.9.5 HTTPs

38.9.6 SNMPv3

38.9.7 MAC lockdown, MAC notification

39. Installation and Commissioning spares & consumables

39.1.1 All installation material and installation consumables shall be provided to enable the proper installation of Microwave equipment supplied. Any other materials and consumables, which are technology dependent and required for installation, but not quoted shall also be supplied free of cost.

39.1.2 Item-wise details of installation materials required for installation has to be furnished along-with its unit. The said details can be provided in the priced BoM.

39.1.3 Complete details of each and every item of installation materials, maintenance spares and maintenance consumables shall be provided.

39.1.4 Further, the successful bidders shall be bound to supply the additional Hardware/ Software for expansions of the network within a period of 3 years as per the traffic and operational requirements of the purchaser on the finalized itemized price after applying the applicable duties & taxes. The period of three years shall be counted from the date of carrying live traffic.

40. Installation Material

Per Hop Installation material for MW wi-l include -

- i. Grounding cable including lugs.
- ii. Fixers (Nut Bolt) for mounting ODU.

- iii. 2*Weather proofing and 4*Adhesive Tape and any additional item required.
- iv. 4*Patch cord LC/LC _ 5 meters for GE (o) if applicable.
- v. Cable Ties per terminal / station as per requirement Minimum 100.
- vi. FO Power cable _ Minimum 4*10 meters with connector and lug or as per site requirement if applicable.
- vii. RJ45 Cable CAT6
- viii. MCB [2 per hop]
- ix. laptop [One laptop for every 200 hops shall be supplied
 - CPU: Quad core, 4MB cache at least 2.8 GHz clock speed or higher.
 - RAM: 8(1*8) GB DDR4.
 - HDD: 1 TB SSD
 - Monitor: Minimum 14 Inch TFT screen
 - Others: 10/100/1000 Mbps LAN port, One HDMI, Wi-Fi 802.11b/g/n/ac, Bluetooth, 3xUSB- 3 ports Licensed Windows 11 Business OS along with Antivirus
 - Software with continuous update on database till the completion of AMC.
 - Office 2021 Business edition or higher version.
 - Bidder to provide required any other interface cables/ Installation materials for their FO.

Note: Corrigendum issued against BSNL Tender No. MM/NWP-GSM/UBR /T-779/2023 Dated 19.09.2023, shall be applicable

X. Digital Micro Wave (DMW)

1. The PIA shall supply, install and commission 15 GHz/E Band Microwave links with Installation Material including cables, BITE etc. wherever, it is decided by BSNL on behalf of USOF, DoT.
2. Microwave General
 - 2.1 This section outlines the detailed technical requirements of Microwave links transport to connect access network. The parameters mentioned in the tender along with clarifications shall be taken while designing the solutions. If any other parameter is also necessary, the same may be suggested during the clarifications round based on the global/Indian experience of the bidder and got confirmed from BSNL.
 - 2.2 All the necessary hardware and the related software licenses including databases in all the network elements shall be dimensioned and equipped accordingly except for those network elements for which higher capacity, if any, has been specified elsewhere in this document.

- 2.3 The Microwave system shall be required for connecting last mile as well as in the back-haul. The Bidder shall quote for such microwave links in 15GHz band / E- band. The transmission equipment proposed shall conform to latest TEC specifications/ GR: TEC GR No TEC/TX/GR/HMR-001/01.MAR-12 (except for those specific requirements stated in this DTR or those that have been outdated due to technology advances and the functional requirement has been met or exceeded) complete with Antenna, feeder and installation material. 0.6 m / 1.2 m / antennae shall be used in the engineering of the links. The provision of BITE is not essential provided other provisions like LED to broadly indicate the health of the system for split radio and LCT for full outdoor unit (FO), Ethernet port for IP connectivity to external OSS or NMS of BSNL and connectivity to local terminal [LCT/laptop] are all available.
- 2.4 The microwave system shall be in 2+0 XPIC (Single carrier with minimum ~350 Mbps to 500 Mbps approx) configuration which is expandable to 4+0 XPIC (two carriers with minimum ~700Mbps to 950 Mbps approx) by addition of required second carrier activation license, along with hardware & software if any. In XPIC functionality, the failure of either horizontal or vertical polarization shall not lead to failure of the system as a whole. These expansions for additional carrier for ODU to make the system 4+0 XPIC from 2+0 XPIC feature shall be supplied as per SOR ordering. All FOs shall support dual carriers & XPIC as well as support carrier aggregation by default. The entire antenna supplied shall be dual polarized for the hop concerned.
- 2.5 The MW system shall be of Full Outdoor architecture (FO). The necessary cables/accessories required for extending the bandwidth from the system to the user equipment like BBU shall be provided as part of the installation material. MCB addition, if required, at any site shall be done as part of I&C.
- 2.6 All FOs can support two modems i.e., one FO shall be sufficient to cater one XPIC radio link. Hub ODUs, as per SoR ordering, shall support convergence of up to 2 radio links along with support for protection schemes. These hops, which would be deployed as hub-hops, shall be typically with capacity enhancement features like 4+0 configuration with XPIC as per SoR ordering in order to cater for the capacity aggregation from the hops in downstream. However with the provision of LAN switch it shall be possible to converge the traffic of 6 or more radio links through the microwave link of hub site.
- 2.7 It shall be possible to define QoS [including Committed Information Rate [CIR] and Excess Information Rate [EIR]] in the system and it shall also be possible to configure the same as per need through the O&M terminal/EMS. These features will be required to be deployed for effective usage of bandwidth, among other uses.
- 2.8 The system configuration, commissioning and monitoring shall be possible to be done using a local terminal [laptop] connected externally through standard Ethernet interface. One such terminal shall be supplied with every 60 hops. The requirement of laptop against this clause shall be captured within the quote of Microwave and captured under the detailed priced BoM. There shall be appropriate LCT with

Browser-based user interface with GUI which shall indicate PMON/RMON to assess the performance of the system with last 7 days historical data.

- 2.9 BSNL is in the process of commissioning a nationwide network monitoring platform and it shall be possible to integrate these Digital Microwave nodes through their EMS to the upcoming platform through standard interfaces including CORBA/xml/SNMP v.1/v.2/v.3. All the required support shall be extended during warranty and AMC for such integrations.
- 2.10 There shall be the necessary L2 switch in-built in the terminal capable of combining electrical FE signals from other co-located access equipment such as GSM, UMTS & LTE base stations so that the combined output available at optical GE that can be interfaced to the transport network of BSNL. The equipment shall have L2 switching functionality having 1 Gbps to 2 Gbps backplane switching capacity. However, the bidder may provide external L2 switch solution and the rate for the same may be quoted separately.
- 2.11 One electrical GE ports [10/100/1000 Base-T[X] type with auto negotiation], 2 GE optical ports (1310nm and 5 Km range SFPs) shall be provided for FO Applicable modulation schemes of QPSK to 2048 for 2K QAM system and QPSK to 4096QAM for 4K QAM with AMR shall be equipped with for achieving spectral efficiency in 7 MHz and 28 MHz channeling plans in 15 GHz.
- 2.12 It shall be the responsibility of the bidder to supply an Optical Distribution Frame for Optical GE links having a minimum of 8 terminations capacity at radio site and terminate the optical interfaces coming from the Access equipment of that site.
- 2.13 All network elements handling IP shall support IPv6 addressing and routing with backward compatibility for IPv4. All equipment (Hardware, firmware, software) / services / features should be available on both IPv4 and IPv6 simultaneously (dual stack). All the network elements located within the LSA including the IP MPLS networking elements shall use only private IP address. Wherever multiple GE interfaces are sought, the IEEE Link Aggregation Control Protocol shall be supported to ensure load sharing and redundancy across the interfaces.
- 2.14 Any requirements stated in the various TEC GRs wrt ATM, LSL, HSL, FTAM, X25 protocol/interfaces etc. if not relevant now for the application due to technological obsolescence, need not be complied with but suitable latest physical/logical interface in TCP/IP etc. shall be provided to meet the requirements of the application.
- 2.15 The equipment shall provide L2 services using MPLS Experimental bit.
- 2.16 The equipment shall support for Ethernet network, LAG (Link Aggregation) protection (including FE/GE ports and radio links). Further, equipment shall support Ethernet-OAM. The offered Equipment shall meet all the specifications of ETH-OAM as per IEEE 802.1ag, IEEE 802.3ah and IEEE y.1731. Monitoring of Error frame events (FER), error frame second events and error frame period events shall be supported by the Ethernet-OAM as per IEEE 802.3ah & IEEE y.1731. Complete

Ethernet link performance monitoring shall be possible as per IEEE 802.3ah & IEEE y.1731.

- 2.17 The MW equipment shall support both the E-Line and E-LAN Ethernet service types. The Maximum frame length of Ethernet frame shall be specified. It shall be possible to configure MAC learning parameters. Ethernet latency shall be < 50 Milliseconds or better. However, bidder shall specify the exact value for various configurations, frame size and packet sizes
- 2.18 The MW radio shall be housed in a weatherproof casing (IP 65 compliant) designed for all weather operation and shall be preferably directly integrated with the antenna. It should be leak proof during monsoon/snow fall.
- 2.19 The MW system shall be provided with traffic protection schemes for Ethernet services as per relevant ITU-T/ITU-R recommendations. The offered equipment shall support sub 50 ms ring protection with ERPS (Ethernet Ring Protection switching) (ITUT-G.8032 / Y.1344).
- 2.20 The microwave system in E-band also shall be supplied in full outdoor mode [1+0] as per SoR ordering.
- 2.21 Synchronization shall be compliant through IEEE 1588 v.2 standard. The provision of 1588 v2 shall be without any limitations and shall support all network topologies.
- 2.22 There shall be dedicated auto-tests in all the network elements and equipment required for installation, troubleshooting, Maintenance, etc.
- 2.23 The Network elements to be provided under this Tender shall have an availability of 99.99%.
- 2.24 All network elements shall have the ability to upgrade software or hardware in the live system without any interruption or degradation of services. Any planned outage for major upgrade is permissible in maintenance window only, but the traffic shall be protected through stand-by systems wherever feasible.
- 2.25 It shall be possible to expand the capacity of Microwave link by adding hardware & software to a live system without any interruption or degradation of services. Further, in general, all hardware and software expansions shall be possible without any downtime. However, In case of any major upgrades which require downtime, they shall be done in the maintenance window with the approval of BSNL.
- 2.26 The supplier shall also ensure the interworking of offered Microwave Equipment with the various network elements of other technology in other licensed service areas of the BSNL Mobile network
- 2.27 The system availability shall be at least 99.99% measured over a period of one year and accordingly each network element forming part of the system shall have much improved fault tolerance and higher reliability as called for elsewhere in the DTR.
- 2.28 The software version of equipment to be supplied shall be the latest and same for all configurations and for all the sites including validation site. The hardware version to

be supplied shall be the latest version and the same for all configurations and for all sites including the validation site.

- 2.29 The Bidder shall furnish, as part of the techno-commercial Bid, solution document detailing the Microwave network Equipment architecture along with dimensioning rules/tools for each of the components

3. EMS System

- 3.1 The supplied Microwave equipment shall extend all internal and external alarms to the EMS.
- 3.2 If all the traffic and statistical reports as required by the Purchaser are not available then necessary post processing software for off-line generation of traffic reports is also to be provided to each Circle along with necessary hardware including printer. However, sometimes, the data need to be changed due to modifications to be carried out at site, supplier has to ensure that necessary modification of the system, office and network data shall be possible to be modified at site together with re-configuration, if required. Necessary tools and commands have to be provided by the supplier for the same.
- 3.3 All server-based applications shall have latest servers equipped with processors having processing speed of 2.2 GHz or higher. The servers shall be of minimum 16 cores scalable to 48 cores within same chassis with minimum 256GB DDR4 RAM and minimum 48MB L3 cache memory. Scalability shall be in all the related components within the chassis and can be implemented easily without shutting it down. Partitioning of the servers is allowed for multiple applications. All the servers and storage shall be powered by DC (nominal -48V) for the four zonal centers. The bidder shall provide full details regarding power, space, and heat dissipation for each node/platform.
- 3.4 The processor loading at rated capacity of the network elements shall not exceed 70% of the total processor capacity. Dimensioning of all nodes shall be done with a maximum loading of 70% for memory, signaling, CPU usage etc. Similarly, all critical storages are be dimensioned to be occupied not more than 70% at the rated load of the Network Element.
- 3.5 The bidder has to necessarily supply DC powered storage & servers at all EMS locations.
- 3.6 All power supply units shall be in redundant mode. The Bidder shall define the redundancy provided in the system as part of the bid document. The interfaces shall be distributed at least in a minimum of two cards/modules. The definition of redundancy shall include the following and details of compliance shall be submitted as part of the Bid for every network element.

4. General

- 4.1 In case, any item/ service/ functionality are required for successful interworking, the supplier will have to supply the same at no additional cost. The inter-working and

interoperability with all the existing network elements is the sole responsibility of the Successful Bidder.

- 4.2 The Purchaser reserves the right to specify the details of redeployment. Redeployment of such items has to be done by the supplier as per the price finalized through this tender.
- 4.3 The successful bidder shall undertake to do the necessary customization as and when required by BSNL besides providing details of the APIs data structures so as to ensure smooth integration without any cost to BSNL.
- 4.4 A soft copy of the documentation shall be supplied in each of the network elements.

5. Installation and Commissioning including spares & consumables

- 5.1 All installation material and installation consumables shall be provided to enable the proper installation of Microwave equipment supplied. Any other materials and consumables, which are technology dependent and required for installation, but not quoted shall also be supplied free of cost.
- 5.2 Item-wise details of installation materials required for installation has to be furnished along-with its unit. The said details can be provided in the priced BoM.
- 5.3 Complete details of each and every item of installation materials, maintenance spares and maintenance consumables shall be provided.
- 5.4 Further, the successful bidders shall be bound to supply the additional Hardware/ Software for expansions of the network within a period of 3 years as per the traffic and operational requirements of the purchaser on the finalized itemized price after applying the applicable duties & taxes. The period of three years shall be counted from the date of carrying live traffic.

Installatio Per Hop Installation material for MW will include –

- i. Grounding cable including lugs.
- ii. Fixers (Nut Bolt) for mounting ODU.
- iii. 2*Weather proofing and 4*Adhesive Tape and any additional item required.
- iv. 4*Patch cord LC/LC _ 5 meters for GE (o).
- v. Cable Ties per terminal / station as per requirement Minimum 100.
- vi. FO Power cable _ Minimum 60 meters with connector and lug or as per site requirement.
- vii. RJ45 Cable _ 60 meters. CAT6
- viii. MCB [2 per hop]
- ix. laptop [One laptop for every 60 hops shall be supplied- Minimum configuration]
 - CPU: Quad core, at least 2.8 GHz clock speed or higher.
 - RAM: 8(1*8) GB DDR4.
 - HDD: 1 TB SSD
 - Monitor: Minimum 14 Inch TFT screen

- Others: 10/100/1000 Mbps LAN port, One HDMI, Wi-Fi 802.11b/g/n/ac, Bluetooth, 3xUSB- 3 ports Licensed Windows 11 Business OS along with Antivirus
- Software with continuous update on database till the completion of AMC.
- Office 2021 Business edition or higher version.
- Bidder to provide required any other interface cables/ Installation materials for their FO.

XI. Technical Specifications for 8.0/ 7.0-meter long RCC pole working load of 115 Kgs
(New section XI added as per Amendment No. 12.6)

The specification covers manufacture, curing, testing and supply of 8.0/7.0 meter long RCC poles, are generally as per drawing enclosed with the specification and are intended to be used. The materials manufactured shall conform strictly to the requirement of relevant INDIANSTANDARDS and latest addition of IS using the best quality of materials and workmanship. The Cement used in the manufacture of RCC Poles shall be of good quality and confirming to the relevant ISS either ordinary or rapid hardening Portland cement conforming to IS: 269. Aggregate used for the manufacture of RCC Poles shall confirm to IS: 383. Reinforcing bars and wires used in the manufacture of RCC Poles shall be as below: -

- Mild steel and medium tensile steel bars and hard drawn steel wire confirming to IS-432/1960
- The steel of Tor-50 grades conforming to latest edition of IS: 1786
- Quality of MS Rounds used for stirrups shall comply with the requirements of IS:226

The reinforcing bars used shall be of required length as per drawing and no joint shall be allowed. All joints and stirrups shall be welded properly. If no welded, the lap length shall not be less than 40 times the diameter of the bars. The cover of concrete over the reinforcement shall be 30mm under normal working conditions and shall not be under any circumstances less than 20mm.

The sand shall be of the quality fit for use in RCC works i.e., river sand and sieved and free from alkaline/acidic materials. The ratio of cement concrete shall be 1:2:3 and shall comply with the requirements of IS:456.

The standards adopted for various materials manufacture shall be as follows:

- The RCC poles shall conform to the requirement of IS:785/1964
- The quality of concrete shall be to the requirements of IS:456/1964
- The testing of proto-type poles shall be as per requirements of IS:2905/1966

The RCC Poles shall be manufactured as per the drawing mentioned below.

The poles shall take working load 115 Kgs for 8.0/7.0 meters, long RCC pole acting at 0.6 M from top with factor of safety of 2.5 respectively and

The tests for transverse strength, torsion strength, measurement of cover and uprightness shall be carried out in the presence of a representative of BSNL/IE.

1.0% of the total number of poles ordered and selected at random shall be tested as per the BIS standard referred above. The PIA or the manufacturer of poles shall offer a lot of upto 500 poles to BSNL QA team for testing. The QA team will draw a sample of 1% of the offered lot and carry out the tests as per test standards referred above . The tests for which the test facilities are available at the manufacturer premises may be carried out and tests for which test facility is not available in the manufacturer premises, sample may be sent to external

lab. After testing the offered lot may be cleared by BSNL QA based on test results as per norms of QA .

No payments will be made for the poles, which fail or tested to destruction.

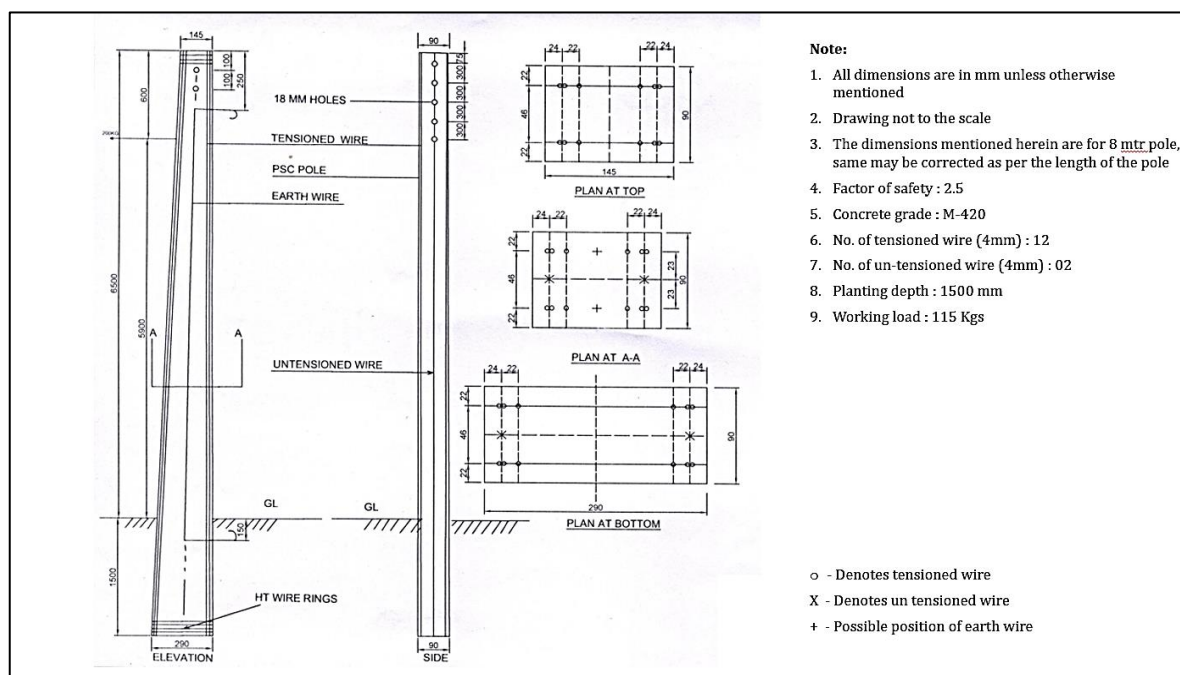
Earthing shall be provided for the poles. By having a continuous separate length of SWG GI wire embedded in concrete during manufacture and the ends of wire left projecting from the narrower end of the poles and 150mm below the ground level. The arrangements for termination of the earth wire to the bolt and nut shall be as indicated in the concerned drawing. The G.I. Wire used for embedding shall comply with requirement of IS: 2141/1968.

The poles shall be clearly and indelibly marked with the following particulars, during manufacture but before testing at a position so as to be easily seen after erection in position.

- a. Month and year of manufacture
- b. Maker's Sl. No. and marking
- c. Purchase order No. and date
- d. A line to indicate the depth of planting
- e. BHARATNET engraved (letters – OWNER)

Provisions for holes for fixing the cross arms and other fixtures shall confirm to drawing and/or the industry construction practice. The universal pole clamp and ADSS accessories are to be used for slinging of ADSS OFC as per E.I

Drawing:



XII. Technical Specification for Armoured Ribbon Optical Fibre Cable for Underground Duct Application *(whole section added as per Amendment No. 13)*

1. Introduction:

- 1.1 This document describes the Standard for generic requirements of Armoured Ribbon Optical Fibre Cable for underground installation in ducts. A ribbon shall have six fibres. Semi-Dry Core Cable type has been mentioned in these specifications. The optical fibre

cables shall be suitably protected for the ingress of moisture by suitable water blocking material. The raw material used in the cable shall meet the requirements of the GR for raw materials (Standard No. TEC 89010:2021(or latest release) and subsequent amendments, if any).

- 1.2 The TEC GR/ Standard for the product (Armoured Ribbon Optical Fibre Cable for Underground Duct Application) is under preparation. Till finalization of the TEC GR/ Standard, Technical Specifications as mentioned in this section shall be applicable. After, finalization of the TEC GR/ Standard, any additional requirement shall be made applicable with mutual consent.

2. Functional Requirements:

- 2.1 The design and construction of Optical fibre cable shall be inherently robust and rigid under all conditions of installation, operation, adjustment, replacement, storage and transport.
- 2.2 The Optical fibre cable shall be able to work in a saline atmosphere in coastal areas and should be protected against corrosion.
- 2.3 Life of cable shall be at least 25 years. Necessary statistical calculations shall be submitted by the manufacturer. The cable shall meet the cable aging test requirement.
- 2.4 The Optical fibre cable shall be manufactured so as to protect the cable from rodent and termite.
- 2.5 It shall be possible to operate and handle the Optical fibre cable with tools as per Standard No. TEC 89060:2006 (latest release) and subsequent amendments, if any. If any special tool is required for operating and handling this optical fibre cable, the same shall be provided, in sufficient numbers as per requirement, along with the cable.
- 2.6 The Optical fibre cable supplied shall be suitable and compatible to match with the dimensions, fixing, terminating & splicing arrangement of the Splice closure.
- 2.7 The manufacturer shall submit an undertaking that the optical and mechanical fibre characteristics shall not change during the lifetime of the cable against the manufacturing defects.
- 2.8 It is mandatory that the Optical fibre cable supplied in a particular route is manufactured from a single source of optical fibres.

3. Technical Requirements:

Single Mode Optical Fibre used in manufacturing optical fibre cables shall be as per ITU-T Rec. G 652 D or G.657 A1. The specifications of optical fibre are mentioned below:

3.1 Type of fibre (Wavelength band optimized nominal 1310 nm):

Single mode as per Section-I of the Standard No. TEC 89010:2021(or latest release) and subsequent amendments, if any

3.2 Geometrical Characteristics of fibre:

As per Section-I of the Standard No. TEC 89010:2021(or latest release) and subsequent amendments, if any. All the parametric values shall be as per the Standard for GR for raw materials (Standard No. TEC 89010:2021(or latest release) and subsequent amendments, if any)

3.3 Transmission Characteristics of fibre:

As per Section-I of the Standard No. TEC 89010:2021(or latest release) and subsequent amendments, if any. All the parametric values shall be as per the Standard for GR for raw materials (Standard No. TEC 89010:2021(or latest release) and subsequent amendments, if any)

3.4 Mechanical Characteristics of fibre:

As per Section-I of the Standard No. TEC 89010:2021(or latest release) and subsequent amendments, if any. All the parametric values shall be as per the Standard for GR for raw materials (Standard No. TEC 89010:2021(or latest release) and subsequent amendments, if any)

3.5 Material Properties of fibre:

As per Section-I of the Standard No. TEC 89010:2021(or latest release) and subsequent amendments, if any. All the parametric values shall be as per the Standard for GR for raw materials (Standard No. TEC 89010:2021(or latest release) and subsequent amendments, if any)

3.6 Environmental Characteristics of Fibre:

As per Section-I of the Standard No. TEC 89010:2021(or latest release) and subsequent amendments, if any. All the parametric values shall be as per the Standard for GR for raw materials (Standard No. TEC 89010:2021(or latest release) and subsequent amendments, if any)

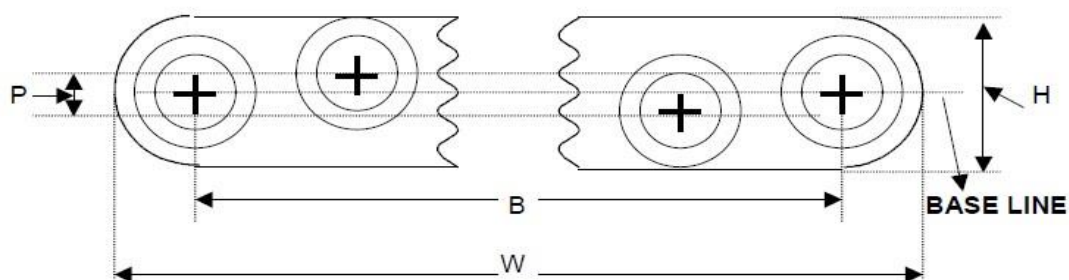
3.7 Colour Qualification and Primary coating Test:

As per Section-I of the Standard No. TEC 89010:2021(or latest release) and subsequent amendments, if any. All the parametric values shall be as per the Standard for GR for raw materials (Standard No. TEC 89010:2021(or latest release) and subsequent amendments, if any)

3.8 Ribbon Structure:

- 3.8.1 Six primary coated fibres shall be arranged in ribbon structure. The fibres in the structure shall be parallel and shall not cross over each other along the entire length of the ribbon. The dimensions of 6 fibres ribbon shall be as per the sectional specification of IEC 60794-3 / Bell Core document no. GR-20Core issue 4, 2013 (latest version) and as given below:
- 3.8.2 **Ribbon Dimensions:** The maximum dimensions of fibre ribbon shall be as follows and the cross section geometry of the fibre ribbon shall be as shown in the following figure:

Number of Fibres	Ribbon Width (W)	Ribbon Height (H)	Extreme Fibres (B)	Planarity (P)
6	1648 μm	360 μm	1310 μm	50 μm



Cross section of Fibre Ribbon

3.8.3 Ribbon Material: The ribbon shall be manufactured using single mode optical fibres coloured with UV cured resin and the ribbon shall be encapsulated with a further layer of UV cured acrylate. The fibres and the ribbons shall confirm to the colour requirement as per clause no. 5.4 of this GR.

3.8.4 Ribbon Mechanical Properties:

3.8.4.1 Ribbon Macro-bend:

Change in attenuation when wrapped on a 60 mm: < 0.05 dB diameter mandrel for 100 turns at 1310 & 1550 nm.

3.8.4.2 Ribbon Compression Resistance:

Change in attenuation when subjected to a compressive: < 0.05 dB load of 500 N at 1310 nm & at 1550 nm

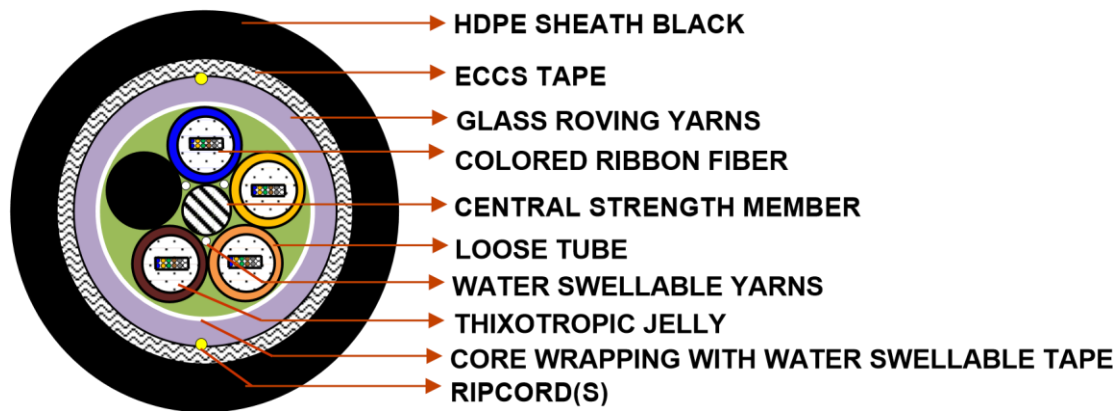
3.8.4.3 Ribbon Torsion Resistance

Change in attenuation (At 1310 nm & 1550 nm) : < 0.05 dB

3.9 Ribbon Optical fibre Cable Construction Specifications for Semi Dry Core :

The cable shall be designed to the parameters mentioned in Annexure – I. The manufacturer shall submit designed calculations and the same shall be studied and checked.

TYPICAL STRUCTURAL DRAWING FOR 48 FIBRE OF SEMI DRY CORE CABLE



3.9.1 Secondary Protection: The primary coated Ribbon fibres may be protected by loose packaging within tube, which shall be filled with thixotropic jelly. The dimensions of tube shall be as per Annexure – I.

3.9.2 Number of fibres in cable: 48, 96, 144, 216, 288

(Type Approval for a cable shall be issued depending upon the no. of fibres in the cable).

- a. Number of fibres per ribbon: Six (6) Fibres
- b. The number of ribbons per loose tube in ribbon optical fibre cable shall be as follows:

S. No	No. of Fibres	Ribbon Per Tube	Multi loose tube type
a.	48 fibres	2 ribbon per tube	4 tubes and 1 Filler
b.	96 fibres	4 ribbon per tube	4 tubes and 1 Filler
c.	144 fibres	6 ribbon per tube	4 tubes and 1 Filler
d.	216 fibres	6 ribbon per tube	6 tubes
e.	288 fibres	6 ribbon per tube	8 tubes

3.9.3 Strength Member: Solid FRP non - metallic strength member shall be used in the center of the cable core. The strength member in the cable shall be for strength and flexibility of the cable and shall have anti buckling properties. The FRP shall keep the fibre strain within permissible values. The FRP central strength member shall be as per the Standard No. TEC 89010:2021(or latest release) and the subsequent amendments, if any. The size of FRP shall be as per Annexure – I.

3.9.4 Moisture barrier (protection) over FRP: The water swellable yarn shall be binded over FRP. The specification of WS yarn shall be as per section XIX of Standard No. TEC 89010:2021(or latest release) and the subsequent amendments issued, if any.

3.9.5 Cable Core Assembly: Primary coated fibres in ribbon structure shall be protected inside loose tubes which are stranded together around a central strength member using helical or reverse lay techniques and form the cable core. The dimensions of FRP and stranding pitch shall be as per Annexure – I. The nylon/polyester binder thread shall be used to hold the cable core, if required.

- 3.9.6 **Core Wrapping:** The main cable core shall be wrapped by a layer/layers of water swellable tape. The water swellable(blocking) tape shall be as per Section-XIV of Standard No. TEC 89010:2021(or latest release) and the subsequent amendments, if any. The nylon/polyester binder thread shall be used to hold the tape, if required. The nylon/polyester binder thread shall be as per Section-IX of Standard No. TEC 89010:2021(or latest release) and the subsequent amendments, if any. The core wrapping shall not adhere to the secondary fibre coating and shall not leave any kink marks over the loose tube.
- 3.9.7 **Filling compound:** The filling compound used in the loose tube shall be compatible to fibre and secondary protection of fibre of the cable. The drip point shall not be lower than +70°C. The fibre movement shall not be constrained by stickiness and shall be easily removable for splicing. Reference test method to measure drop point shall be as per ASTM D 566. The thixotropic filling compound (jelly) shall be as per the Standard No. TEC 89010:2021(or latest release) and subsequent amendments issued, if any.
- 3.9.8 **Glass Reinforcement:** Impregnated Glass Fibre Reinforcement are used to achieve the required tensile strength of the optic fibre cables over the cable core wrapping to provide peripheral reinforcement along with Solid Rigid FRP Rod in the centre at cable core. The use of Solid Rigid FRP Rod(s) is mandatory in Optical Fibre cable design. Impregnated Glass Fibre Reinforcement used shall be equally distributed over the periphery of the cable core wrapping. The quantity of the Impregnated Glass fibre Reinforcement used per km length of the cable along with its dimensions shall be as per Annexure-I. The specification of the glass roving shall be as per Section XII of Standard No. TEC 89010:2021(or latest release) and subsequent amendments issued, if any and as per other details given in the Annexure-I.
- 3.9.9 **Armouring:** Armouring shall be provided by corrugated ECCS Tape (Electrolytically Chrome Coated Steel) to make the cable protected from rodent and termite. The armour shall also provide the sufficient radial as well as compressive strength and the armour shall be electrically continuous and bonded to the outer sheath. The force of adhesion shall be minimum 14 Newton and shall be tested as per ASTM D- 4565 test method.
- 3.9.9.1 The ECCS Tape armouring corrugated transversely for lateral strength and bending flexibility shall be applied longitudinally with an overlap of 10% (MIN) over the main cable core. The corrugation over the entire length of the tape shall be uniform. The overlap portion of the cable armour shall be suitably protected for the ingress of the moisture (below the armour) by water swellable tape.
- 3.9.9.2 The height of corrugation shall be 0.6 mm (min) & the pitch of corrugated tape shall be 2.5 mm (max). Height and pitch of corrugation shall be measured between crest and trough base line.
- 3.9.9.3 The corrugated armouring of ECCS Tape shall offer excellent corrosive resistance The specifications of ECCS tape shall be as per Section-XV of the Standard No. TEC

89010:2021(or latest release) and subsequent amendments, if any .

3.9.10 Continuity of Metallic members: All metallic elements used in the cable (i.e. longitudinally applied tape) shall be electrically continuous.

3.9.11 Outer Sheath: A non-metallic moisture barrier sheath (black in colour) shall be applied over the armour, which shall consist of tough weather resistant made High Density Polyethylene compound (HDPE), UV stabilized. The colour shall confirm to Munsell colour standards. The thickness of the outer sheath shall not be less than **1.8 mm** and the strength members embedded with in the sheath. The outer sheath shall be uniform, circular, smooth, free from pin holes, joints mended pieces and other defects. The reference test method to measure thickness shall be as per IEC 60811-202.

Note1: HDPE material from finished product shall be subjected to following tests (on sample basis) and shall confirm to the requirement of the material as per Section III of Standard No. TEC 89010:2021(or latest release) and the subsequent amendments, if any:

- i) Density
- ii) Melt flow index
- iii) Oxidative Induction time
- iv) Carbon black content
- v) Carbon black dispersion
- vi) ESCR
- vii) Moisture content
- viii) Tensile strength and elongation at break
- ix) Absorption Coefficient
- x) Brittleness Temperature

Note 2: The outer jacket of HDPE shall be as to protect the sheath from attack by termites. Manufacturer shall ensure that doping material/additives used if any, are non-toxic and non-hazardous. The surface of the sheath shall be smooth and free of defects such as cracks, blisters, etc.

3.9.12 Cable diameter: The finished cable diameter shall be as per Annexure-I.

3.9.13 Cable Weight: The nominal cable weight shall be as per Annexure – I.

3.9.14 RIP Cord:

- a) The minimum two suitable ripcords, diametrically opposite to each other, shall be provided in the cable, which shall be used to open the HDPE sheath and armour of the cable. It shall be capable of consistently slitting the sheath without breaking for a length of 1 meter at the installation temperature. The ripcords (3ply & twisted) shall be nonwicking type and shall not work as a water carrier.
- b) The ripcords used in the cable shall be readily distinguishable from any other components utilized in the cable construction.

4 Mechanical Characteristics and Tests on Optical Fibre Cable:

(Note: All observations are to be taken at 1310nm and 1550nm wavelengths)

4.1 Tensile strength Test:

Objective: This measuring method applies to optical fibre cables which are tested at a particular tensile strength in order to examine the behaviour of the attenuation as a function of the load on a cable which may occur during installation.

Method: IEC 60794-1-21-E1

Test Specs.: The cable shall have sufficient strength to withstand a load of value $T(N) = 3000N$. The load shall be sustained for 10 minutes and the strain of the fibre monitored.

Requirement: The load shall not produce a strain exceeding 0.25% in the fibre and shall not cause any permanent physical and optical damage to any component of the cable. The attenuation shall be noted before and after the release of load. The change in attenuation of each fibre after the test shall be ≤ 0.05 dB both for 1310 nm and 1550 nm wavelength.

4.2 Abrasion Test:

Objective: To test the abrasion resistance of the sheath and the marking printed on the surface of the cable.

Method: IEC-60794-1-21-E2

Test Specs.: The cable surface shall be abraded with needle (wt. 150 gm) having diameter of 1 mm with 500 grams weight (Total weight more than equal 650 gms.)

No. of cycles : 100

Duration : One minute (Nominal)

Requirement: There shall be no perforation & loss of legibility of the marking on the sheath.

4.3 Crush Test (Compressive Test):

Objective: The purpose of this test is to determine the ability of an optical fibre cable to withstand crushing.

Method: IEC 60794-1-21-E3

Test Specs.: The fibres and component parts of the cable shall not suffer permanent damage when subjected to a compressive load of 2000 Newton applied between the plates of dimension 100 mm x 100 mm. The load shall be applied for 10 minutes. The attenuation shall be noted before and after the completion of the test.

Requirement: The change in attenuation of the fibre after the test shall be ≤ 0.05 dB both for 1310 nm and 1550 nm wavelength.

4.4 Impact Test:

Objective: The purpose of this test is to determine the ability of an optical fibre cable to

withstand impact.

Method: IEC 60794-1-21-E4

Test Specs: The cable shall have sufficient strength to withstand an impact caused by a mass weight of 50 Newton, when falls freely from a height of 0.5 meters. The radius R of the surface causing impact shall be 300 mm. 10 such impacts shall be applied on the cable at different locations typically spaced not less than 500mm apart.. The attenuation shall be noted before and after the completion of the test.

Requirement: The change in attenuation of the fibre after the test shall be $\leq 0.05\text{dB}$ both for 1310 nm and 1550 nm wavelength.

4.5 Repeated Bending Test:

Objective: The purpose of this test is to determine the ability of an optical fibre cable to withstand repeated bending.

Method: IEC 60794-1-21-E6

Test Specs.: The cable sample shall be of sufficient length (5 m minimum) to permit radiant power measurements as required by this test. Longer lengths may be used if required.

Parameters:

Length of Cable sample	: 5m (minimum)
Load	: as per FOTP-104
Minimum distance from Pulley centre to holding device	: 216mm
Minimum distance from Wt. to Pulley centre	: 457mm
Pulley Diameter (D - cable diameter)	: 20 D
Angle of Turning	: 90°
No. of cycles	: 30
Time Required for 30 cycles	: 1 min

Requirement: During the test no fibre shall break and the attenuation shall be noted before and after the completion of the test. The change in attenuation of the fibre after the test shall be $\leq 0.05\text{ dB}$ both for 1310 nm and 1550 nm wavelength.

4.6 Torsion Test:

Objective: The purpose of this test is to determine the ability of an optical fibre cable to withstand torsion.

Method: IEC 60794-1-21-E7

Test Specs.: The length of the specimen under rest shall be 2 meters and the load shall be

100 N. The sample shall be mounted in the test apparatus with cable clamped in the fixed clamp sufficiently tight to prevent the movement of cable sheath during the test. One end of the cable shall be fixed to the rotating clamp which shall be rotated in a clock wise direction for one turn. The sample shall then be returned to the starting position and then rotated in an anti-clock wise direction for one turn and returned to the starting position. This complete movement constitutes one cycle. The cable shall withstand 10 such complete cycles. The attenuation shall be noted before and after the completion of the test.

Requirement: The cable shall be examined physically for any cracks tearing on the outer sheath and for the damage to other component parts of the cable. The twist mark shall not be taken as damage. The change in attenuation of the fibre after the test shall be ≤ 0.05 dB both for 1310 nm and 1550 nm wavelength.

4.7 Kink Test:

Objective: The purpose of this test is to verify whether kinking of an optical fibre cable results in breakage of any fibre, when a loop is formed of dimension small enough to induce a kink on the sheath.

Method: IEC 60794-1-21-E10

Test Specs.: The sample length shall be 10 times the minimum bending radius of the cable. The sample is held in both hands, a loop is made of a bigger diameter and by stretching both the ends of the cable in opposite direction, the loop is made to the minimum bend radius so that no kink shall form. After the cable comes in normal condition, the attenuation reading is taken.

Requirement: The kink should disappear after the cable comes in normal condition. The change in attenuation of the fibre after test shall be ≤ 0.05 dB both for 1310 nm & 1550 nm wavelength.

4.8 Cable Bend Test:

Objective: The purpose of this test is to determine the ability of an optical fibre cable to withstand repeated flexing. The procedure is designed to measure optical transmittance changes and requires an assessment of any damage occurring to other cable components.

Method: IEC 60794-1-21-E11 (Procedure-I).

Test Specs.: The fibre and the component parts of the cable shall not suffer permanent damage when the cable is repeatedly wrapped and unwrapped 4 complete turns of 10 complete cycles around a mandrel of 20 D, where D is the diameter of the cable. The attenuation shall be noted before and after the completion of the test.

Requirement: The change in attenuation of the fibre after the test shall be ≤ 0.05 dB both for 1310 nm and 1550 nm wavelength. Sheath shall not show any cracks visible to the naked eye when examined whilst still wrapped on the mandrel

4.9 Test of Figure of 8 (Eight) on the cable (Type Test):

Objective: Check of easiness in formation of figure of 8 of the cable during installation in the field.

Test Method: 1000 meter (approximate) of the cable shall be uncoiled from the cable reel and shall be arranged in figure of 8 (eight). The diameter of each loop of the figure of 8 shall be maximum 2 meters.

Requirement: It shall be possible to make figure of 8 of minimum 1000meter length of the cable uncoiled from the cable reel, without any difficulty. No visible damage shall occur.

4.10 Temperature Cycling (Type Test):

Objective: To determine the stability behaviour of the attenuation of a cable subjected to temperature changes which may occur during storage, transportation and usage.

Method: IEC 60794-1-22-F1 (To be tested on Standard cable length & drum i.e 2Km. $\pm$ 5%)

Test Specs.: The permissible temperature range for storage and operation will be from -20°C to +70°C. The rate of change of temperature during the test shall be 1°C per minute approx. The cable shall be subjected to temperature cycling for 12 Hrs. at each temperature as given below:

TA2 temp.	:	-20°C
TA1 temp.	:	- 10°C.
TB1 temp.	:	+ 60°C.
TB2 temp.	:	+ 70°C.

The test shall be conducted for 2 cycles at the above temperatures.

Requirement: The change in attenuation of the fibre under test shall be $\leq$ 0.05 dB for 1310 nm and 1550 nm wave length respectively for the entire range of temperature.

4.11 Cable aging Test (Type Test):

Objective: To check the cable material change dimensionally as the cable ages.

Method: IEC 60794-1-22-F9

Test Specs.: At the completion of temperature cycle test, the test cable shall be exposed to 85 ± 2 degree C for 168 hours. The attenuation measurement at 1310 & 1550 nm wave length to be made after stabilization of the test cable at ambient temperature for 24 hours.

Requirement: The increase in attenuation shall be $\leq$ 0.05 dB at 1310 and 1550 nm.

Note: The attenuation changes are to be calculated with respect to the base line attenuation values measured at room temperature before temperature cycling.

4.12 Water Penetration Test (Type Test):

Objective: The aim of this test is to ensure that installed Optical Fibre cable will not allow water passage along its length.

Method: IEC 60794-1-22-F5

Test Specs.: A circumferential portion of the cable end shall face the water head. The water tight sleeve shall be applied over the cable. The cable shall be supported horizontally and two-meter head of water, containing a sufficient quantity of water-soluble fluorescent dye for the detection of seepage, shall be applied on the HDPE sheath for a period of 7 days at ambient temperature. No other-coloured dye is permitted.

Requirement: No dye shall be detected when the end of the 3m length of the cable is examined with ultraviolet light detector.

4.13 Flexural Rigidity Test on the optical fibre cable (Type Test):

Objective: To check the Flexural Rigidity of the metal free optical fibre cable.

Method: To be tested as per ASTM D –790

Test Specs: The fibre and the component parts of the cable shall not suffer permanent damage in the cable subjected to Flexural Rigidity Test as per the above method. The attenuation shall be noted after and before the completion of the test.

Requirement: The change in attenuation of the fibre after the test shall be < 0.05 dB at 1310, 1550 nm and 1625nm wavelengths. The sheath shall not show any cracks visible to the naked eye.

4.14 Static Bend test (Type Test):

Objective: To check the cable under Static bend.

Method: As per the clause no 4.8 of the GR alternatively as per ASTM D790.

Test Specs: The cable shall be subjected to static bend test. The optical fibre cable shall be bend on a mandrel having a Diameter of 10 D (D is diameter of the cable).

Requirement: The change in attenuation of the fibre after the test shall be <0.05 dB for 1310, 1550 nm and 1625nm wavelengths. Sheath shall not show any cracks visible to the naked eye when examined whilst still wrapped on the mandrel.

4.15 Cable Jacket Yield Strength And Ultimate Elongation:

Objective: To determine the yield strength and elongation of the polyethylene (HDPE) cable sheath (jacket).

Test Method: FOTP-89 or ASTM 1248 Type III class

Test Condition: 1. Sample shall be taken from a completed cable. The aged sample shall be conditioned at $100 \pm 2^{\circ}\text{C}$ for 120 hours before testing. 2. The cross-head speed

shall be 50 mm per minute.

Requirement:

Jacket Material	Minimum Yield Strength		Minimum Elongation (%)
	(MPa)	(psi)	
HDPE un-aged	16.5	2400	400
HDPE aged	12.4	1800	375

4.16 Ribbon Dimension Measurements test: (Type Test)

Objective: To Check the fibres in ribbon structure, fibre cross over and fibre identity to ensure the transmission performance and the mechanical service life of the fibre in the ribbon structure.

Test Method: As per extant method of BSNL QA.

Requirement: It shall meet the dimensional requirements given in clause no. 3.8.2 of this GR. The fibres in the entire length of the ribbon shall not cross over at any point.

4.17 Ribbon Resistance to Twist (Robustness) test: (Type Test)

Objective: To check the robustness of the fibre ribbons to withstand the twist in installed conditions and to check the structural integrity of the ribbon over the deployed length for mid-span entry, maintenance purposes, consideration in rearrangements and housekeeping.

Test Method: As per extant method of BSNL QA.

Requirement: The un-aged and aged (at 85 + 2 degree C with uncontrolled humidity for a period of 30 days) completed ribbon shall not show any separation of individual fibres from the ribbon structure after completion of the twist test when observed under 5X magnification.

4.18 Ribbon Residual Twist (Flatness) Test: (Type Test)

Objective: To check the dimensional integrity of the ribbon without twisting to allow rearrangements and to limit the potential attenuation increases due to a macro-bending caused by twisting of the fibre ribbon.

Test Method: As per extant method of BSNL QA.

Requirement: The aged (at 85° + 2° C with uncontrolled humidity for a period of 30 days) ribbon residual twist (if any) shall have a pitch: > 400 mm.

4.19 Ribbon Separation Test:

Objective: (a) To check the separation of individual fibres, separation of sub-unit of fibres and mid span separation from a fibre ribbon.

(b) To check the retention of sufficient colorant for identification for any 2.5 cm length of fibre after separation for individual and sub-unit of fibres.

Test Method: As per extant method of BSNL QA.

Test to be conducted for:

(a) Separation of any single fibre or a multi-fibre subgroup by a tool or by hand from a ribbon for a length of 1 meter. Mid span separation from a 2 meter sample, separated close to middle for at least 0.5 meter (both single fibre and the six fibre sub – units) for un-aged ribbon.

Requirement: The un-aged ribbon of minimum length of a 0.3 meter (1.0 foot) of an individual fibre and a sub group of six fibres shall be separated from the ribbon without breaking the fibres or damaging the fibre coating. The force required to perform separation shall not exceed 4.4 N. The area at the separation shall not show any damage to the fibre coating when examined under 5X magnification.

(b) **Retention of the Colour and Fibre Identification after separation.**

Requirement: Individual fibre colour identification shall be maintained after the separation test. It shall retain sufficient colorant that any 2.5 cm length is readily identifiable.

(c) **Removal of Ribbon matrix material to access individual fibres. Requirement:**

No damage shall occur either to fibre coating or the fibres. The coating shall not sustain any swelling self-stripping, cracking or splitting when examined under 5X magnification.

Note: The manufacturer shall recommend the procedure for the removal of ribbon matrix.

4.20 Ribbon Strippability Test:

Objective: Check of removal of the matrix material and the fibres protective coating mechanically with commercial stripping tools from unaged and aged ribbons.

Test Method: As per extant method of BSNL QA.

Pre-Conditioning:

a. **Aged samples:** The humidity of aged ribbons shall be soaked at 85 ± 2 degree C and a non-condensing humidity of $85 \pm 5\%$ for a period of 30 days.

b. **Water aged samples:** The water aged ribbons shall be soaked in de- ionized or distilled water at a temperature of 23 ± 5 degree for a period of 14 days.

The fibre ribbon strip-ability testing shall be conducted at standard atmospheric conditions. The un-aged, humidity – aged, and water aged ribbons shall be tested within eight hours after aging.

Requirement: There shall be no fibre breakage, and any coating residue shall be removable with a single isopropyl alcohol wipe when at least 25 mm of the matrix material and the fibre Protective coating is mechanically removed with commercial stripling tools from un-aged and aged ribbons.

4.21 Ribbon Macro-Bend Performance

Objective: To check the macro-bend performance of a ribbon.

Test Method: As per extant method of BSNL QA.

Method: One hundred turns of ribbon are wound around a 60 mm diameter ribbon and the loss increase at 1310 nm & 1550 nm shall be measured.

Requirement: The change in attenuation of the fibre shall be < 0.05 dB, for 1310 nm and 1550 nm wave lengths.

4.22 Torsion Resistance of the ribbon (Type test):

Objective: To check the torsion resistance of the ribbon.

Test Method: As per extant method of BSNL QA.

Method: One-meter length of ribbon is twisted to through five revolutions of 360° and measurement is taken.

Requirement: The change in attenuation of the fibre shall be < 0.05 dB, for 1310 nm and 1550 nm wave lengths.

4.23 Crush Resistance of Ribbon (Type Test):

Objective: To check the crush resistance of the ribbon.

Method: A 50 mm² sample is subjected to a load of 500 N and the attenuation measurement taken for both 1310 nm & 1550 nm wave lengths.

Requirement: The change in attenuation of the fibre shall be < 0.05 dB, for 1310 nm and 1550 nm wave lengths.

4.24 Check of the quality of the loose tube (containing optical fibre ribbon) (Type Test):

a. Embrittlement Test of Loose Tube

This test method is based on bending by compression and reflects embrittlement much better than the other tensile tests. This test is independent of wall thickness of the loose tube.

Sample: The minimum length of the test sample depends on the outside diameter of the loose tube and should be 85 mm for tubes up to 2.5 mm outside dia. The length of the bigger tubes should be calculated by using the following equation:

$$L_o > \frac{100 \times \sqrt{(D^2 + d^2)}}{4}, \text{ Where}$$

Lo = Length of tube under test.

D = Outside dia of loose tube.

d = Inside dia of loose tube.

Procedure: Both the ends of a buffer tube test sample may be mounted in a tool, which is clamped in jaws of a tensile machine which exerts a constant rate of movement. The movable jaw may move at a rate of 50 mm per minute toward the fixed jaw. Under load, the tube will bend so that it is subjected to tensile and compressive stresses. The fixture for holding the tube should be designed in a manner that the tube might bend in all directions without further loading.

Requirement: The tube should not get embrittled. No kink should appear on the tube up to the safe bend diameter of tube (15 D), where D is the outside diameter of the loose tube. There should also not be any physical damage or mark on the tube surface.

b. Kink Resistance Test on the Loose Tube

Objective: To safeguard the delicate optical fibres, the quality of the loose tube material should be such that no kink or damage to the tube occur while it is being handled during installation and in splicing operations.

Method: IEC 60794-1-23-G7

Procedure: To check the kink resistance of the loose tube, a longer length of the loose tube is taken (with fibre and gel), a loop is made and loop is reduced to the minimum bend radius of loose tube i.e. 15 D (where D is the outside diameter of the loose tube). This test is to be repeated 4 times on the same sample length of the loose tube.

Requirement: No damage or kink should appear on the surface of the tube.

4.25 Drainage Test for Loose Tube and Drip test on the cable (Type Test):

a. Drainage Test for loose tube

Method:

Sample Size: 30 cm tube length.

Test procedure:

1. Cut the tube length to 40 cm.
2. Fill the tube with the tube filling gel ensuring that there are no air bubbles and the tube is completely full.
3. Place the filled tube in a horizontal position on a clean worktop and cut 5 cm from either end so that the finished length of the sample is 30 cm.

4. Leave the filled tube in a horizontal position at an ambient temperature for 24 hrs. (This is necessary because the gel has been sheared and the viscosity has been reduced during the filling process).
5. The sample tube is then suspended vertically in an environment heat oven over a weighed beaker. It is left in the oven at a temperature of 70° C for a period of 24 Hrs.
6. At the end of the 24 hrs period the beaker is checked and weighed to see if there is any gel in the beaker.

Requirement:

1. If there is no gel or oil in the beaker, then tube has PASSED the drainage test.
2. If there is gel or oil in the beaker, then tube has FAILED the drainage test.

b. Drip test on the cable

Objective: The purpose of this test is to determine the ability of jelly in the O.F. cable to withstand a temperature of 70-degree C.

Method: IEC 60794-1-22-F16

Test Specs.: Take a sample of 30 cm. length of the cable with one end sealed by end cap. Remove outer black sheath, binder tapes for 5 cm from open end of the sample. Clean the jelly. Then the sample is kept vertically with open end downwards in the oven for 24 hours at 70° C with a paper under the sample.

Requirement: Examine the paper placed below the cable inside the oven for dripping of the jelly after 24 hours. There should be no jelly drip or oily impression on the paper.

4.26 Check of easy removal of sheath:

Objective: Check of the easy removal of sheath of the optical fibre cable by using normal sheath removal tool.

Procedure: To check easy removal, about 300 mm length of the sheath should be removed by use of rip cords. It should be observed during sheath removal process that the cable core should not be damaged during the operation. One should be able to remove the sheath easily.

4.27 Check of the effect of aggressive media on the cable (Acidic and Alkaline Behaviour) (Type Test):

Procedure: To check the effect of aggressive media, solution of PH4 and PH10 shall be made. The two test samples of the finished cable, each of 600 mm in length, are taken and the ends of the samples are sealed. These test samples are put in the PH4 and PH10 solutions separately. After 30 days these samples are taken out from the solutions and examined for any corrosion etc on the sheath and other markings of

the cables. (Test method no. ISO175).

Requirement: The sample should not show any effect of these solution on the sheath and other marking of the cable.

4.28 Sheath to ground dielectric strength test:

Objective: To confirm that the cable sheath is continuous and free from pin holes.

Test Specs.: The dielectric strength shall be 8KV RMS or 12 KV DC when spark tested.

Method: IEC 62230

Requirement: The cable shall pass the test.

4.29 Electrical Continuity Test :

Objective: The aim of this test is to ensure that all the metallic elements used in the cable are electrically continuous throughout the cable.

Method: IEC 60794-1-403

Procedure: Strip and open both the ends of the cable (for a short distance sufficient enough to access the inner metallic elements) and connect the test apparatus to the metallic members to complete the test circuit.

Requirements: All the metallic elements used in the cable shall be electrically continuous.

5 Engineering Requirements:

5.1 Cable Marking:

5.1.1 A long lasting suitable marking shall be applied in order to identify this cable from other cables. The cable marking shall be imprinted (indented). The marking on the cable shall be indelible of durable quality and at regular intervals of one meter length. The accuracy of the sequential marking must be within -0.25% to +0.5% of the actual measured length. The sequential length markings must not rub off during normal installation and in life time of optical fibre cable. The total length of the cable supplied shall not be in negative tolerance.

5.1.2 The marking shall be in contrast colour over the black HDPE Sheath (jacket) and shall be one by hot foil indentation method. The colour used must withstand the environmental influences experienced in the field. The marking on the cable shall be permanent, insoluble in water and shall be legible for duration of cable life.

5.1.3 The type of legend marking on O.F. cable shall be as follows:

- a) Company Legend
- b) Legend containing telephone mark & international acceptable Laser symbol
- c) Type of Fibre – G.652 D / G.657 A1
- d) Number of Fibres

- e) Type of cable
- f) Year of manufacture
- g) Sequential length marking
- h) User's Identification
- i) Cable ID

5.2 Cable Ends:

5.2.1 Both cable ends (the beginning end and end of the cable reel) shall be sealed and readily accessible. Minimum 5 meter of the cable of the beginning end of the reel shall accessible for testing. Both ends of the cable shall be kept inside the drums and shall be located so as to be easily accessible for the test. The drum (confirming to GR No. G/CBD-01/02 NOV 94 (latest release) and subsequent amendments, if any) should be marked to identify the direction of rotation of the drum. Both ends of cable shall be provided with cable pulling (grip) stocking and the anti twist device (free head hook). The wooden drums shall be properly treated against termites and other insects during transportation and storage. The manufacturer shall submit the methodology used for the same

5.2.2 An anti-twist device (Free head hook) shall be provided, attached to the both the ends of the cable pulling arrangement. The arrangement of the pulling eye and its coupling system along with the anti-twist system shall withstand the prescribed tensile load applicable to the cable.

5.3 The nominal drum length:

5.3.1 Length of OF Cable in each drum shall be 2 Km / 4Km / 8Km / 10Km shall be supplied as per the order. The variation in length of optical fibre cable in each drum shall be $\pm 5\%$ to $\pm 10\%$, as decided by the purchaser. Purchaser may at their discretion procure shorter length cable drum as per their requirement.

5.3.2 The fibres in cable length shall not have any joint.

5.3.3 The drum shall be marked with arrows to indicate the direction of rotation.

5.3.4 Packing list supplied with each drum shall have at least the following information:

- a) Drum No.
- b) Type of cables
- c) Physical Cable length
- d) No. of fibres
- e) Length of each fibre as measured by OTDR
- f) The Cable factor - ratio of fibre/cable length
- g) Attenuation per Km. of each fibre at 1310 & 1550 nm

- h) Users / Consignee's Name
- i) Manufacturers Name, Month, Year and Batch No.
- j) Group refractive index of fibre.
- k) Purchase Order No.
- l) Cable ID

5.4 Colour coding and Ribbon identification in O.F. Cables:

5.4.1 The colorant applied to individual fibres shall be readily identifiable throughout the life time of the cable and shall match and conform to the MUNSELL color standards (EIA-598D) and also IEC Publication 304(4).

5.4.2 Colour Coding Scheme:

When the loose tubes are placed in circular format, the marking to indicate the loose tube no. "1" shall be in blue colour followed by loose tube no.2 of orange and so on for other tubes as per the colour scheme given below at Table-1 and complete the circular format by placing the dummy /fillers at the end.

Table -1: Colour Coding scheme of Loose tube

Loose tube No./Sequence	Loose tube identification
1	Blue
2	Orange
3	Green
4	Brown
5	Slate
6	White
7	Red
8	Black
9	Yellow
10	Violet
11	Rose/Pink
12	Aqua

Depending upon the number of fibres in a Ribbon (which depends on the cable capacity), the fibres within each Ribbon are serially chosen starting from blue colour as per the colour scheme given below at Table-2.

Table-2: Colour Coding scheme of the Optical Fibre within Ribbon

Fiber No./Sequence within Ribbon	Fibre Identification
1	Blue
2	Orange
3	Green
4	Brown
5	Slate
6	White
7	Red
8	Black
9	Yellow
10	Violet
11	Rose/Pink
12	Aqua

5.4.3 Identification of Ribbon:

No. of fibre in a Cable	No. of Tubes	No. of Ribbon per Tube	Fiber Per Ribbon	Marking on Ribbon
48 Fibres	4 Tubes 1 Filler	2	6	Individual Ribbon shall be printed with respective number as 1, 2.
96 Fibres	4 Tubes 1 Filler	4	6	Individual Ribbon shall be printed with respective number as 1, 2, 3, 4.
144 Fibres	4 Tubes 1 Filler	6	6	Individual Ribbon shall be printed with respective number as 1, 2, 3, 4, 5, 6.
216 Fibres	6 Tubes	6	6	Individual Ribbon shall be printed with respective number as 1, 2, 3, 4, 5, 6.
288 Fibres	8 Tubes	6	6	Individual Ribbon shall be printed with respective number as 1, 2, 3, 4, 5, 6.

Note: The individual number marking shall be at regular interval of every 300 mm or lesser on natural color ribbon and shall be legible. The printing on the ribbon shall also be of durable quality and shall be compatible with coating of the ribbon and Thixotropic Jelly (filled in the loose tube of the cable).

6 Quality Requirements:

6.1 The cable shall be manufactured in accordance with the international quality standards ISO 9001-2015 or latest issue for which the manufacturer should be duly accredited. The Quality Manual shall be submitted by the manufacturer.

6.2 Raw Material:

6.2.1 The cable shall use the raw materials approved against the Standard No. TEC 89010:2021(or latest release) and the subsequent amendments issued, if any. The list and details of the Raw Materials used, the make and grade of the raw material and valid certificate of source approval issued by CACT or any Conformity Assessment Body(CAB) recognized by TEC, shall be submitted by the manufacturer.

6.2.2 Any other material used shall be clearly indicated by the manufacturer. The detailed technical specifications of such raw materials used shall be furnished by the manufacturer at the time of evaluation/testing.

6.2.3 The raw materials used from multiple sources is permitted and the source / sources of raw materials (Type and grade) from where these have been procured shall be submitted by the manufacturer.

6.2.4 The manufacturer can change the raw material from one approved source to other approved source with the approval of QA wing of purchaser. The change of source/grade of SM optical Fibre and/or design of cable shall call for fresh approval/certification. The clauses 10.2 and 10.3 of this Standard for GR shall facilitate the clause 6.2.4 of this Standard for GR, in order to simplify the certification process and to avoid repetitive testing.

6.2.5 The raw material used (HDPE black in colour) for outer sheath shall protect the cable from attack by termite. The manufacturer shall specify anti-termite additives used if any, and submit the detail characteristics of the material and additives used to make it termite proof. The cable shall be tested for the presence of Anti- termites additives by recognised laboratory or institute. The additives/dopants used if any, shall be non-toxic and nonhazardous. The non-toxicity, thermal stability, half-life, efficacy etc. of additives/dopants shall be tested by recognized laboratory or institute. The

cable shall be tested for its termite proof-ness by recognised laboratory or institute.

6.2.6 The HDPE black in colour used for sheath shall be UV stabilised.

Note:

A test certificate from CACT or from any Conformity Assessment Body(CAB) recognized by TEC may be acceptable for the UV stability of the HDPE sheath material. Source Approval Certificate (SAC) issued by CACT against Standard No. TEC 89010:2021(or latest release) for the HDPE raw material used, indicating UV stabilized grade, may also be acceptable in this respect.

- 6.2.7 The material used in optical fibre cable must not evolve hydrogen that will affect the characteristics of optical fibres.

Note: A test certificate from a recognised laboratory or institute may be acceptable.

6.3 Cable Material Compatibility:

Optical fibre, buffers/core tubes, and other core components shall meet the requirements of the compatibility with buffer/core tube filling material(s) and/or water-blocking materials that are in direct contact with identified components within the cable structure (This shall be tested as per clause no. 6.3.3 of Telecordia document GR-20-CORE issue 4, July 2013 or as per IEC 60794-1-219).

Note: The tests may be conducted in house (if facility exist) or may be conducted at CACT or at any Conformity Assessment Body(CAB) recognized by TEC. The test certificate may be accepted and the tests may not be repeated subsequently, in next type approvals, if the raw material used is of same make and grade.

7 Safety Requirements:

- 7.1 The material used in the manufacturing of the Optical fibre cables shall be non-toxic and dermatologically safe in its life time and shall not be hazardous to health. The manufacturer shall submit MSDS (Material safety Data Sheet) for all the material used in manufacturing of OF Cable to substantiate the statement.

ABBREVIATIONS

ASTM	-	American Society for Testing and Materials
BIS	-	Bureau of Indian Standards
CACT	-	Component Approval Centre For Telecommunications
dB	-	decibel
EIA	-	Electronic Industries Association
ESCR	-	Environmental Stress Crack Resistance
FRP	-	Fibre Reinforced Plastic
FOTP	-	Fibre Optic Test Procedure
HDPE	-	High Density Polyethylene
IEC	-	International Electro -Technical Commission
ISO	-	International Organization for standardization
ITU-T Sector	-	International Telecommunication Union– Telecommunication Standardization
MFD	-	Mode Field Diameter
MSDS	-	Material Safety Data Sheet
QA	-	Quality Assurance
SM	-	Single Mode
TEC	-	Telecommunication Engineering Centre
UV	-	Ultra Violet
µm	-	Micrometer
oC	-	Degree Celsius

Annexure - I

(Semi Dry Core Design)

The following parameters of the component of the cable are to be taken in to account while designing and manufacturing the optical fibre cables of the required fibre count. These parameters shall be checked during evaluation of the OF cables.

SN	Parameter	Unit	48F Ribbon Fibre cable	96F Ribbon Fibre cable	144F Ribbon Fibre Cable	216F Ribbon Fibre Cable	288F Ribbon Fibre Cable
1	FRP Rod EAA Coated	mm					
2	FRP Up-coating thickness	mm					
3	Tube ID (min)	mm					
4	Tube OD	mm					
5	No of fibre / ribbon	No	6	6	6	6	6
6	No of Ribbon in a tube	No	2	4	6	6	6
7	Color of fibre per Ribbon		BL,OR, GR, BR,SL,W H	BL,OR, GR, BR, SL, WH	BL,OR, GR, BR, SL, WH	BL,OR, GR, BR, SL, WH	BL,OR, GR, BR, SL, WH
8	No of loose tubes	No	4 with 2 Ribbons	4 with 4 Ribbons	4 with 6 Ribbons	6 with 6 Ribbons	8 with 6 Ribbons
9	Colour of loose tubes		BL,OR, GR, BR	BL,OR, GR, BR	BL,OR, GR, BR	BL,OR, GR, BR, SL, WH	BL,OR,GR ,BR,SL,W H, RD, BK
10	No of dummy cord	No	1	1	1	0	0
11	Tube stranding lay over length	mm					
12	Qty. of Impregnated Glass roving (min.)	Kg					
13	Outer Sheath Thickness(min)	mm					
14	Cable diameter	mm					
15	Cable weight	Kg/km					

16	Cable to be designed to Fibre strain value of.	%					
17	Cable to be tested at defined load for fibre strain value of	%					

Note: The manufacturer shall submit the design calculations which shall be cross checked.

Annexure C: ENGINEERING INSTRUCTIONS (E.I.)

Annexure C (1) - Engineering Instructions for Under Ground Optical Fiber Cable Laying Works

SCOPE

The Engineering Instructions spelt out in this document deal with the methods to be adopted for underground Optical Fiber Cable laying in PLB HDPE ducts and termination of OF Cables at Gram Panchayats (GPs) for BharatNet Projects. The methods of under ground OFC laying included in this EI are

1. Open trenching method
2. Horizontal drilling method (HDD)

Under this RFP unified rates have been taken irrespective of the method used for OFC laying, therefore PIA has to take appropriate decision to adopt any of the above method depending upon the feasibility, time frame, meeting SLA over the contract period and O&M. The PIA has to follow the guidelines for open trenching method or HDD method adopted by him as under.

OF CABLE LAYING APPROACH

On the basis of the survey reports done by CONTRACTOR and further approved by BSNL, routes for OF cable laying shall be finalized. Road Cutting Permission shall be obtained from road and rail authorities for laying the Optical Fiber Cable along the finalized roads and at rail / road crossing along the route. Generally, O.F. Cable may preferably be laid straight as far as possible along the road near the boundaries, away from the burrow pits. When the O.F. Cable is laid along the National Highways, Cable should run along the road land boundary or at a minimum distance of 15 meters from the center line of the road where the road land is wider as the OFC carries high capacity traffic and is planned for about 25 to 30 years of life. It is essential that the cable is laid after obtaining due permission from all the concerned authorities to avoid any damage (which may result in disruption of services / revenue loss) and shifting in near future due to their planned road widening works. For obtaining RoW BSNL will facilitate the CONTRACTOR.

In special cases where it may be necessary to avoid burrow pits or low lying areas, the Cable may be laid underneath the shoulders at a distance of 0.6 meter from the outer edge of the road embankment provided the same is located at least 4.5 meters away from center line of road.

GENERAL

Soil Classification

Soil shall be classified under two broad categories Rocky and Non Rocky. The soil is categorized as rocky if the cable trench cannot be dug without blasting and / or chiseling. All other types of soils shall be categorized as Non Rocky including Murrum & soil mixed with stone or soft rock.

Rocky soil.

The terrain which consists of hard rocks or boulders where blasting/ chiseling is required for trenching such as quartzite, granite, basalt in hilly areas and RCC (reinforcement to be cut through but not separated) and the like.

Non Rocky soils

This will include all types of soil- soft soil/hard soil/Murum i.e. any strata, such as sand, gravel, loam, clay, mud, black cotton murum, shingle, river or nullah bed boulders, soling of roads, paths etc. (All such soils shall be sub-classified as kachcha soil) and hard core, macadam surface of any description (water bound, grouted tarmac etc.), CC roads and pavements, bituminous roads, bridges, culverts (All such soils shall be classified as Pucca soils)

The Optical Fiber Cable shall be laid through PLB HDPE Ducts buried at a nominal depth of 165cm. The steps involved in OF Cable laying are as under

Excavation of trench up to a nominal depth of 165 cm in non-Rocky soil, according to construction specifications along National/State Highways/other roads and in built up /rural areas. Under exceptional conditions/ genuine circumstances due to site constraints/ soil conditions, relaxation can be granted by the competent authority for excavation of trench to a depth lesser than 165cm. Such relaxation shall be given as per the laid down norms/ procedures being set by BSNL and with the approval of the competent authority. The payment in such cases shall be made on pro-rata basis as per the laid down rates mentioned in clause 5 of section IV B of tender document and norms adopted by the concerned BSNL.

Laying of PLB HDPE Ducts/coils coupled by sockets in excavated trenches, on bridges and culverts, as per construction specification and sealing of PLB HDPE Ducts pipe ends at every manhole/ joint chamber by end-plugs of appropriate size.

Providing additional protection by R.C.C. Pipes/GI pipes and/or concreting/chambering, wherever required according to construction specification mentioned in section IV B of tender document .

Fixing of GI pipes/troughs with clamps on culverts/bridges and/or chambering or concreting of G.I. Pipes/troughs, wherever necessary. Normally, RCC/DWC pipes shall be used and use of GI pipes shall be avoided. However, in case it is felt that GI pipe is unavoidable in certain circumstances this should be done with the prior approval of competent authority within the concerned BSNL. This shall be recorded appropriately.

Laying Protection Pipes on Bridges and Culverts. In case trenching and pipe laying is not possible on the culverts, the pipes shall be laid on the surface of the culverts/bridges after due permission from the competent authority within the concerned BSNL as per construction specification and CC may be done over the pipe for protection.

Back filling and Dressing of the Trench according to construction specifications.

Making manhole/joint chamber of size (1.0 m length x 1.0 m width x 1.65 m Depth) at every Cable pulling location for housing the OF Cable loop & Pulling Optical Fiber Cable using proper tools and accessories. Sealing of both ends of the PLB HDPE pipe in manhole/joint chamber by hard rubber bush of suitable size to avoid entry of rodents into the PLB HDPE Ducts, putting split PLB HDPE Ducts and split RCC pipes with proper fixtures over cable in the manhole to protect the bare cable.

Digging of pit of size 2 meter x 2 meter x 1.8 meter (depth) for fixing of Jointing chambered- cast RCC cover or stone of suitable size on jointing chamber to protect the Joint and backfilling of

jointing chamber with excavated soil.

Digging of pits 500 cm to 1000 cm towards jungle side at every jointing chamber along the route to a depth of 75cm fixing of route Indicator/joint indicator, concreting and backfilling of pits. Painting of route indicators with Blue colour and joint Indicator by Grey color and sign writing denoting route/joint indicator number and marked as “BBNL/BSNL” as per construction specifications. Alternatively electronic markers shall be used for joint indicators by fixing/tying them to joint closure.

4.3 Specifications of Materials to be used

PLB HDPE Duct

Optical Fiber Cables should be pulled through Permanently Lubricated HDPE Duct of 40mm/33 mm size conforming to the specifications as per. TEC/GR 72030:2019 with latest Amendments. The Ducts shall be blue in colour and have the identification markings as per TEC GR wherein BSNL logo shall be marked as BSNL's name.

PLB HDPE Duct Accessories

Push fit Coupler

Push Fit couplers shall be used for coupling PLB HDPE ducts/coils. The specifications of the couplers shall be as per GR no TEC/GR 72030:2019 with latest amendments.

PP Rope

Should confirm to GR No. TEC/GR 72030:2019 with latest Amendments. However, this is optional and PIA may use the same on need basis. The PP rope can be ordered along with the PLB duct as required. In this case PP ropes drawn through the HDPE/PLB pipes/coils and safely tied to the end caps at either ends with hooks to facilitate pulling of the OF cables at a later stage. The rope used is 3 strands Polypropylene Para Pro rope having yellow colour and size of 6 mm diameter. It should have a minimum breaking strength of 550 kgs. The length of each coil of rope should be 5 meter more than the standard length of duct(or as ordered) and it should conform to (i) BS 4928 Part-II of 1974 (ii) IS 5175 of 1982. It should be of special grade and should have ISI certificate mark. It should be manufactured out of industrial quality Polypropylene.

End Cap

End Cap shall be used for sealing the ends of the empty ducts, prior to installation of the OF Cable and shall be fitted immediately after laying the duct to prevent the entry of any dirt, water, moisture, insects/rodents etc. It should confirm to GR No. TEC/GR 72030:2019 with latest amendments. The ends of the PLB HDPE ducts/coils laid in the manholes should be closed with End Caps. The End Caps used should be suitable for closing 40mm/33mm PLB HDPE ducts/coils. A suitable arrangement should be provided in the End Cap to tie PP Rope. (See figure-1 for details)

Cable sealing Plug

This shall be used to seal the end of the ducts perfectly, after the OF cable is pulled in the duct. For pulling the cable through the ducts, it is necessary to provide manholes at that location and also at bends and corners wherever required. The ends of the PLB HDPE ducts/coils are closed with Cable

sealing Plugs. The End Plugs used should be suitable for closing 40mm/33mm PLB HDPE ducts/coils. The Cable sealing plug shall conform to GR No TEC/GR 72030:2019 with latest amendments.(Wherever blowing technique is used for laying OF Cable, at the discretion of the PIA concerned, the hand holes/manholes required for accessing the cable during cable laying can be at longer distances depending upon requirement.)

Material for Providing Additional Protection

RCC Full Round Pipes: Reinforced cement concrete pipes (spun type) coupled with RCC collars sealed with cement mortar used to provide additional protection to PLB HDPE Ducts/coils at lesser depths should be of full round, NP-2 class and size 100 mm (internal diameter), conforming to IS standard 458-1988 with latest amendments. The pipes should have a nominal length of 2 meters.

The RCC collars should be properly sealed using cement mortar 1:3 (1:53 grade cement of reputed brand, 3: fine sand without Impurities). If case of long spans, every third joint will be embedded in a concrete block of size 60 cm (L) x 40cm (W) x 25 cm (H) of 1:2:4 cement concrete mix (1: cement, 2: coarse sand, 4: stone aggregate of 20 mm nominal size) so that the alignment of RCC pipes remain firm and intact. Also, both ends of RCC pipes spans will be sealed by providing concrete block of size 40 cm (L) x 40 cm (W) x 25 cm (H) of 1:2:4 cement concrete mix to avoid entry of rodents.

RCC Split Pipes: The split Reinforced cement concrete pipes (spun type) with in-built collars are used to provide additional protection to PLB HDPE Ducts/coils should be of 100mm internal dia.(Spotted), Class--NP-3, Thickness: 25mm, Length: 2 Meters with inbuilt collaret one end, Conforming to ISI Specification IS: 458, 1988 with latest amendment

G.I. Pipes: G.I. pipes should be of medium duty class having inner diameter of 50mm and should conform to specifications as per IS 554/1985 (revised up to date) IS 1989 (Part- I), 1900 Sockets (revised up to date) & IS 1239 (Part-II) 1992 (revised up to date).

DWC Pipes: Use of normal duty DWC (Double walled corrugated) HDPE pipe confirming to TEC GR no.GR/ with latest amendments shall be preferably utilized as first choice for protection of Optical Fiber Cable instead of GI pipes. The DWC pipes used shall be of size 75/61mm as per table 2 of the said TEC GR.

M.S. Weld Mesh: The PLB HDPE Ducts can also be protected by embedding it in concrete of size of 25 cm x25 cm reinforced with MS weld mesh. The MS weld mesh used should be of 50 mm x 100mm size, 12 SWG, 120 cm in width in rolls of 50m each. One meter of MS weld Mesh caters to approx. 3 meters of concreting (See figure '2' for details). The strength of RCC/CC is dependent on proper curing, therefore, it is imperative that water content of CC/RCC mix does not drain out into the surrounding soil. In order to ensure this, the RCC/CC work should be carried out by covering all the sides by yellow PVC sheets of weight not less than 1 kg per 8 sqm to avoid seepage of water into the soil.

Joint Chamber: The Joint chamber shall be provided at every joint location to keep the OF cable joint well protected and also to house extra length of cable which may be required in the event of faults at a later date. The Joint chamber shall be of pre-cast RCC type as per construction specification. Brick chamber can also be made with prior permission of BSNL.

Rubber Bush: To prevent entry of rodents into PLB HDPE DUCTS, the ends of PLB HDPE DUCTS are sealed at every manhole and joint using rodent resistant hard rubber bush (cap) after optical Fiber cable is pulled. The rubber bush should be manufactured from hard rubber with grooves and holes to fit into 40 mm PLB HDPE DUCTS pipe, so that it should be able to prevent the entry of insects, rodents, mud, and rainwater into the PLB HDPE DUCTS pipe. It should conform to TEC GR with latest amendments. (See Figure-3)

Route/Joint Indicator: The Route/Joint indicators are co-located with each manhole/joint chamber. In addition Route indicators are also to be placed where route changes direction like road crossings etc. Either RCC/Pre-cast or Stone based route indicators can be used. The detailed specification and design of the same shall be as per construction specification. Generally, Stone Route indicators shall be used for the BharatNet Project. Alternatively electronic markers shall be used for joint indicators by fixing/tying them to joint closure.

EXACAVATION OF TRENCHES

Trenching

Location and Alignment of the Trench: In built up areas, the trench will normally follow the foot-path of the road except where it may have to come to the edge of the carriage way cutting across road with specific permissions from the concerned authorities maintaining the road (such permissions shall be obtained by the department as per MOU signed with respective State Govt.). Outside the built up limits the trench will normally follow the boundary of the roadside land. However, where the road side land is full of burrow pits or afforestation or when the cable has to cross culverts/ bridges or streams, the trench may come closer to the road edge or in some cases, over the embankment or shoulder of the Road (permissions for such deviations for cutting the embankment as well as shoulder of the road shall be obtained). The alignment of the trench will be decided by a responsible official of the BSNL

Once the alignment is marked, no deviation from the alignment is permissible except with the approval of BSNL. While marking the alignment only the center line will be marked and the CONTRACTOR shall set out all other work to ensure that, the excavated trench is as straight as possible. The CONTRACTOR shall provide all necessary assistance and labor, at his own cost for marking the alignment. CONTRACTOR shall remove all bushes, undergrowth, stumps, rocks and other obstacles to facilitate marking the centre line without any extra charges. It is to be ensured that minimum amount of bushes and shrubs shall be removed to clear the way and the CONTRACTOR shall give all, consideration to the preservation of the trees.

The line-up of the trench must be such that PLB pipe(s) shall be laid in a straight line, both laterally as well as vertically except at locations where it has to necessarily take a bend because of change in the alignment or gradient of the trench, subject to the restrictions mentioned elsewhere.

Line-Up: The line-up of the trench must be such that PLB HDPE Ducts shall be laid in a straight line except at locations where it has to necessarily take a bend because of change in the alignment or gradient of the trench, subject to the restrictions mentioned elsewhere.

Method of Excavation

In built up areas, the PIA shall resort to use of manual labour / HDD only to ensure no damage is caused to any underground or surface installations belonging to other public utility services

and/or private parties.

However, along the Highways and cross country there shall be no objection to the PIA resorting to mechanical means of excavation, provided that no underground installations existing the path of excavation, if any, are damaged.

There shall be no objection to resort to horizontal boring to bore a hole of required size and to push through G.I. Pipe (50 mm ID) through horizontal bore at road crossing or rail crossing or small hillocks etc.

All excavation operations shall include excavation and 'getting out'. 'Getting out' shall include throwing the excavated materials at a distance of at least one meter or half the depth of excavation, whichever is more, clear off the edge of excavation. In all other cases 'getting out' shall include depositing the excavated materials as specified.

In Rocky strata excavation shall be carried out by use of electro mechanical means like breakers/ jack hammers or by blasting wherever permissible with express permission from the competent authority. If blasting operations are prohibited or not practicable, excavation in hard rock shall be done by chiseling / jack hammers.

Trenching shall as far as possible be kept ahead of the laying of pipes. PIA shall exercise due care that the soil from trenching intended to be loose for back filling is not mixed with loose debris. While trenching, the PIA should not cause damage to any underground installations belonging to other agencies and any damage caused should be made good at his own cost and expense.

Necessary barricades, night lamps, warning board and required watchman shall be provided by the PIA to prevent any accident to pedestrians or vehicles. While carrying out the blasting operations, the PIA shall ensure adequate safety by cautioning the vehicular and other traffic. The PIA shall employ sufficient man-power for this with caution boards, flags, sign writings etc.

The PIA should provide sufficient width at the trench at all such places, where it is likely to cave in due to soil conditions without any extra payment. A minimum free clearance of 15 cm should be maintained above or below any existing underground installation. No extra payment will be made towards this. In order to prevent damage to PLB HDPE DUCTS over a period of time, due to the growth of trees, roots, bushes, etc., the PIA shall cut them when encountered in the path of alignment of trench without any additional charges.

In large burrow pits, excavation may be required to be carried out for more than 165 cm in-depth to keep gradient of bed less than 15 degrees with horizontal. If not possible as stated above, alignment of trench shall be changed to avoid burrow pit completely.

Depth and Size of the Trench

The depth of the trench from top of the surface shall not be less than 165 cm unless otherwise relaxation is granted by BSNL under genuine circumstances.

In rocky terrain, less depth shall be allowed only in exceptional circumstances with additional protection where it is not possible to achieve the normal depth due to harsh terrain/ adverse site conditions encountered. This shall be done only with the approval of the BSNL. This shall be properly documented. In all cases, the slope of the trench shall not be less than 15 degrees with the horizontal surface. The width of the trench shall normally be 45 cm at the top & 30 cm at the bottom.

In case, additional pipes (HDPE/GI/RCC Pipes) are to be laid in some stretches, the same shall be accommodated in this normal size trench.

When trenches are excavated in slopes, uneven ground and inclined portion, the lower edge shall be treated as top surface of land and depth of trench will be measured accordingly. In certain locations, such as uneven ground, hilly areas and all other Places, due to any reason whatsoever it can be ordered to excavate beyond standard depth of 165 cm to keep the bed of the trench as smooth as possible. Near the culverts, both ends of the culverts shall be excavated more than 165 cm to keep the gradient less than 15 degree with horizontal. For additional depth in excess of 165 cm, no additional payment shall be applicable.

If excavation is not possible to the minimum depth of 165 cm, as detailed above, full facts shall be brought to the notice of the BSNL in writing giving details of location and reason for not being able to excavate that particular portion to the minimum depth.

Approval shall be granted by the BSNL in writing under genuine circumstances. The decision of the BSNL shall be final and binding on the PIA. All the relaxations granted as specified above shall be dealt with as per the laid down norms and procedure of BSNL.

Dewatering: The PIA shall be responsible for all necessary arrangements to remove or pump out water from trench. The PIA should survey the soil conditions encountered in the section and make his own assessment about dewatering arrangement that may be necessary. No extra payment shall be admissible for this.

Wetting: Wherever the soil is hard due to dry weather conditions, if watering is to be done for wetting the soil to make it loose, the same shall be done by the PIA. No extra payment shall be admissible for this.

Blasting: For excavation in hard rock, where blasting operations are considered necessary, the PIA shall obtain approval of the BSNL in writing for resorting to blasting operation. The PIA shall obtain license from the BSNL for undertaking blasting work as well as for obtaining and storing the explosive as per the Explosive Act, 1884 as amended up to date and the explosive Rules, 1983. The PIA shall purchase the explosives fuses, detonators, etc. only from a licensed dealer. Transportation and storage of explosive at site shall conform to the aforesaid Explosive Act and Explosive Rules. The PIA shall be responsible for the safe custody and proper accounting of the explosive materials. Fuses and detonators shall be stored separately and away from the explosives. BSNL or his authorized representatives shall have right to check the PIA's store and account of explosives. The PIA shall provide necessary facilities for this.

The PIA shall be responsible for any damage arising out of accident to workmen, public or property due to storage, transportation and use of explosive during blasting operation. Blasting operations shall be carried out under the supervision of a responsible authorized agent of the PIA (referred subsequently as agent only), during specified hours as approved in writing by the BSNL. The agent shall be conversant with the rules of blasting. All procedures and safety precautions for the use of explosives drilling and loading of explosives before and after shot firing and disposal of explosives shall be taken by the PIA as detailed in IS: 4081 safety code for blasting and related drilling operation.

Trenching Near Culverts/ Bridges: The PLB HDPE Ducts shall be laid in the bed of culvert at the depth not less than 165 cm protected by RCC pipes as decided by BSNL. Both ends of culverts shall be excavated more than 165 cm in depth to keep the gradient of not less than 15 degree with horizontal. The bed of trench should be as smooth as possible.

While carrying out the work on bridges and culverts, adequate arrangement for cautioning the traffic by way of caution boards during day time and danger lights at night shall be provided. In

case of small bridges and culverts, where there is a likelihood of their subsequent expansion and remodeling, the cable should be laid with some curve on both sides of the culvert or the bridge to make some extra length available for readjustment of the cable at the time of reconstruction of culvert or the bridge.

Laying OF PLB HDPE Ducts

After the trench is excavated to the specified depth, the bottom of the trench has to be cleared of all stones or pieces of rock and levelled up properly. A layer of soft soil/or sand (in case the excavated material contains sharp pieces of rock/stones) of not less than 5 cm is required for levelling the trench to ensure that the cable when laid will follow a straight alignment. Adequate care shall be exercised while laying so that the OF cables are not put to undue tension/pressure after being laid as this may adversely affect the optical characteristics of cables with passage of time.

The PIA shall ensure that trenching and pipe laying activities are continuous, without leaving patches or portions incomplete in between. In case intermediate patches are left, measurement of the completed portions will be taken only after work in such left over patches are also completed in all respects.

Preparatory to aligning the pipe for jointing, each length of the PLB HDPE Ducts shall be thoroughly cleaned to remove all sand, dust or any other debris that may clog, disturb or damage the optical Fiber cable when it is pulled at a later stage. The ends of each pipe and inside of each Socket shall be thoroughly cleaned of any dirt or other foreign materials.

After the trench is cleaned the PLB HDPE Ducts/Coil shall be laid in the cleaned trench, jointed with Sockets. Drawing up of PP rope is optional as per TEC GR. In case of use of PP Rope, at every manhole or approximately at every 200m or at bends or turns the PP rope will be tied to the HDPE end caps used for sealing the PLB HDPE Ducts, to avoid entry of rodents/mud etc.

At the end of each day work, the open ends of the pipes sections shall be tightly closed with end caps to prevent the entry of dirt/mud, water or any foreign matter into PLB HDPE Ducts until the work is resumed. In built up area falling within Municipal/Corporation limits, the PLB HDPE Ducts shall be laid with protection using RCC Pipes/ Concreting reinforced with weld mesh (only in exceptional cases).

For lesser depths requiring additional protection in built up areas, towns and cities falling within the municipal limits, suitable protection shall be provided to PLB HDPE pipes/coils using RCC/DWC full round/split pipes or GI pipes or cement concreting reinforced with MS weld mesh or a combination of any of these as per the site requirement. This shall be done only with the prior instructions/approval of the BSNL. The specifications for providing each of these protections are given later in this document.

Moreover, in cross country routes, if depth is less than 1.2 meters, protection by using DWC Pipe shall be provided. BSNL shall decide about such stretches and type of protection to be provided in view of the site requirements. Normally 63 / 100 mm DWC Pipes shall be used for protecting PLB HDPE Ducts but if more than one PLB pipe is to be laid and protected, DWC Pipe of suitable size to accommodate the required number of PLB Pipes shall be used.

The PLB HDPE Ducts shall be laid in RCC Full Round spun Pipes/GI Pipes as required at Road crossings. The RCC pipes/GI pipes shall extend at least 3 meters on either side of the road at Road crossings. At Road crossings, extra GI/PLB HDPE Ducts may be laid as per the direction of the BSNL. On Rail bridges and crossings, the PLB HDPE Ducts shall be encased in suitable cast iron as

prescribed by the Railway Authorities.

Wherever RCC pipes are used for protection, the gaps between the RCC collars and the RCC pipes shall be sealed using cement mortar 1:3 (1:53 grade cement of reputed brand, 3: fine sand without impurities) to bar entry of rodents. Every third collar of RCC pipes (normally of 2 meters length) and also both ends of RCC Pipes will be embedded in a concrete block of size 40 cm (L)x 40 cm(W) x 25 cm (H) of 1:2:4 cement concrete mix (1:53 grade cement of reputed brand, 2: coarse sand, 3: stone aggregate of nominal size of 20 mm) so that the alignment of RCC pipes remain firm and intact and to avoid entry of rodents.

Wherever GI pipes are used, special care should be taken to ensure that G.I. Pipes are coupled properly with the sockets so as to avoid damage to PLB pipe and eventually the OF Cable in the event of pressure coming on the joint and G.I. Pipe joint giving its way. Rubber bushes shall be used at either ends of the GI pipes to protect PLB pipe. Both the ends of G.I. Pipe will be embedded in a concrete block of size 40 cm (L) x 40 cm ((W) x 25 cm (H) of 1:2:4 cement concrete mix (1:53 grade cement of reputed brand, 2: coarse sand, 3: stone aggregate of nominal size of 20 mm) so that the alignment of G.I. Pipes remain firm and intact and to avoid entry of rodents.

In case of protection by concreting at site, the nominal dimension of concreting shall be 250 mm x250 mm section. Cement Concrete Mixture used shall be of 1:2:4 composition i.e. 1:53 grade Cement of a reputed company, 2: Coarse Sand, 4: Graded Coarse Stone aggregate of 20 mm nominal size, reinforced with MS weld mesh. As the RCC is cast at site, it is imperative to ensure that special care is taken to see that proper curing arrangements are made with adequate supply of water. The PIA shall invariably use mechanical mixer at site for providing RCC protection, to ensure consistency of the mix.

For carrying out concreting work in trenches, yellow PVC sheets of width not less than 1.0 M and of weight not less than 1 kg. Per 8 sq. meters shall be spread and nailed on sides of the trench to form trapezoidal section for concreting in the cleaned trench, to avoid seepage of water into the soil.

A bed of cement concrete mixture of appropriate width and 75 mm thickness shall be laid on the PVC sheet, before laying PLB HDPE ducts. The PLB HDPE Ducts shall then be laid above this bed of concrete. After laying the PLB HDPE Ducts, MS weld mesh is wrapped around and tied and concrete mix is poured to form the cross sectional dimensions as instructed by the BSNL.

The strength of RCC is dependent on proper curing therefore, it is imperative that water content of RCC mix does not drain out into the surrounding soil. Portions where cement concreting has been carried out shall be cured with sufficient amount of water for reasonable time to harden the surface. After curing, refilling of the balance depth of the trench has to be carried out with excavated soil.

The PLB HDPE Ducts/RCC/GI Pipes shall be laid only in trenches accepted by BSNL or his representative. The PIA shall exercise due care to ensure that the PLB HDPE Ducts are not subjected to any damage or strain.

Water present in the trench at the time of laying the PLB HDPE Ducts shall be pumped out by the PIA before laying the pipes in the trench to ensure that no mud or water gets into the pipes, thus choking it.

In case of nallahs, which are dry for nine months in a year, the PLB HDPE Ducts shall be laid inside the RCC Pipes laid at a minimum depth of 165 cm, as instructed by the BSNL. The mechanical protection shall extend at least 5 meters beyond the bed of nallah on either side.

Notwithstanding anything contained in clauses referred above, the BSNL may order, based on special site requirements, that the PLB HDPE Ducts may be encased in reinforced cement concrete, as detailed, *ibid*. While laying the pipes, a gap of 2 M is kept at convenient locations approx. 200 m apart and at the bends and turns, which will be used as manholes during OF cable pulling. Ends of the PLB HDPE Ducts at the manholes shall be sealed using end caps after tying the PP rope to the end caps to avoid choking of the pipes. In a similar manner, manholes shall be kept while approaching bridges, road crossings etc., as instructed by the BSNL. The location of the manholes will be decided by the BSNL

Laying Protection Pipes on Bridges and Culverts:

In case trenching and pipe laying is not possible on the culverts, the pipes shall be laid on the surface of the culverts/bridges after due permission from the BSNL. Of late the bridge construction authorities are providing channel ducts on the footpaths on the bridges for various services. The RCC/DWC/ G.I. Pipes can be laid in these ducts for pulling cables. However, for laying cables on existing bridges, where duct arrangement does not exist, one of the following methods may be adopted.

In case of the Bridges/Culverts, where there are no ducts and where the cushion on the top of the Arch is 50 cm to 100 cm or more, G.I. Pipe (Carrying PLB HDPE pipe and cable) may be buried on the top of the Arch adjoining the parapet wall, by digging close to the wheel guards. Every precaution shall be taken to see that no damage occurs to the arch of the culvert. After burying the GI pipe, the excavated surface on the arch shall be restored.

Where the thickness of the Arch is less than 50 cm, the pipe must be buried under the wheel guard masonry and the wheel guard rebuilt.

If neither of the two methods is possible, the G.I. Pipes/GI Troughs must be clamped on the parapet wall with the clamps. If necessary, the pipes may be taken through the parapet wall at the ends where the wall diverges away from the road.

Methods cited in above clauses should be carried out under close supervision of Road authorities.

The surface to be concreted should be thoroughly cleaned and levelled before concreting. At both ends of the Bridges/Culverts, where the GI Pipes /GI Troughs slope down and get buried, the concreting should be extended sufficiently to ensure that no portion of the GI Pipes/GI Troughs is exposed as approved by the BSNL to protect the pipe/trough from any possible externally caused damage.

Where white wash/colour wash is existing on the Bridges/ Culverts, the same should also be carried out on the concreted portion to ensure uniformity.

Back Filling and Dressing of the Trench

Provided that the PLB HDPE pipes have been properly laid in the trench at the specified depth, the back filling operation shall follow as early as practicable. The earth used for filling shall be free from all roots, Grass, shrubs, vegetation, trees, saplings and any other kind of garbage or pebbles. The back filling operation shall be performed in such a manner so as to provide firm support under and above the pipes and to avoid bend or deformation of the PLB HDPE pipes when the pipes get loaded with the back filled earth.

At locations where the back filled materials contains stones/sharp objects which may cause injury to the PLB HDPE pipes and where the excavated or rock fragments are intended to refill the trench

in whole or in part, the trench should be initially filled, with a layer of ordinary soil or loose earth (free from any stones/pebbles) not less than 10 cm thick over the pipes.

Back filling on public, roads, railway crossings, footpaths in city areas shall be performed immediately after laying the HDPE pipes. Back filling at such locations shall be thoroughly rammed, so as to ensure original condition so that it is safe for the road traffic. All excess soil/ material left on road/ footpath/railway crossing shall be removed by PIA. However, along the highways and in country side, the excess dug up material left over after refilling should be kept in a heap above over the trench.

In city limits, at any given time not more than 50 Meters length of trench should be kept open and in all places where excavation has been done, no part of the trench should be kept open over night to avoid occurrence of any mishap or accident in darkness.

Restoration of Road Surface

Road restoration work to be made with bituminous macadam for semi grouting 50 mm thick and premix carpet surfacing 25 mm thick over the grouted surface (total up to 75 mm thick) including supply of asphalt etc. to evenly match the road, including consolidation and rolling as per standard specification of DSR 1997

Road restoration work with cement concrete 1:4:8 mix for thickness varying from 150 mm to 225 mm, including supply of concrete to be made to evenly match the road.

CABLE PULLING AND JOINING/SPLICING

CABLE PULLING

Manholes/Joint chambers marked during PLB HDPE Ducts pipe laying of approx. size of 1.0 m length x 1.0 m width x 1.65 m depth shall be excavated for pulling the cables. There may be situations where addition manholes/joint chambers are required to be excavated, for some reasons, to facilitate smooth pulling of cable. Excavation of addition manholes will be carried out, without any extra cost. De-watering of the manhole, if required, will be carried out without any extra costs. Dewatering/ De- gasification of the Ducts, if required, will be carried out without any extra costs.

The Optical Fiber cables are available in drums in lengths of approx. 2 km. The cables shall be blown / manually pulled (in exceptional cases) through already laid PLB HDPE DUCTS. This work is to be carried out under the strict supervision of site in-charge. It shall be ensured that during the blowing / pulling of Cable the tension is minimum and there is no damage to the Cable/Optical Fibers.

After pulling of the drum is completed, both ends of the PLB HDPE DUCTS pipe in each Manhole should be sealed by hard rodent resistant rubber bush, to avoid entry of rodents/mud into PLBHDPE Ducts.

The Manholes are prepared by providing 40 mm split PLB HDPE DUCTS pipe of 2.5 to 3m length and closing the split PLB HDPE Ducts by providing necessary clamps/ adhesive tape as per the directions of BSNL. Afterwards, the split/cut PLB HDPE DUCTS pipe are covered with 100 mm split RCC pipe of 2m length and sealing the ends of RCC pipe with lean cement solution for protecting bare cable in the manhole . After fixing of RCC Split Pipes necessary back filling/reinstatement and dressing of manholes should be carried out as referred under trenching. The location of the pulling manhole should be recorded for preparation of documentation.

Jointing/ Splicing

Optical Fiber Cable Joints will be at varying distances depending upon the incremental fiber to be laid for connecting Panchayats. The 48 fibers are to be spliced at every Joint & at both ends (Terminations) in the equipment room as directed by the BSNL. The Infrastructure required for cable splicing i.e. Splicing machine OTDR. Optical talk set Tool kit etc. will be arranged by the PIA and also any additional accessories. e. g. Engine etc. required at site for splicing will also be arranged by the PIA.

The Optical Fiber Cable thus jointed end-to-end will be tested by the BSNL/TPA/IE officer of Acceptance Testing unit of the concerned BSNL for splice losses and transmission parameters as specified by BSNL and prevalent at that time. The through Optical Fiber should meet all the technical parameters, specified and no relaxation will be granted.

Construction of Jointing Chamber:

The joint chambers are provided at every joint to keep the O.F.C. joint well protected and also to keep extra length of cable, which may be, required to attend the faults at a later date. Jointing chambers are to be prepared at the Fiber Point of Interconnect (FPIO) or normally at distance of every 2 km. Actual location of jointing chamber depends on length of cable drum and appropriateness of location for carrying out jointing work.

In case of restoration of existing made-over network and during O&M phase, the Manholes shall be provisioned only in case a long section is being replaced. Construction of manholes for attending single cuts and small section replacement is not mandatory.

The jointing chambers are constructed by way of fixing pre-cast RCC chambers/Brick Chambers and covers as per the instructions from BSNL. (*Amendment No. 12.10*)

Pre cast RCC chamber

For fixing pre cast RCC chamber, first a pit of size 2 m x 2 m x 1.8 m depth shall be required to be dug. Pre cast RCC chamber shall consist of three parts (i) round base plate of 140 cm diameter and 5 cm thickness in two halves (ii) full round RCC joint chamber with diameter of 120 cm and height of 50 cm and thickness of 5 cm (iii) round top cover will be in two halves with diameter of 140 cm and thickness of 5 cm having one handle for each half in centre and word "BSNL OFC" engraved on it. (See figure '4'). After, fixing the pre-cast RCC joint chamber, the joint chamber is filled with clean sand before closing. Back filling of joint chamber pit with

excavated soil shall be carried out in the end.

Brick Chamber

For constructing brick chamber, first a pit of size 2m x 2 m x 1.8 m depth is shall be required to be dug, then, base of the chamber shall be made using concrete mix of 1:5:10 (1 cement, 5 coarse sand, 10 graded stone aggregate of 40mm nominal size) of size of 1.7m x 1.7 m and 0.15 m

using cement mortar mix of 1:5 (1: cement, 5: fine sand). The chamber should have internal dimensions of 1 m x 1 m and 1 m height. The bricks to be used for this purpose should be size 9"x4.5"x3", best quality available and should have smooth rectangular shape with sharp corners and shall be uniform in colour and emit clear ringing sound when struck.

The joint chamber should be so constructed that PLB pipe ends remain protruding minimum 5 cm

inside the chamber on completion of plastering. The PLB pipes should be embedded in wall in such a way that, the bottom brick should support the pipe and upper brick should be provided in a manner that PLB HDPE pipe remains free from the weight of the construction. The joint chamber should be plastered on all internal surfaces and top edges with cement mortar of 1:3 (1: cement, 3: coarse sand), 12 mm thick finished with a floating coat of complete cement as per standard. Pre-cast RCC slab with two handles to facilitate easy lifting, of size 0.7 m x 1.4 m and of thickness of 5 cm having one handle for each half in centre and word 'OFC' engraved on it are to be used to cover the joint chamber. Two numbers of such slabs are required for one joint chamber. This pre-cast slab should be made of cement concrete mix of 1:2:4 (1: cement, 2: coarse sand, 4: stone aggregate 6 mm nominal size) reinforced with steel wire fabric 75 x 25 mm mesh of weight not less than 7.75 Kg per sq. Meter. The joint chamber is filled with clean sand before closing. Back filling of joint chamber pit with excavated soil shall be carried out in the end

Fixing of Route Indicators / Joint Indicators

Pits shall be dug 500 cm to 1000 cm towards jungle side at every Manhole and Jointing chamber for fixing of Route/Joint Indicator. In addition, Route Indicators are also required to be placed where O.F. Cable changes directions like road crossing etc. Alternatively electronic markers shall be used for joint indicators by fixing/tying them to joint closure.

The pits for fixing the indicator shall be dug for a size of 60 cm x 60 cm and 75 cm (depth).

The indicator shall be secured in upright position by ramming with stone and murrum up to a depth of 60 cm and concreting in the ratio of 1:2:4 (1: cement, 2: coarse sand, 4 stone aggregate 20 mm nominal size) for the remaining portion of 15 cm. Necessary curing shall be carried out for the concreted structure with sufficient amount of water for reasonable time to harden the structure.

RCC/Pre cast Route Indicators

The route /joint indicator made of pre-cast RCC should have the following dimensions Base - 250 mm x 150 mm Top - 200 mm x 75 mm Height - 1250 mm (See Figure '5')

Stone based Route Indicators

The route /joint indicators made of Sand/lime Stone Should have the following dimension. The word 'BBNL/BSNL OFC' should be engraved on the Route/Joint indicators.

Stone to be used (Sand/lime Stone)

Indicator Top surface to be rounded

Base 155 mm × 100 mm

Upper 500 mm length to be Tapered width wise as shown in the drawing and homogeneously finished.

Height 650mm (Straight) + 400 mm (Tapered) vi.

The route indicators should be engraved with word 'OFC' of size 80mm length & 50mm, width.

vii. Length 3.5 Ft., top 4"x4" dressed 1Ft. from top & tapered.

(See figure '6' for details of Stone Route Indicators)

The Route indicators shall painted Blue and placed at 500 to 1000 cm away from the centre of the

trench towards jungle side. The Joint indicators are placed at OFC joints and placed 500 to 1000 cm away from wall of the joint chamber facing jungle side and are painted Grey. The engraved word "BBNL/BSNL OFC" should be painted in white, on route as well as joint indicators. Numbering of route indicators/joint indicators should also be done in white paint. The numbering scheme for route indicators will be Joint No./Route Indicator No. for that joint. For example, 2/6 marking on a route indicator means 6th route indicator after 2nd joint. Additional joints on account of faults at a later date should be given number of preceding joint with suffix A, B, C, and D. For example sign writing 2A on a joint indicator means, additional joint between joint No. 2 and 3. The numbering of existing route/joint indicator should not be disturbed on account of additional joints. Enamel paints of reputed brand should be used for painting and sign writing of route as well joint indicators.

The route and joint indicator shall be painted with primer before painting with oil paint. The material used should bear ISI mark. The size of each written letter should be at least 3.5 cm. The colours of painting and sign writing is as under:

For Joint Indicator: Grey colour

For Route Indicator: Blue colour

For BSNL OFC & Nos: White colour.

Documentation

The documentation, consisting of the following shall be prepared for each Block and the Panchayats connected to the Block. 4 sets of documentation shall be provided both in Electronic format on CD as well as Hard binded copy.

Route Index Diagrams General: This diagram shall consist of Cable Route Details on Geographical Map drawn to scale with prominent land marks and alignment of cable with reference to road. This shall be prepared on A-3 sheets of 80 GSM.

Route Index Diagrams Profile –

These diagrams will contain

Make and size of the cable.

Offset of cable from centre of the road at every 10 meters

Depth profile of Cable at every 10 meter;

Details of protection with type of protection depicted on it;

Location of culvert and bridges with their lengths and scheme of laying of PLB HDPE Ducts pipe thereon.

Important landmarks to facilitated locating the cable in future; Location of Joints and pulling manholes.

These diagrams shall be prepared on A-4 sheets of 80 GSM. On one sheet profile of maximum 400 meters shall be given to ensure clarity.

Joint Location Diagram

This diagram will show

Geographical location of all the joints.

Depth of Joint Chamber covers from ground level

Type of chamber (Brick/Pre-cast)

Length of O.F. Cable kept inside the joint chamber from either direction. This shall be prepared on A-4 sheets of 80 GSM.

All the diagrams (1), (2) & (3) shall bear the signatures of the PIA, the BSNL as a proof of accuracy of the details. The diagrams shall be bound in A-4 size book with cover.

The cover sheets shall be of 110 GSM and laminated. The front cover shall have the following details.

Name of the State/District/Block

Name of the Panchayats connected

Name of the BSNL with logo

Name of the PIA

Date of commencement of work

Date of completion of work

For each Block 1 sets of above mentioned document shall be submitted to BSNL.

SAFETY PRECAUTIONS

Safety Precautions when excavating or working in excavations close to electric cables

The Officer in charge (BSNL) of the work should get full information from Electricity undertaking regarding any electric cables, which are known or suspected to exist near the proposed excavation and unless this is done, excavation should not be carried out in the section concerned. The electricity undertaking should be asked to send a representative and work should be preceded with close consultation with them.

Only wooden handled hand tools should be used until the electric cables have been completely exposed. Power Cables, not laid in conduits, are usually protected from above by a cover slab of concrete, brick or stone. They may or may not be protected on the sides. It is safer, therefore, always to drive the point of the pick axe downwards then uncovering a cable, so that there is less chance of missing such warning slabs. No workman should be permitted to work alone where there are electric cables involved. At least one more man should be working nearby so that help can be given quickly in case of an accident. If disconnection of power could be arranged in that section it will be better. No electric cables shall be moved or altered without the consent of the Electric Authority and they should be contacted to do the needful. If an electric cable is damaged even slightly, it should be reported to the Electric Authority and any warning bricks disturbed during excavation should be replaced while back filling the trench. Before driving a spike into the ground, the presence of other underground properties should be checked. Information on plans

regarding the location of power cables need not to be assumed as wholly accurate. Full precautions should be taken in the vicinity until the power cable is uncovered. All electric cables should be regarded as being live and consequently dangerous. Any power is generally dangerous, even low voltage proving fatal in several cases.

Electric shock-Action and treatment :

Free the victim from the contact as quickly as possible. He should be jerked away from the live conductors by dry timber, dry rope or dry clothing. Care should be taken not to touch with bare hands as his body may be energized while in contact. Artificial respiration should begin immediately to restore breathing even if life appears to be extinct. Every moment of delay is serious, so, in the meanwhile, a doctor should be called for.

Safety Precautions while working in public street and along railway lines :

Where a road or footpath is to be opened up in the course of work, special care should be taken to see that proper protection is provided to prevent any accidents from occurring. Excavation work should be done in such a manner that it will not unduly cause inconvenience to pedestrians or occupants of buildings or obstruct road traffic. Suitable bridges over open trenches should be so planned that these are required for the minimum possible time. Where bridges are constructed to accommodate vehicular traffic and is done near or on railway property, it should be with the full consent and knowledge of the competent railway authorities.

Danger from falling material

Care should be taken to see that apparatus, tools or other excavating implements or excavated materials are not left in a dangerous or insecure position so as to fall or be knocked into the trench thereby injuring any workman who may be working inside the trench.

Care when working in Excavations

Jumping into a trench is dangerous. If it is deep, workmen should be encouraged to lower themselves. Workers should work at safe distance so as to avoid striking each other accidentally with tools. If the walls of the trench contain glass bits, corroded wire or sharp objects they should be removed carefully. If an obstruction is encountered, it should be carefully uncovered and protected if necessary. If an obstruction is encountered, it should be carefully uncovered and protected if necessary. Care must be taken to see that excavated material is not left in such a position that it is likely to cause any accident or obstruction to a roadway or waterway. If possible the excavated material should be put between the workmen and the traffic without encroaching too much on the road.

Danger of cave in

When working in deep trenches in loose soil, timbering up/shoring the sides will prevent soil subsidence. The excavated material should be kept at sufficient distance from the edge of the trencher pit. Vehicles or heavy equipment must not be permitted to approach too close to the excavation.

When making tunnelled opening, it should be ensured that the soil is compact enough to prevent cave in even under adverse conditions of traffic. Extra care should be taken while excavating near the foundations of buildings or retaining walls. In such cases, excavation should be done gradually and as far as possible in the presence of the owners of the property.

Protection of Excavations

Excavations in populated areas, which are not likely to be filled up on the same day should be protected by barriers or other effective means of preventing accidents and the location of all such openings must in any event be indicated by red flags or other suitable warning signs. During the hours from dusk to dawn, adequate number of red warning lamps should be displayed. Supervisory officers should ensure that all excavations are adequately protected in this manner as serious risk and responsibility is involved. Notwithstanding adoption of the above mentioned precautions, works involving excavations should be so arranged as to keep the extent of opened ground and the time to open it to a minimum.

Precautions while working on roads

The period between half an hour after sun-set and half an hour before sunrise, and any period of fog or abnormal darkness may also be considered as night for the purpose of these instructions, for the purpose of providing the warning signs.

Excavation liable to cause danger to vehicles or the public must at all times be protected with fencing of rope tied to strong uprights or bamboo poles at suitable height or by some other effective means. Any such temporary erection which is likely to cause obstructions and which is not readily visible should be marked by posts carrying red flags or boards with a red background by day and by continuously lighted lamps at night.

The flags and the lamps should be placed in conspicuous positions so as to indicate the pedestrians and drivers of vehicles the full expanse i.e. both width and length of the obstruction. The distance between lamps or between floors should not generally exceed 1.25 m along the width and 6m along length of the obstruction in non-congested areas, but 4 meters along the length in congested areas.

If the excavation is extensive, sufficient notice to give adequate warning of the danger, should be displayed consciously not less than 1.25 m above the ground and close to the excavation. Where any excavation is not clearly visible for a distance of 25m to traffic approaching from any direction or any part of the carriage way of the road in which the excavation exists, a warning notice should be placed on the kerb or edge of all such roads from which the excavation or as near the distance as is practicable but not less than 10 m from the junction of an entering or intersecting road in which the excavation exists. All warnings, in these should have a red background and should be clearly visible and legible. All warning lamps should exhibit a red light, but white lights may be used in addition to facilitate working at night. Wherever required a passage for pedestrians with footbridge should be provided. At excavations, cable drums, tools and all materials likely to offer obstructions should be properly folded round and protected. This applies to jointer's tents as well. Leads, hoses etc stretched and across the carriageway should be guarded adequately for their own protection and also that of the public.

Traffic Control

The police authorities are normally responsible for the control of traffic and may require the setting up of traffic controls to reduce the inconvenience occasioned by establishment of a single line of traffic due to restriction in road width or any other form of obstruction caused by the work. As far as possible, such arrangements should be settled in advance. If there are any specific regulations imposed by the local authorities, these should be followed.

Work along Railway Lines

Normally all works at Railway crossing is to be done under supervision of the railway authorities concerned, but it is to be borne in mind that use of white, red or green flags by the Departmental staff is positively forbidden to be used when working along a railway line as this practice may cause an accident through engine drivers mistaking them for railway signals. When working

along double line of railway, the men should be warned to keep a sharp look on both the "UP" and 'DOWN" lines to avoid the possibility of any accident when trains pass or

happen to cross one another near the work spot.

Procedure and Safety Precautions for use of explosives during blasting for trenching

In areas where the cable trench cannot be done manually on account of boulders and rocks, it is necessary to blast the rocks by using suitable explosives. The quality of explosive to be used depends on the nature of the rocks and the kind of boulders. A few types of explosive fuses and detonators normally used for making trenches for cable works are detailed below:

Gun powder

Nitrate Mixture

Gelatine

Safety fuse

Electric Detonator

Ordinary Detonator

Procedure

A detailed survey of the route is to be done to assess the length of the section where trenching is to be done with the help of blasting. A route diagram of the rocky section may be prepared indicating the length of the route where the explosives are to be used. For the purpose of obtaining license, a longer length of route should be given in the application as in many cases, after digging, rocks appear which was not initially anticipated.

Next a license will have to be obtained for use and storing of explosive in that section. If the area falls under a police commissioner, the authority for granting such license is the police commissioner of the concerned area. When the route does not fall in the jurisdiction of a police commissioner, the authority for issuing license is the District Magistrate.

The concerned BSNL authority should be applied in prescribed form with a route map. The concerned authority will make an enquiry and issue license for using/storing explosives for cables trenching work. Such license will be valid for 15 days only. The license should be got renewed if the blasting operation needs to be extended. Once the license is granted, it is the responsibility of the holders of the license for the proper use of explosives, its transportation and storing.

Method of using

The safest explosive is the Gelatin and electric detonator. Gelatin is in the form of a stick. Electric

detonator is a type of fuse used for firing the explosive electrically. Holes are made at suitable intervals on rocky terrain or boulders either by air compressor or by manual chipping. The depth

First the electric detonator is to be inserted into the Gelatin and the Gelatin is to be inserted into the holes keeping the + ve and - ve wirings of electric detonators outside the holes. Again refill the holes with sand. These +ve and -ve insulated wires of detonator are then extended and finally connected to an EXPLoder kept at a distance of not less than 100 m.

Now the explosive is ready for blasting. But, before connecting wires to exploder for blasting, all necessary precautions for stopping the traffic, use of red flags, exchange of caution signals, etc. should be completed and only then Exploder should be connected and operated.

Operation of exploder (IDL schaffler type 350 type exploder)

The type 350 blasting machine consists of a bearing block with blasting machine system and the explosion proof light- alloy injection moulded housing. The exploder is held with the left hand. The twist handle is applied to the drive pin, clapped with the right hand turned in the clock wise direction in continuous measurements at the highest speed from the initial position until it reached to a stop. At this stage an indication lamp will glow. When the indication lamp glows, "press button switch" should be pressed. This will extend the electric current to detonator and Gelatin will be detonated. The rock will be blasted out of the trench. Number of holes can be blasted in a single stroke by connecting all such detonators in series connection and finally to the exploder. After blasting, again mazdoors are engaged on the work to clear the debris. If the result of the first blasting is not satisfactory, it should be repeated again on the same place.

Warning

There may be two reasons for unsatisfactory results of the blasting

Misfire of Gelatin due to leakage of current from detonator.

Over loading because of overburdens.

Never pull the broken wire pieces from the holes in such cases. Attempt should not be made to re-blast the misfired Gelatin. The safest way is to make a fresh hole by its side and put fresh Gelatin in that hole and blast it.

Precautions

The abstract of Explosives Rules 1983 which are relevant to our work is given below:

Restriction of delivery and dispatch of explosives

No person shall deliver or dispatch any explosives to anyone other than a person who is the holder of a license to possess the explosives or the agent of a holder of such a license duly authorized by him in writing on his behalf?

OR

Is entitled under these rules to possess the explosives without a license.

The explosives so delivered or dispatched shall in no case exceed the quantity, which the person to whom they are delivered or dispatched is authorized to possess with or without a license under

these rules.

No person shall receive explosives from any person other than the holder of a license granted under these rules. No person shall receive from or transfer explosives to any person for a temporary storage or safe custody in a licensed premise unless prior approval is obtained from the Chief Controller.

A person holding license for possession of explosives granted under these rules shall store the explosives only in premises specified in the license.

Protection from Lightning During Storing

Every magazine shall have attached there to one or more efficient lightning conductors designed and erected in accordance with the specification laid down in Indian Standard Specifications No.2309 as amended from time to time. The connections to various parts of earth resistance of the lightning conductor terminal on the building to the earth shall be tested at least once in every year by a qualified electrical engineer or any other competent person holding a certificate of competency in this behalf from the State Electricity Department. A certificate showing the results of such tests and the date of the last test shall be hung up in conspicuous place in the building.

Precautions during thunder-storm

When a thunder- storm appears to be imminent in the vicinity of a magazine or store house every person engaged in or around such magazine and store house shall be withdrawn to a safe distance from such magazine or store house and the magazine and store house shall be kept closed and locked until the thunder storm has ceased or the threat of it has passed.

Maintenance of records

Every person holding a license granted under these rules for possession, sale or use of explosives shall maintain records in the prescribed form and shall produce such record on demand to an Inspection Officer.

Explosives not to be kept in damaged boxes

The licensee of every magazine or store house shall ensure that, the explosives are always kept in their original outer package. In case, the outer package gets damaged so that the explosive contained therein cannot be stored or transported, such explosives shall be repacked only after the same are examined by controller of explosives.

Storage of explosives in excess of the licensed quantity

The quantity of any kind of explosives kept in any licensed magazine or store house shall not exceed the quantity entered in the license against such kind of explosives. No explosives in excess of the licensed quantity shall be stored in the magazine or store house unless a permit in this behalf is obtained from the licensing authority by a letter or telegram.

Precautions to be observed at Site

The electric power at the blasting site shall be discontinued as far as practicable before charging the explosives. No work other than that associated with the charging operations shall be carried out within 10 meters of the holes unless otherwise specified to the contrary by the licensing authority.

When charging is completed, any surplus explosive detonators and fuses shall be removed from the vicinity of the hole and stored at a distance which should prevent accidental detonation in the event of a charge detonating prematurely in any hole. The holes which have been charged with explosive shall not be left unattended till the blasting is completed. Care shall be taken to ensure that fuse or wires connected to the detonation are not damaged during the placing of stemming materials and tamping.

Suitable warning procedure to be maintained

The licensee or a person appointed by the licensee to be in charge of the use of explosives at the site shall lay down a clear warning procedure consisting of warning signs and suitable signals and all persons employed in the area shall be made fully conversant with such signs and signals.

Precautions to be observed while firing

The end of the safety fuse (if used in place of a detonator should be freshly cut before being lighted. The exploders shall be regularly tested and maintained in a fit condition for use in firing. An exploder shall not be used for firing a circuit above its rated capacity. The electric circuits shall be tested for continuity before firing. All persons other than the shot-firer and his assistant, if any, shall be withdrawn from the site before testing the continuity.

For the purpose of jointing, the ends of all wires and cables should have the insulation removed for a maximum length of 5 cm. and should, then be made clear and bright for a minimum length of 2.5 cm. and the ends to be joined should be twisted together so as to have a positive metal contact.

Then these should be taped with insulation to avoid leakage when in contact with earth. In case of blasting with dynamite or any other high explosive, the position of all the bore holes to be drilled shall be marked in circles with white paint. These shall be inspected by the PIA's agent. Bore holes shall be of a size that the cartridge can easily pass down. After the drilling operation, the agent shall inspect the holes to ensure that drilling has been done only at the marked locations and no extra hole has been drilled. The agent shall then prepare the necessary charge separately for each bore hole. The bore holes shall be thoroughly cleaned before a cartridge is inserted. Only cylindrical wooden tamping rods shall be used for tamping. Metal rods or rods having pointed end shall never be used for tamping. One cartridge shall be placed in the bore hole and gently pressed but not rammed down. Other cartridges shall then be added as may be required to make up the necessary charge for the bore hole. The top most cartridge shall be connected to the detonator which shall in turn be connected to the safety fuses of required length. All fuses shall be cut to the length required before being inserted into the holes. Joints in fuses shall be avoided.

Where joints are unavoidable, a semi-circular niche shall be cut in one piece inserted into the niche. The two pieces shall then be wrapped together with string. All joints exposed to dampness shall be wrapped with rubber tape.

The maximum of eight bore holes shall be loaded and fired at one occasion. The charges shall be fired successively and not simultaneously. Immediately before firing, warning shall be given and

the agent shall see that all persons have retired to a place of safety. The fuses of the charged holes shall be ignited in the presence of the agent, who shall see that all the fuses are properly ignited.

Careful count shall be kept by the agent and other of each blast as it explodes. In case all the charged bore holes have exploded, the agent shall inspect the site soon after the blast but in case of misfire the agent shall inspect the site after half an hour and mark red crosses (X) over the holes which have not exploded. During this interval of half an hour, nobody shall approach the misfired holes. No driller shall work near such bore until either of the following operations has been done by the agent for the misfired boreholes.

The PIA'S agent shall very carefully (when the tamping is a damp clay) extract the tamping with a wooden scraper and withdraw the primer detonator.

The holes shall be cleaned for 30 cm of tamping and its direction ascertained by placing a stick in the hole. Another hole shall then be drilled 15 cm away and parallel to it. This hole shall be charged and fired. The misfired holes shall also explode along with the new one.

Before leaving the site of work, the agent of one shift shall inform the agent relieving him for the next shift, of any case of misfire and each such location shall be jointly inspected and the action to be taken in the matter shall be explained to the relieving agent. The BSNL shall also be informed by the agent of all cases of misfire, their cause and steps taken in that connection.

General Precautions

For the safety of persons red flags shall be prominently displayed around the area where blasting operations are to be carried out. All the workers at site, except those who actually ignite the fuse, shall withdraw to a safe distance of at least 200 metre from the blasting site. Audio warning by blowing whistle shall be given before igniting the fuse.

Blasting work shall be done under careful supervision and trained personnel shall be employed. Blasting shall not be done within 200 meters of an existing structure, unless specifically permitted by the BSNL in writing.

Precautions against misfire

The safety fuse shall be cut in an oblique direction with a knife. All saw dust shall be cleared form inside of the detonator. This can be done by blowing down the detonator and tapping the open end. No tools shall be inserted into the detonator for this purpose. If there is water present or if the borehole is damp, the junction of the fuse and detonator shall be made water tight by means of tough grease or any other suitable material. The detonator shall be inserted into the cartridge so that about one-third of the copper tube is left exposed outside the explosive. The safety fuse just above the detonator shall be securely tied in position in the cartridge. Waster proof fuse only shall be used in the damp borehole or when water is present in the borehole. If a misfire has been found to be due to defective fuse, detonator or dynamite, the entire consignment from which the fuse, detonator or dynamite was taken shall be got inspected by the BSNL or his authorized representative before resuming the blasting or returning the consignment.

Precaution against stray currents

Where electrically operated equipment is used in locations having conductive ground or

continuous metal objects, tests shall be made for stray current to ensure that electrical firing can proceed safely.

Horizontal Directional Drilling (HDD)

HDD Overview :Horizontal directional drilling is an excellent alternative to traditional utility installation methods. Unlike manual labor, trenching or excavation, the HDD process is highly suitable in urban areas or places where aboveground obstructions exist that are expensive, inconvenient or impossible to disturb for product installation. HDD machines install utilities under obstacles such as roads, rivers, creeks, buildings and highways — with little or no impact to the aboveground surface.

Drill Rig : Horizontal directional drilling machines are available in many sizes. Regardless of a machine's size, it has three main functions — rotation, forward thrust/pullback and fluid flow.

HDD Process :Horizontal directional drilling machines will bore under or around obstacles. Once the drill path is planned, an underground pilot bore is performed utilizing a series of drill rods connected to a drill head. After the pilot bore is completed, a back reamer is attached to the drill string that enlarges the drill path to accommodate the product that will subsequently be pulled into place. Vermeer NAVIGATOR horizontal directional drilling machines can install product under roads, buildings, railroad tracks, streets, rivers, creeks and in congested underground areas.

Steering :Steering refers to control of the direction of a drill path. The shape of a drill bit on the drill head allows an operator to change the drill path direction during a bore. When an operator points the drill bit downward to the 6 o'clock position and pushes the drill head forward, the drill head goes deeper. When the drill faces the 12 o'clock position, the drill head will rise. Pushed to the 9 o'clock position, the head goes left. Pushed to the 3 o'clock position, the head goes right. If no change in drill path is needed, the drill head and rod are rotated while thrusting.

Locating :Prior to starting a bore, the drill head is equipped with a transmitter that sends signals to an aboveground receiver during the bore. The drill head's location must be tracked during a bore in order to provide steering position information to the HDD operator.

ALLIED ACTIVITIES

Storing/Warehousing of Materials: PIA will be responsible for storing and warehousing of all the material and accessories, but not limited to, supplied by him at his own cost. No storing/warehouse shall be provided by BSNL.

Transportation of Materials: The PIA shall be responsible for transporting the materials, to be supplied by the BSNL or otherwise to execute the work under the contract, to site at his/ their own cost. The costs of transportation are subsumed in the standard quoted Rates and therefore no separate charges are payable on this account.

Disposal of Empty Cable Drums: The PIA shall be responsible to dispose of the empty cable drums after laying of the cables. The cost of various sizes of empty cable drums recoverable from the PIA will be fixed taking into account the prevailing market rates.

It shall be obligatory on part of the PIA to dispose of the empty cable drums at his/their level and

the amount fixed for various empty cable drums shall be recovered from the bill for the work for which the drum (s) was/were issued or from any other amount due to the PIA or the Security Deposit.

The PIA shall not be allowed to dump the empty cable drums in Govt. /Public place which may cause inconvenience to the BSNL / public. If the PIA does not dispose of the empty cable drums within 3 days of becoming it empty, the BSNL shall be at liberty to dispose-off the drums in any manner deemed fit and also recover the amount fixed in this contract from the bill/security deposit/ any other amount due to the PIA.

Supply of Materials: There are some materials (Accessories) other than as mention in BoQ required to be supplied by the PIA for execution of work under this contract like Bricks, Cement, Wire Mesh and Steel for protection, etc., besides using other consumables which do/don't become the part of the asset. The PIA shall ensure that the materials supplied are of best quality and workmanship and shall be strictly in an accordance with the specifications.

Social auditing: While carrying out the execution work of cable/Eqpt. ,videography may be carried out on sample basis for duration of 15 to 30 minutes per Gram Panchayat which may also involve the local people of the Gram Panchayats and villages including the Gram Panchayat Pradhan (If possible) and same may be submitted in a form of CD along with the documentation sets for information.

Note: All the materials as above have to be TSEC/Type approved by BSNL QA/TEC against mentioned TEC GR or as per the approval procedure of BSNL for which TEC GR not there.

Figure 1

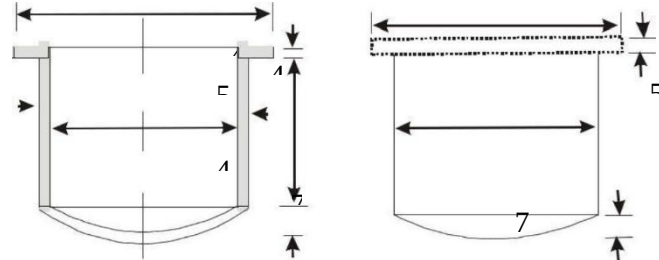
HDPE END CAPS

66.0

58

4

4

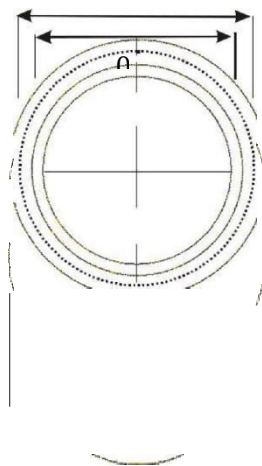


SECTION ON A.B

58

5

40



66



Figure 2

M.S. WELDMESH

DETAILS OF 100 MM X 50 MM, 12 SWG MILD STEEL WELD MESH HAVING WIDTH OF

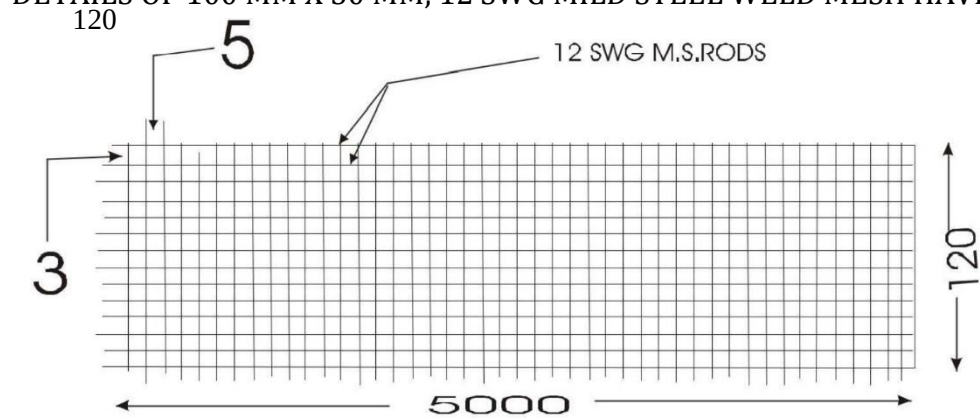
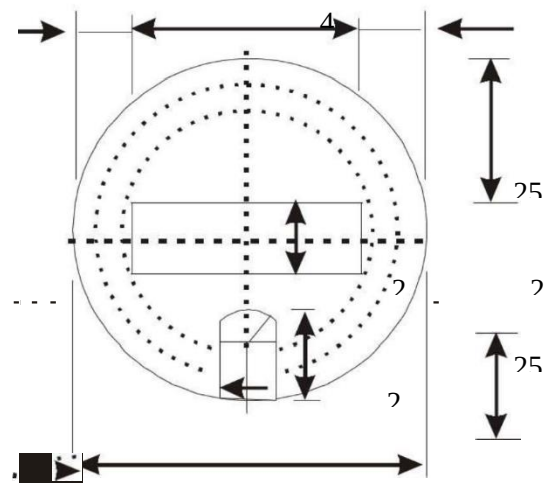
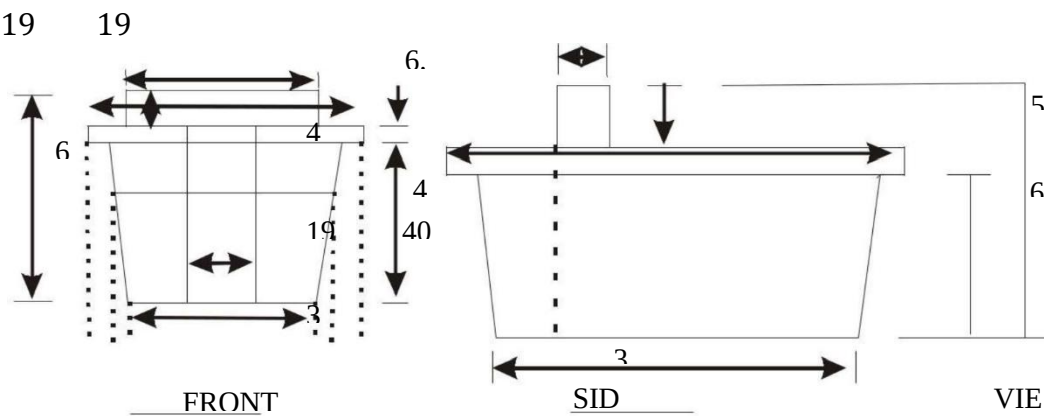


Figure 3
RRubber Cork

20
49
55
19



55

TOP VIEW

NOTE:
1. ALL DIMENSIONS ARE IN MM.
2. DIMENSIONS ARE ONLY FOR GUIDENCE. TAPPER SHOULD BE SUCH THAT IT SHOULD TIGHTLY FIX. INTO TYPE A & TYPE B HOPE 50 mm OO PIPES.

Figure
Figure 5
RCC Route Indicator

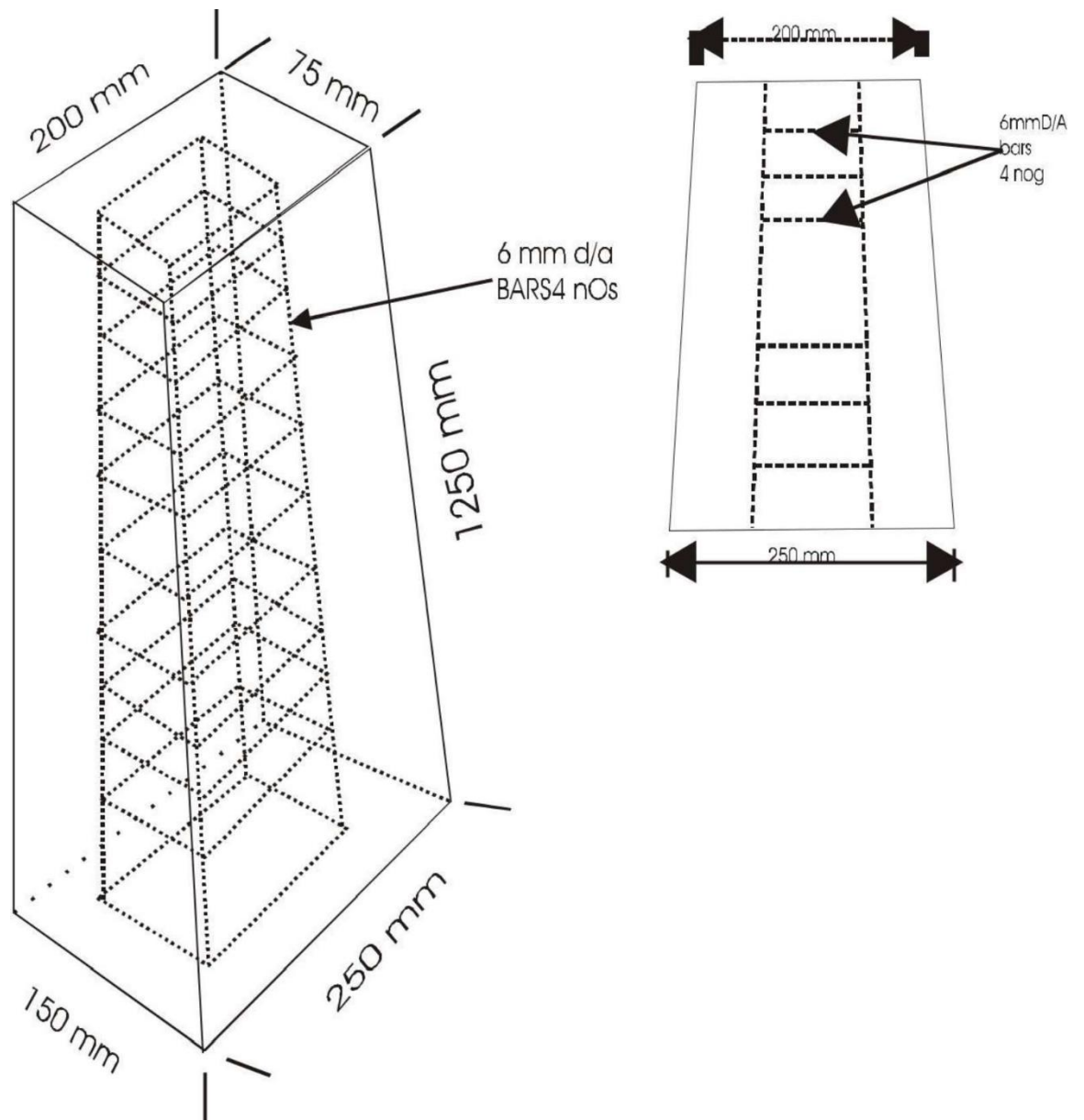
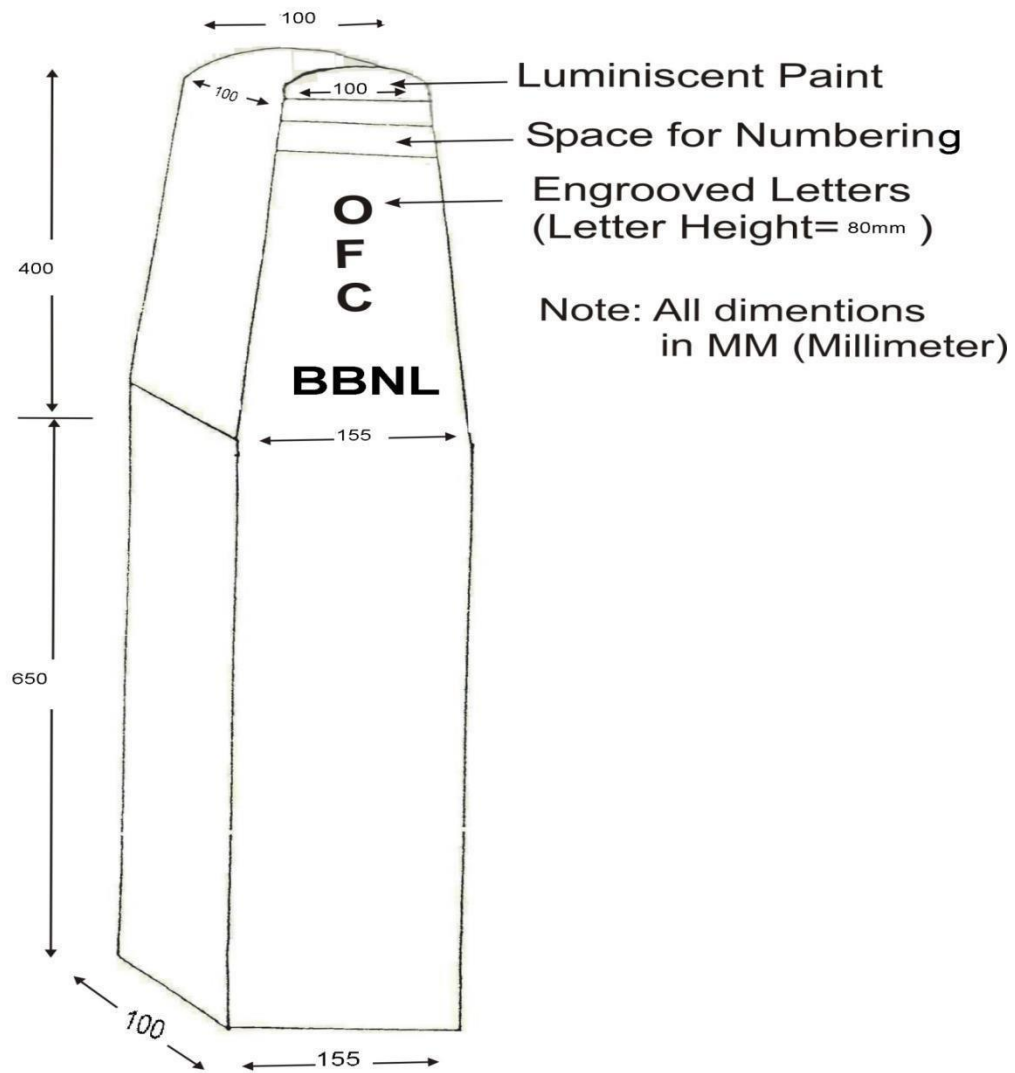


Figure 6

1. Stone OFC Route Indicator



Abbreviations

Annexure B (1) - Penalty for Deviation from Standard Engineering Instructions Underground Laying

Normally depth of the trench should be 1.65 m in normal & mix soil and 1.2m in hard soil. Deviations due to field conditions will be required to have necessary protections in case of less depth. The cases and solutions are as following;

Minimum depth of burial in general shall be 1.65m

In rocky/ hilly area (including Murrumbidgee soil mixed with stone or soft rock) depth of burial shall be 1.2m at the minimum.

In case of utility where depth is 100 to 120 cm then DWC protection is to be used in normal/mix soil case.

In some areas where the depth is 60cm, in those cases reinforced concrete casing of 4" (Four inch) round or GI pipe should be provided.

For hard strata/rock soil layer for 50 to 80 cm cases DWC with wire mesh and PCC or GI pipe is to be used. However, for depth relaxation photograph (with GPS) proof and justification is required.

Above ground installation of ducts shall be limited to culvert and bridge crossings only. At such locations, ducts shall be installed inside GI pipe or HDPE DWC pipes with metal sheet protection (GI sheet wrapping) of appropriate size (4" to 6") suitable for number of ducts to be installed.

Trenching depth under no circumstances shall be less than 30cms. Trenching work in soft/hard rock patches are to be achieved using rock breakers or any other method deemed fit.

The relaxation by the competent authority prescribed below shall be obtained giving reasons for not achieving standard depth;

Note:

In case of rocky/hilly soil, full payment is to be made for depth equal to or more than 1.2 m. The details of payment to be made in less depth cases are mentioned at clause 5 of section IV B of tender document.

Duct: Extra 2% of trench length to account for actual PLB length in trenches. The payment shall be made with above factor included.

In compliance to para 11, joint chambers are to be provided at every joint to keep the O.F.C. joint well protected and also to keep extra length of cable, which may be, required to attend the faults at a later date. Separate payment shall be made for construction of Joint Chambers. Extra OFC length shall normally be kept @ 20 meter per joint. However, to avoid wastage of OFC, extra length beyond 20 meters and upto 100 meters may be allowed.

The payment of OFC shall be made as per the end to end OTDR length.

INSTALLATION PRACTICE OF
SELF SUPPORTING METAL FREE AERIAL OPTICAL FIBRE CABLE

1. Introduction

This engineering Instruction (EI) deals with the guidelines and the installation practice for installing of self-supporting metal free aerial optical fibre cable.

2. General guidelines

2.1 General Instruction for *Installation of ADSS* :

- (a) The methods described in this Engineering Instruction for installation of All Dielectric Self- Supporting (ADSS) fiber optic cable are intended to be used as guidelines by design engineers and outside plant construction personnel. This guide is generic enough, and yet contains sufficient specific information, to be applicable for most installations of ADSS cable, however, local conditions, existing engineering and customer procedures and requirements must be considered.
- (b) ADSS Cables should meet National Electric Safety Code (NESC) loading requirements for heavy, medium, and light loading conditions in their sag/tension tables. Special tables can be generated based on specific customer installation requirements, which may include minimum separation and clearance, sag requirements, and loading conditions.
- (c) It is assumed that the personnel using the information presented in this document have prior experience in the planning, engineering or placement of ADSS fiber Optic Cable.
- (d) The ADSS Cable should meet the P1222 IEEE Standard for All- Dielectric Self-Supporting Fiber Optic Cable (ADSS).

2.2 Precautions during Installation of ADSS :

- (a) The following are some suggested precautions which should be observed when working with fiber optic cables. Before starting any aerial fiber optic cable installation, all personnel must be thoroughly familiar with Occupational Safety and Health Act (OSHA) regulations. Each individual company's safety precautions for ADSS fiber optic cable installations should be reviewed before work begins and practiced during the entire installation process.
- (b) Before cable installation begins, the cable reels should be carefully inspected for any imperfections such as nails and broken flanges which might cause damage to the cable as it is payed out. Precautions should be taken to protect stored reels from possible damage by vandals or other sources when left unattended.

- (c) Fiber optic cable is a high capacity transmission medium which can have its transmission characteristics degraded when subjected to excessive pulling force, sharp bends, and crushing forces. These losses may not be immediately revealed after installation. For these reasons extra care must be taken during the entire installation process.
- (d) Whenever cable from the reel is placed on pavement or other surfaces, it should be protected with barricades or cones to prevent possible vehicular or pedestrian traffic damage.
- (e) Fiber optic cables are susceptible to performance degradation due to tight bending. The minimum bend radius of each cable is specified relative to the cable's diameter. During installation a cable not be exposed to a bend radius smaller than 20 times the cable diameter and that after installation a cable should not be exposed to a bend radius smaller than 10 times the cable diameter.
- (f) Whenever cable from the reel is placed on pavement or other surfaces, it should be protected with barricades or cones to prevent possible vehicular or pedestrian traffic damage. A "figure-eight" configuration should be used when the cable is removed from the reel and piled on the ground. This prevents kinking and twisting of the cable which could cause damage. Fiber optic cable should not be coiled in a continuous direction except for lengths of 30 meters (100 ft) or less. The preferred sized for the "figure-eight" is about 4.5 meters (15 ft) in length with each loop 1.5 meters (5 ft) to 2.4 meters (8 ft) in diameter.

Note: An alternative to the manual figure-eight is the "figure-eight" machine. This equipment will "figure-eight" cable much faster than manual methods saving time and manpower. Using a "figureeight" machine the remaining cable on the reel is wound on the machine's drum. Once the inside cable end is accessible, the machine is reversed and the cable is pulled from the machine through the duct. The machine's drum and rollers are designed to keep the cable at a bend radius that exceeds the minimum bend radius of the cable.

- (g) Never, during the pull-in process, should the fiber optic cable experience sags, bends or twists that produce in the cable a bend whose radius is smaller than that specified as the minimum bend radius for the cable being installed.
- (h) Do not cut the Cable under any circumstances without prior approval of the engineer responsible for the project. Splice locations are determined in the initial system design by the project engineer. Introducing new splices can potentially degrade the transmission characteristics of the system.
- (i) Temporary or permanent guys should be installed at any location where the self-supporting cable is tensioned to avoid placing an unbalanced load on the support poles. Wire mesh grips are intended for pulling the cable into place and are not intended for tensioning the cable in place. Do not use split wire mesh grips to tension or to hold cable under tension.

2.3 Accessories and tools for Installation of ADSS :

- (a) The type and construction of the reel support determines the method and tools for handling. Reel construction requires that they be mounted on an axle or be supported by the reel flange. The equipment used must be rated for the maximum load and be able to lift the reel. When the reel stand is not self-loading, a crane, forklift or some other method of lifting must be available to lift the reel onto its stand.
- (b) The reel support design employed must incorporate an adjustable brake to supply the necessary hold-back tension needed to properly tension the cable. The cable may be pulled directly from the reel support when employing slack stringing methods that apply minimal tension to the reel of cable.
- (c) Capstan and reel type pulling machines with approved adjustable tensioners may be used to install the ADSS fiber optic cable.
- (d) The pulling and braking system employed should operate smoothly to prevent any jerking or bouncing of the cable during placement. The system should be controllable and able to maintain a constant and even tension on the cable during the installation process. Pullers and tensioner should be equipped with tension indicator and limiting devices. Tensioner wheels should be controlled so that a constant hold-back tension is maintained at all pulling speeds. A braking system to maintain cable tension when pulling is stopped is required.
- (e) Sheave diameters larger than those specified in Paragraph 2.5 are suggested, especially at the payoff reel position and the take-up or winch location. A larger diameter than the minimum diameter required offers the advantage of reducing the load applied to the cable.
- (f) The depth and flare of grooves in wheels used during the placing process are not critical, but there are some recommended guidelines that should be followed. The sheave grooves should have depth of 25% greater than the cable diameter with a flare angle of 15 to 20 degrees from vertical. This will facilitate the passage of grips, swivels, etc. and contain the cable within the groove. The material and finish of the grooves should be such that it does not mar the surface of the cable.
- (g) Traveler, sheave, or quadrant blocks used should be in good working order and properly lubricated. The cable release should work smoothly with minimal pressure. These should be lined so that they do not cause any abrasion of the cable jacket. A plastic lining of neoprene or urethane are acceptable.
- (h) Tangent supports made of metal with a protective pad can be used as a replacement for stringing blocks. These supports are mounted directly on the pole and open from the top. The protective pads can be removed and the top closed and secured for stringing.
- (i) At places where uplift may occur, it is recommended that uplift rollers or hold down blocks be used.

- (j) Wire mesh grips or pulling eyes can be used to pull the cable into place through the travelers, sheaves, or quadrant blocks. The mesh grip or pulling eye must be used in conjunction with a swivel link which will minimize cable twisting that can be introduced by the pull rope. The load rating of the swivel link shall not exceed the maximum pulling tension rating of the cable.

2.4 ADSS Installation Methods:

There are two primary method used for placing ADSS cable. Both these methods are very similar to those methods used to place most aerial cables. The first method is called the stationary reel, or the “Pull-back Method,” and the second is called the moving reel, or the “Drive-out Method.”

The Pull-back Method: The Pull-back Method is illustrated in **Figure A** below.

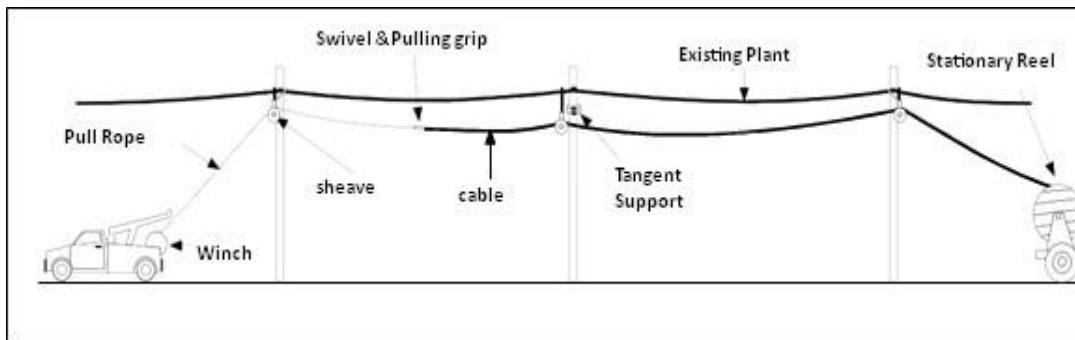


Figure A: The Pull-back Method of Installation of ADSS

- (a) Holes are drilled in all poles along the cable run and line pole hardware is attached to the poles at the engineered height. At dead-end and tangent locations, down guys are placed at the correct position according to local engineering practices.
- (b) Travelers, sheaves, or quadrant block are placed just above or just below the location of the installed pole line hardware at each pole location. The diameter of these supports must meet the minimum bend radius specs for the cable in any location where the cable will be bent more than 20 degrees. The cable warranty is void if these limits are not observed.
- (c) Please note that if tension is let off the cable during a pull, the natural sag of the cable will usually produce angles larger than 20 degrees at each support point. Thus, extreme caution must be used if pulling through small diameter supports.
- (d) The pulling line is then pulled through each traveler, sheave, or quadrant block. After the pulling line is in place, it is attached to the ADSS cable with a break-away swivel and a factory installed pulling eye. A wire mesh grip may be used when a pulling eye has not been installed.
- (e) The ADSS cable is then pulled in through the entire section using the puller and the tensioner. Care must be taken to avoid over tensioning the cable and to avoid sagging of the cable that may introduce bends that are smaller than the minimum bending

radius of the cable. Several pulling stages may be required to place the cable through the entire system.

- (f) When the entire cable has been pulled into place, starting at an end location, each dead-end to dead-end cable length can be sagged and tensioned and support hardware applied according to the installation requirements.

The Drive-back Method : The Pull-back Method is illustrated in Figure B below.

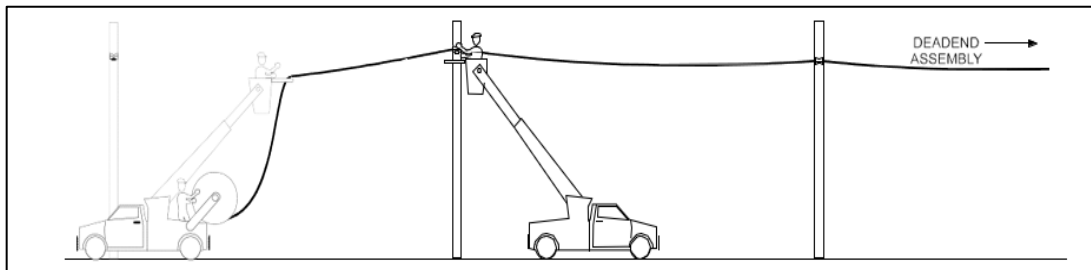


Figure B: The Pull-back Method of Installation of ADSS

- (a) The Drive-out method of cable placement is primarily used during the construction of new lines where there is a clear right-of-way and with no obstructions to vehicles.
- (b) The reel of cable is placed on a reel trailer or a truck equipped with a reel carrier. The cable should play off the top of the reel for reel trailers and the bottom of the reel for trucks equipped with a reel carrier. The reel trailer or reel equipped truck should have a braking device, set on minimum. The brake is used to prevent overrun of the reel when stopping at the support poles.
- (c) Holes will have to be drilled at the poles to mount the support hardware. At dead-end and tensioning locations, down-guys of the correct loading factor are to be placed according to local engineering practices.
- (d) Travelers, sheaves, or quadrant blocks are placed above or below the pole mounting hardware at each pole location.
- (e) With the cable dead ended at the starting location and minimum tension applied to the reel brake, the reel of cable is transported along the construction route while the cable is played out.
- (f) As the reel passes a pole location, the trailer or truck must be stopped while the cable is placed into the traveler, sheave, or quadrant block attached to the pole.
- (g) The reel then travels on to the next pole where the process is repeated over again. This continues until the cable is completely deployed or a deadend is reached.

- (h) With the cable deployed, each span must be sagged and tensioned with supporting hardware installed. Each span is started at the deadend and slack worked back towards the opposite end. An alternative method is to sag and tension each span and install permanent hardware as the cable is being deployed.

2.5 Route Survey:

The route should be inspected before the actual installation of optical fibre cables. Survey of the aerial route should be carried out pole by pole.

2.6 Over Head Alignment:

The existing route alignment wherever available should be used. On new routes, alignment should be erected. The span length must not exceed above 90 metres.

2.7 Line Diagram:

- (a) A line diagram should be prepared to mark the poles & the actual distance between the poles in a splice section (Normally 15 poles per km are recommended).
- (b) Additional poles should be erected if required to keep the span length within the specified limits.
- (c) Care should be taken that the alignment is easily accessible from the road. It is necessary to keep a clear head way (Ground clearance) of 12 to 15 feet in a section.
- (d) A complete line diagram should be prepared i.e. from station A to station B.
- (e) The number of road crossings, canals or nallahs, electric lines should be clearly marked in the route diagram.

2.8 Hilly Regions:

- (a) Line erection rules must be strictly followed. Additional poles may be erected for better support to optical fibre cable & to avoid sharp curves & bends.
- (b) Span lengths should be reduced to avoid sags in case of steep slopes.

3. Installation of ADSS on New poles

3.1 Tension Poles

Tension poles are dead end or termination poles. The tension poles shall have dead end fittings. The dead end fittings offer a continuous run of the aerial optical fibre cable. These fittings relieve the optical fibre cable of its compressive, bending & clamping stresses. The performed dead end fittings are suitably gritted for excellent tensile holding strength.

3.1.1 Selection of Tension Poles

Selection of tension poles depends upon the actual site location of the route. Every fifth pole should be a tension pole in straight alignment. Splicing location poles should

be tension poles or wherever alignment takes a sharp turn (more than 15 degrees) should also be a tension pole.

3.2 Suspension Poles

The suspension pole assembly is designed to offer cushion to aerial optical fibre cable against the dynamic stress of Aeolian vibration at the suspension point. They also reduce static stresses at the Support point.

3.3 Selection Poles

Selection of suspension poles also depends upon actual site location of route. All the intermediate poles between two tension poles will be suspension poles.

3.4 Selection of Splice location

The splice box of the aerial optical cable should be buried underground. Therefore it is necessary to fix & determine the splicing location as per the designated cable drum length.

3.5 Aerial optical Fibre Cable Specifications

1. Maximum span length : 90 metres (*Amendment No. 12.7*)
2. Maximum ice loading : 1 Kg per meter
3. Operational wind velocity : 75Kms per hour
4. Maximum sag allowed : 2% of span length
(without excess load)
5. Maximum sag allowed : 3% of span length
(with excess load)
6. Temperature range :
 - operation & storage : -30 to +70 degree C
 - installation : -15 to +50 degree C
7. Minimum bend radius : 2D (D-Dia of cable)
8. Tensile force
 - During installation : $9.81 \times 1.3 \times w$
 - Permanent with ice & wind load: $9.81 \times 3 \times w$
 - (where **w** is the mass of 1 km length of cable, in kg)

3.6 Type of Accessories and Fixtures

3.6.1 FORMED OFC DEAD END AND TERMINATION FITTINGS:

These fittings are used at tension/termination poles (dead end poles), or poles where splices are located and the poles where the overhead alignment takes a turn, (angle exceeding more than 15 degrees) as shown in fig. 1.

(a) J-SHAPED TENSION HOOK

J - Shaped tension hook is for the installation on cross arm channel C (C-Bracket) of the poles as shown in fig. 2.

(b) TURN BUCKLE

Galvanized forged steel turn - buckle is used at the dead end and at tension positions (for adjusting the sag & tension) as shown in fig. 3.

(c) EXTENSION LINK:

Galvanized steel extension link is used along with turn buckle as shown in fig. 4.

(d) CLEVIS THIMBLE:

Aluminium alloy die cast thimble is used to attach the extension link and for accommodating the loop of the helically formed terminating helix at the other and its smooth internal contour as shown in fig.5.

(e) PROTECTIVE HELIX (T):

Set of aluminium alloy helically formed protective helix having predetermined spiral shape is used & making them conveniently applied on the optical fibre cable without excessive clamping pressure at any point. See fig. 6.

(f) TERMINATING HELIX:

Helically formed terminating helix of Aluminized steel having a prefabricated loop shall be to fit into the grooved contour of the thimble and for fixing over protective helix over the optical fibre cable. See fig. 7.

(g) JUMPER CABLE CLAMP:

Galvanized steel jumper cable clamp is used to support the through length of optical fibre cable at the intermediate tension poles as shown in fig. 8.

(h) POLE MOUNTED STAY CLAMP (TUBULAR) OR POLE MOUNTED STAY CLAMP (RAIL)

Galvanized mild steel pole mounted stay clamp should be used at the pole for the fixing with a twisted eye & turn buckle; see figs. 9 & 10.

The selection of the type of stay clamp will depend upon the type of poles.

3.6.2 OFC SUSPENSION FITTINGS:

Helically formed suspension fittings along with the elastomeric pads inserts strapped by a galvanized steel eye-band is used to hang from the twisted eye-link connected to a pole mounted stay clamp or on the tension hook (J-shaped) installed on the C bracket at the intermediate poles as shown in fig. 11.

(a) TIWSTED EYE LINK:

The twisted eye link is used for installing suspension fitting on stay clamp or on tension hook as shown in fig. 12.

(b) PROTECTIVE HELIX (S)

Set of aluminium alloy helically formed protective helix having predetermined spiral shape is used & making them conveniently applied on the optical fibre cable without excessive clamping pressure at any point. See fig. 13.

(c) ARMOUR GRIP HELIX:

Set of aluminium alloy armour grip helix is used or fixing on the profile shaped elastomer pad for proper strut action, grip & bird caging as shown in fig, 14.

(d) SUSPENSION CLIPPER WITH ELASTOMER PAD:

Set of suspension clipper (made of aluminium alloy permanent mould die cast split type clamp) is used to support the elastomer pad inserts & is strapped by a galvanised steel eye-band in order to hang from a twisted eye-link connected to a pole mounted stay clamp or tension hook as shown in fig. 14.

(e) SPIRAL VIBRATION DAMPER (SVD)

Helically formed spiral vibration dampers are used on both sides of suspension fittings as shown in fig. 15.

3.6.3 DEMOUNTABLE PULLEY:

Demountable pulleys are used during the installation of aerial optical fibre cables see fig.16.

These are made from mild steel & the contour of the wheel is coated with rubber or any other suitable material for free movement of cable.

3.6.4 MATERIAL REQUIREMENT OF INSTALLATION ACCESSORIES AND FIXTURES:

(a) FOR DOUBLE TENSION POLES:

	DESCRIPTION	QUANTITY
1.	J-shaped tension hook (For C-bracket)	2
2.	Turn buckle	2
3.	Extension link	2
4.	Clevis thimble	2
5.	Protective helix (T)	2 sets
6.	Terminating helix	2 sets
7.	Jumper cable clamp	
8.	a) Pole mounted stay clamp(Tubular)	1 (Pole having C-bracket)
	b) Pole mounted stay clamp (Tubular) bracket)	2(Pole without C-

OR

a) Pole mounted stay clamp (Rail)	1(Pole having C- bracket)
b) Pole mounted stay clamp (Rail)	2 (pole having C-bracket)

(b) FOR SUSPENSION (INTERMEDIATE POLES)

DESCRIPTION	QUANTITY
a) Pole mounted stay clamp (Tubular)	
b) Pole mounted stay clamp (Tubular)	7
OR	
a) Pole mounted stay clamp (Rail)	
b) Pole mounted stay clamp (Rail)	
Twisted eye link	1 set
Suspension clamp consisting of the following:	
Protective Helix (S)	1 set
Wear grip helix	
Suspension clipper with elastomer pad etc.	1 set
Vertical vibration damper	
Shaped tension hook	1 (Pole with C-bracket)
Remountable pulley	One per pole in the splice section

Note: The ADSS accessories to be used shall be Helix type-I as per GR.no. 87060: 2017. The type of pole clamp to be used shall depend on type of poles and optical fiber cable used in the network; to ascertain the required SLA.

(Amendment No. 12.11)

3.7 ENTRY OF THE O.F. CABLE IN THE BUILDING:

Normal methods for leading in and precautions recommended for leading-in of the optical fibre cable should be followed. A conduit pipe should be laid for leading-in the O.F. cable inside the building; the cable may also be taken directly from the nearby O/H pole to inside of the building for termination.

- (a) Before the installation the O.F. cable should be tested.
- (b) As per requirement install the additional new poles.
- (c) Each pole should be checked for its strength. Provide extra stays if more strength is required.

- (d) The Aerial O.F. Cable is recommended to be installed on the outermost hole of bracket towards road on the existing bracket/new bracket on the poles.
- (e) Replace weak and other poles for clear ground clearance and strength as per the field conditions.
- (f) Provide ground clearance of 12 feet in non-obstructing areas.
- (g) Raise the height to minimum 16 feet at all the road crossings.
- (h) Maintain the alignment as straight as possible.
- (i) Construct splice chambers.

3.8 SPLICE LOCATIONS:

The field splices should be buried underground. The cable should be brought down through a 40mm dia GI pipe clamped on the pole. Proper bends (120-135 degree) are recommended for negotiating the bend. Wooden/hard rubber bushes shall be used at the entry and exit points of the GI pipe to avoid damage to the cable. A splice chamber as per the standard practice shall be made.

The selection of the splice point shall depend upon the availability of space and the cable length.

Wherever, burying of splice closure is not possible, the same be installed on the poles with proper clamping with the approval of BSNL.

3.9 CALCULATION OF SECTION LENGTH:

Aerial O.F. cable is supplied as per TEC GR in a length of 2 Kms $\pm$ 10%.

To arrive at the section length and allocating a particular reel of the cable to a particular section following consideration are required.

Strength Length:

- Actual section length measured.
- Allowance for sag 2% for each span length.
- Cable at each through tension pole (4 meters).
- Extra spare cable for coiling at the splice location (10 meters).

3.10 INSTALLATION MATERIAL REQUIRED DURING INSTALLATION

1. Demountable pulleys	:	1 each for each pole in the installation section
2. Jack for cable drum	:	1 set
3. Ladders	:	For each pole
4. Tools	:	Screw drivers C&T pliers Spanner set & hammer etc.

5. Manila rope 12 mm dia	:	250 meters
6. Cable pulling winch machine with tension monitoring device	:	1
7. Anti twist device	:	1
8. Cable pole fork	:	10
9. Flat twin open type cable grip	:	2

3.11 INSTALLATION OF AERIAL OPTICAL FIBRE CABLE

The following steps are recommended:

- (a) Install the accessories and fixtures as per the requirement of the individual poles it tension and suspension fittings.
- (b) Install the demountable pulley on all the poles in the section before pulling the cable.
- (c) Keep the cable drum over the jack near the 1st pole at the beginning of the section.
- (d) Attach anti twist device and the shackle hook along with the rope to the front and of the cable on pulling eye or on the cable grip. Carry the attached rope over the demountable pulleys for pulling the cable.
- (e) Depute one person at each pole to monitor and in case it is required to guide the cable over the demountable pulley during pulling operation.
- (f) The cable should be pulled till the cable reaches the last pole of the section.
- (g) Wherever in the pulling section; through pulling is difficult; half section or one fourth, action pulling method may be adopted by using figure of a techniques.
- (h) The feeding and pulling of the cable should be synchronized by using communication link. Care is required to be taken so that the cable is not accumulated at any one point during pulling operation and sharp bends are avoided.
- (i) Once the cable reaches the other end actual tensioning of the cable and fixing the installation of the accessories and fixtures shall be taken up with the help of cable pulling winch. The pulling tension must be monitored during tensioning.
- (j) Install the tension fittings and accessories at the 1st pole.
- (k) Fix a flat twin open type cable grip on the cable after tension pole for tensioning the cable in the preceding tension section.
- (l) The cable shall be tensioned to a tension of 1-3 to 1-6 times of the cable weight. The sag shall be monitored and kept between 0.25 to 0.5% of the span length.
- (m) The cable should be lifted between two poles by using cable pole fork during tensioning and fixing of the cable.
- (n) During the fixing operation the cable shall remain under required tension for minimizing the sag in the splice section.

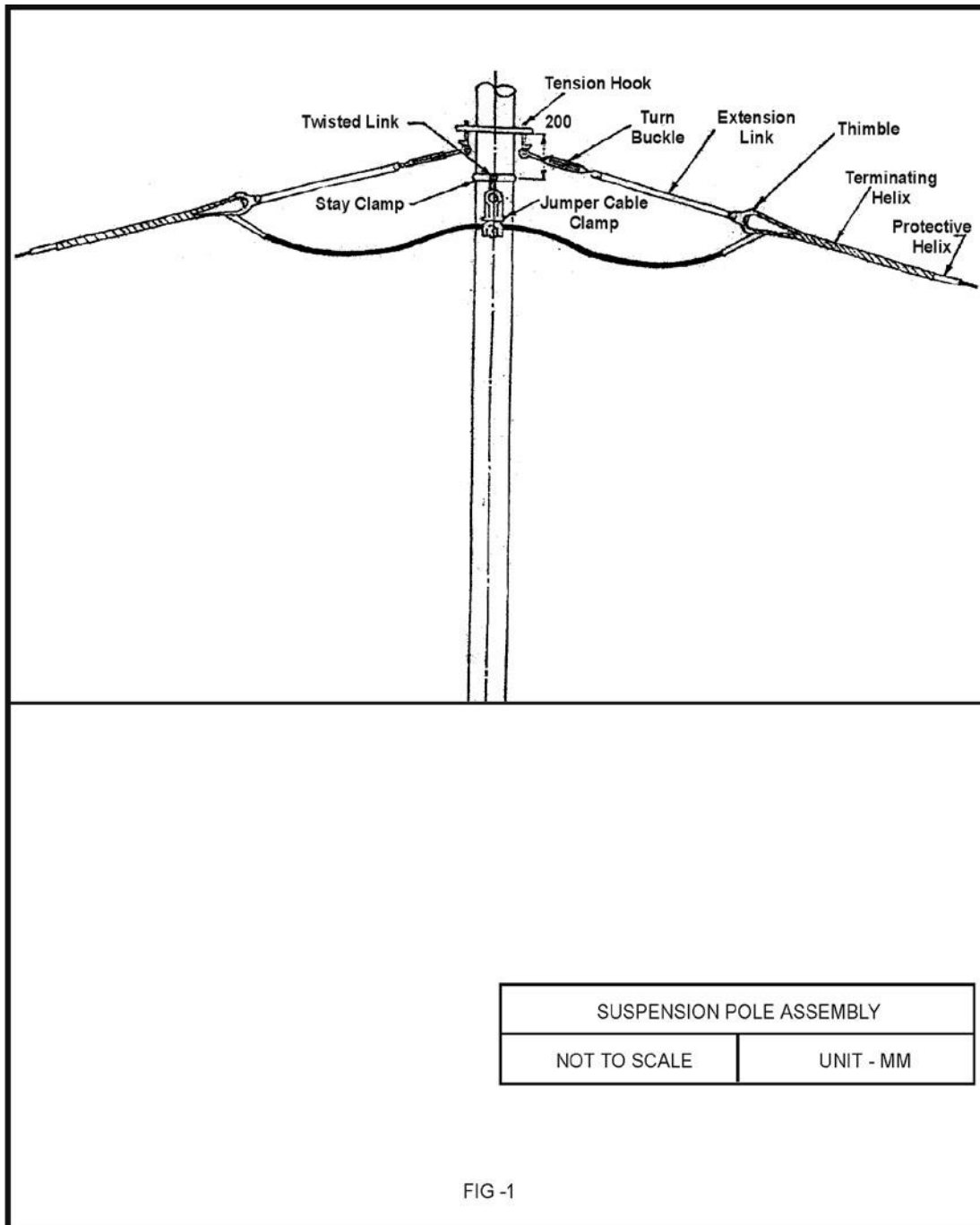
- (o) Now install tension fitting and accessories at the all tensioned pole at the end of the tension section.
- (p) Install the suspension fitting and accessories on the intermediate poles in the tensioned section.
- (q) Similarly installation should be carried out in each tension pole in the entire section and the tension and suspension fittings are in stalled.
- (r) At the Through tension poles the cable shall be kept loose and shall be supported by cable jumper clamp.
- (s) At the end pole where the cable reel is kept; the cable to be taken through GI pipe (fixed to the pole) to the splice location.
- (t) Extra care for the aerial O.F. cable may be taken at the bends and at entry and at the exit of the pipe. About 10 meters of cable shall be kept at the splice location for coiling (spare cable) and jointing requirement.
- (u) Test the installed OF cable.
- (v) Coil the OF cable and keep it safe in the splice location for splicing.

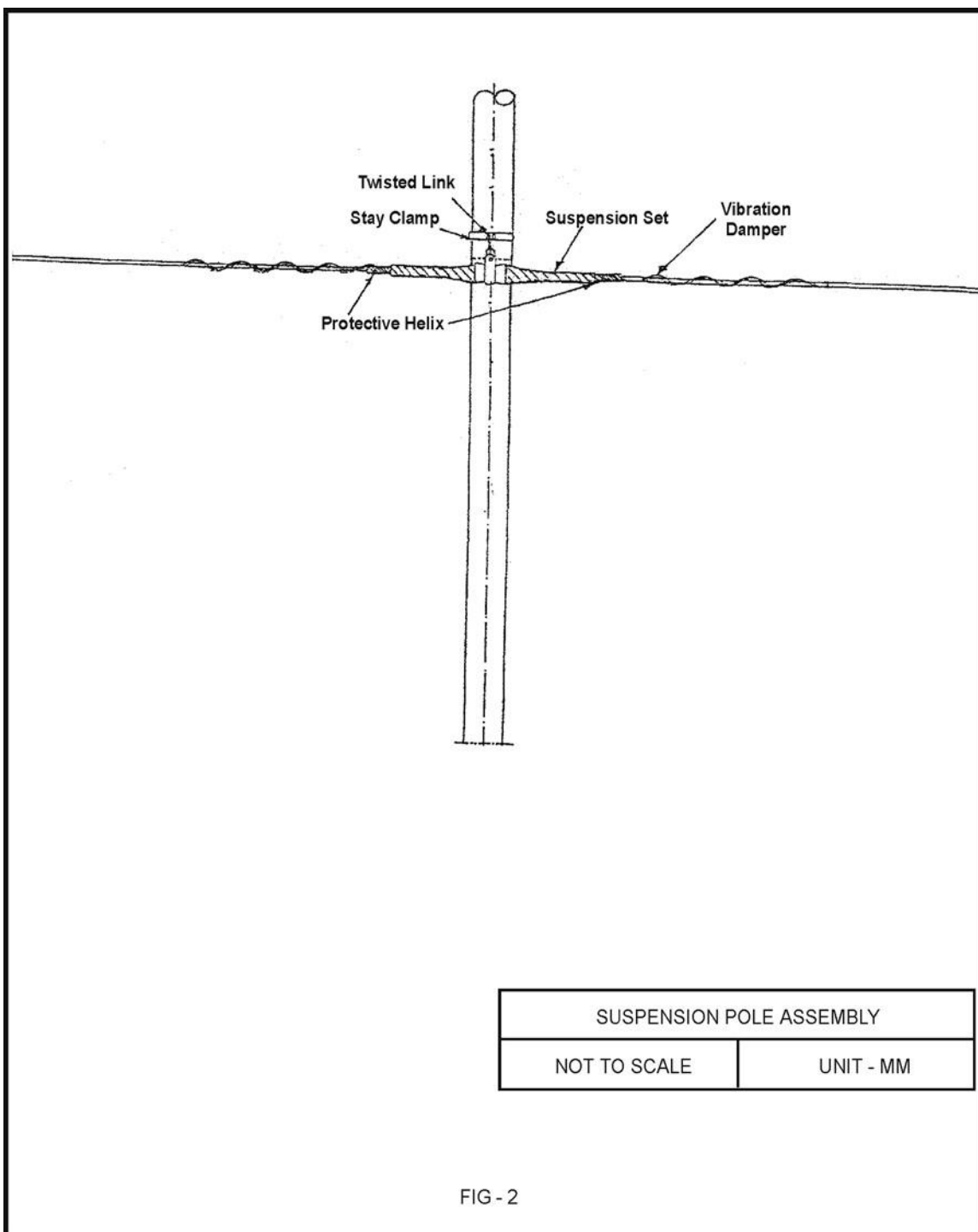
3.12 PECAUTIONS

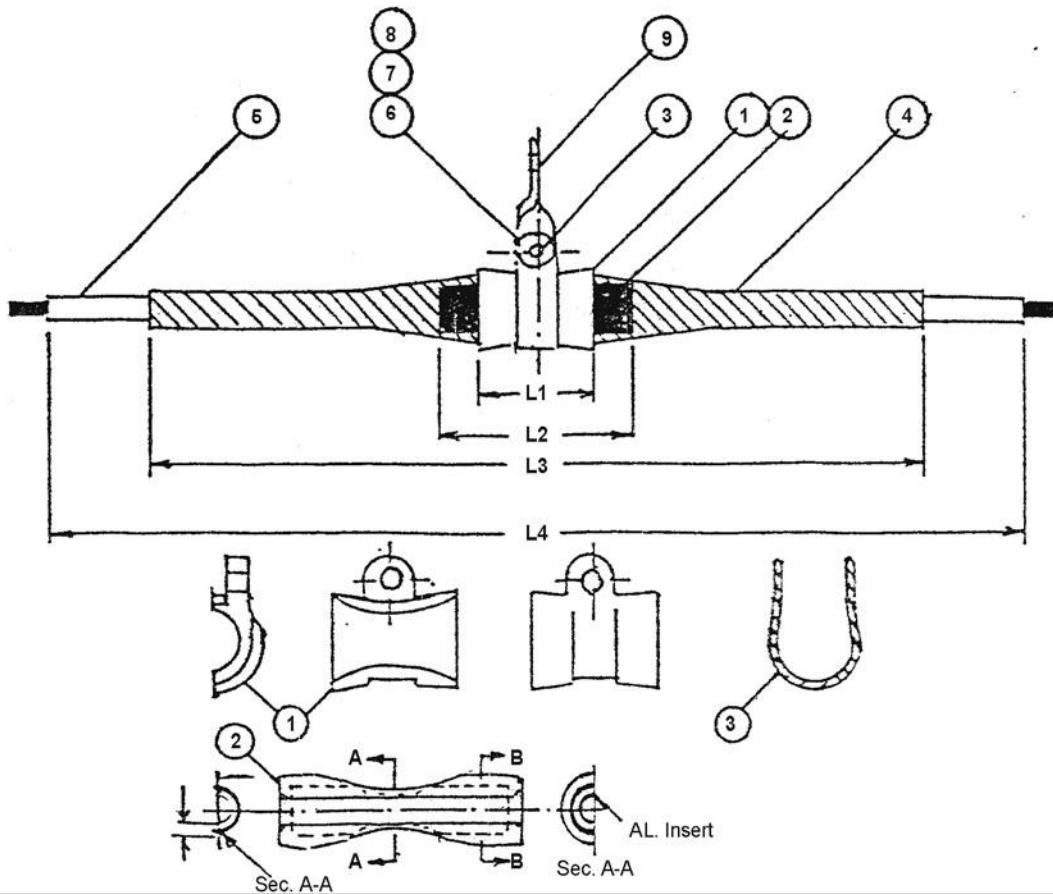
- (a) Provide display boards.
- (b) Provide sufficient number of road sign and traffic cones.
- (c) Avoid sharp bending of the OF cable during installation.
- (d) The OF cable should not be given extra tension than the permissible tension limits.
- (e) While crossing the overhead electric installations, safety measures should be taken. Also provide guard wire.
- (f) To avoid man made damages, safety measures should be taken for each pole.

3.13 REFERENCE

TEC GR on Planning Guidelines and the Installation Practices for the installation of self supporting metal free aerial optical fiber cable.







(FOR EXAMPLE)

DIMENSIONS :- CABLE SIZE - 14.4 MM DIA.

CABLE DIA	L1	L2	L3	L4	COLOUR CODE	DIA AGS. ROD
14.4	115	200	800	1400	BROWN	4.25± 0.1

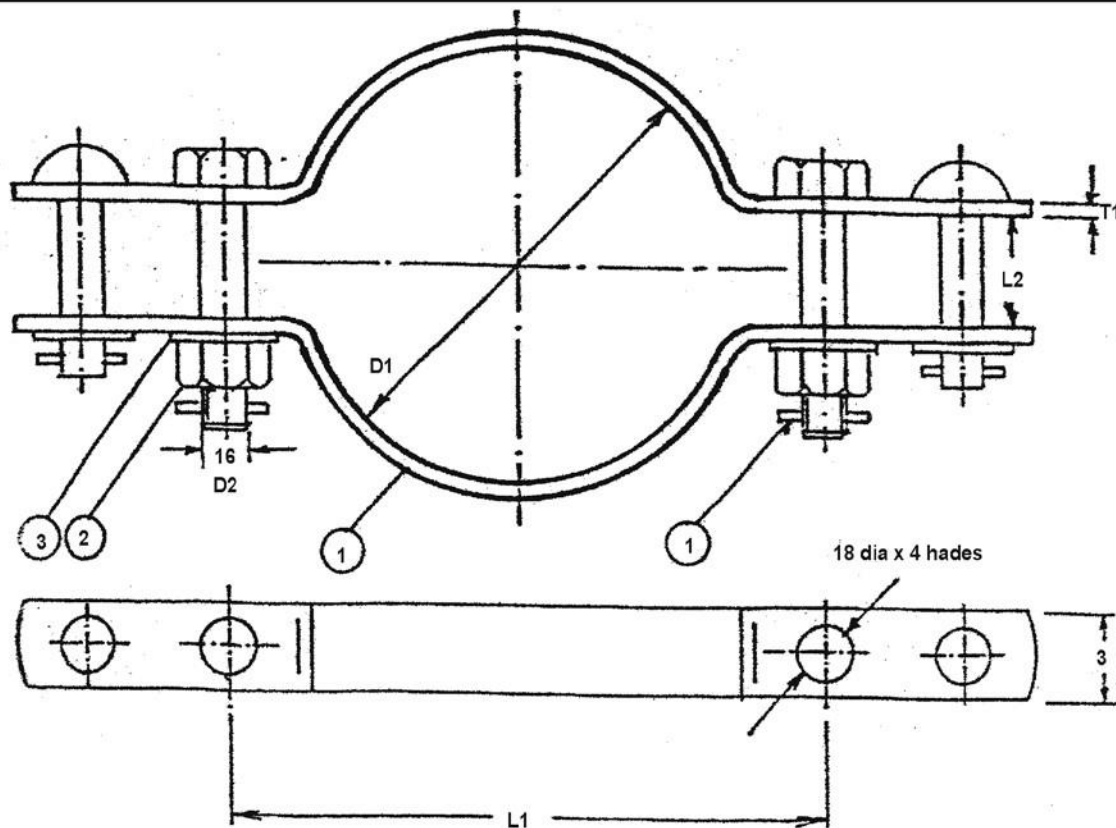
NOTE :- DIMENSIONS FOR DIFFERENT CABLE SIZES TO BE DECIDED AFTER TYPE TEST APPROVAL
INSERT DIMENSIONS IN MM

INNER DIA.	AT - A - A	AT - B - B
	22	22
OUTER DIA.	33	60

DESCRIPTION	MATERIAL	REF. Spec.	Qty.
1 CLAMP	ALUMINIUM ALLOY GDC	IS : 617	1 SET
2 INSERTS) SUSPEN. CLIPPER	POLYCHLOROPRENE COMPOUNDED	1 PAIR	1 PAIR
3 STRAP	ALUMINIUM ALLOY	IS : 617	1
4 AGS HELIX	ALUMINIUM ALLOY 6061		1 SET
5 PROTECTIVE HELIX	ALUMINIUM ALLOY 6061		1 SET
6 RIVET M 16	MILD STEEL GALVANISED	IS : 2062	1
7 FLAT WASHER	MILD STEEL GALVANISED	IS : 2016	1
8 SPLIT PIN	STAINLESS STEEL	IS : 2549	1
9 TWISTED EYE	MILD STEEL GALVANISED	IS : 2062	1

ARMOUF GRIP SUSPENSION SET
NOT TO SCALE UNIT - MM

FIG - 3



POLE MOUNTED STAY CLAMP (RAIL)

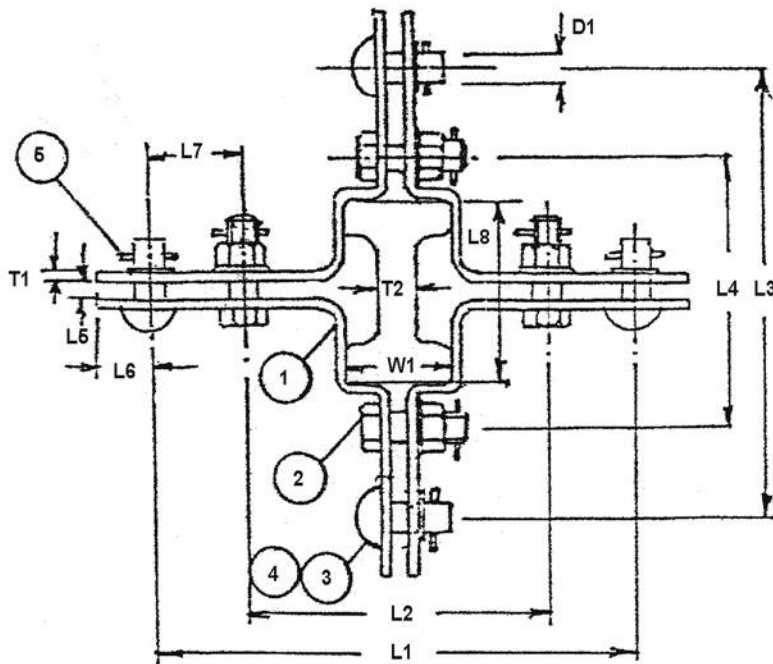
L1	L2	L3	L4	L5	L6	L7	L8	T1	T2	D1	W1
270	170	251	151	20	32	50	120	5	20	16	60

NOTE :- TOLERANCE SHALL BE AS PER IS : 2102
(DETAIL AS PER GR UNLESS UNTILL SPECIFIED)
HOT dIP Galvanised as per is : 2629

DESCRIPTION	METERIAL	REF. Spec.	Qty.
1 CLAMP	MILD STEEL GALVANISED	IS : 2062	1 SET
2 BOLT & NUT M 16	MILD STEEL GALVANISED	IS : 1363	2
3 RIVET 16	MILD STEEL GALVANISED	IS : 2016	2
4 WASHER	MILD STEEL GALVANISED	IS : 2016	4
5 SPILT PIN	STAINLESS STEEL	IS : 549	4

POLE COLLAR CLAMP	
NOT TO SCALE	UNIT - MM

FIG - 4



DIMENSIONS IN MM :
POLE MOUTED STAY CLAMP TUBULAR

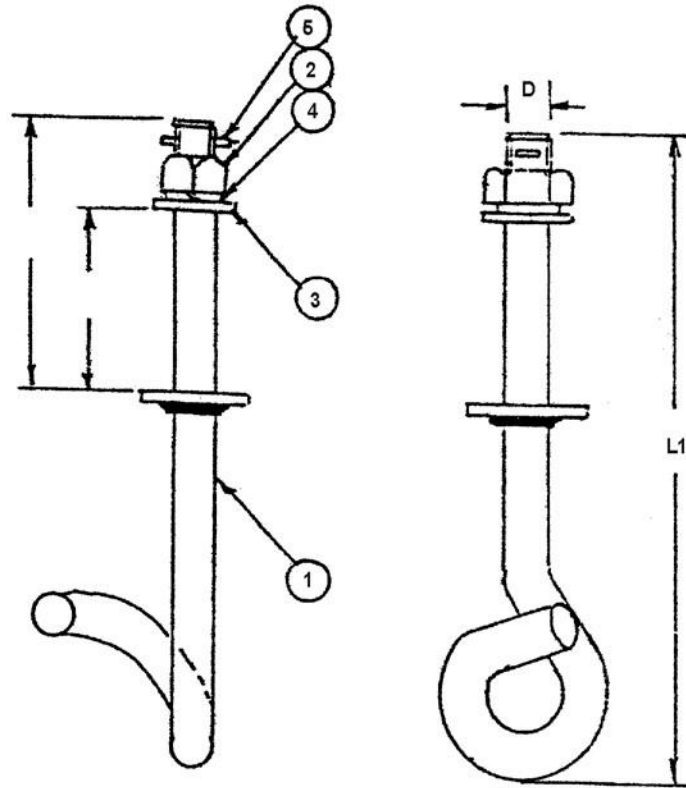
L1	L2	D1	D2	T1	W
210	20	150	16	5	30

NOTE :- TOLERANCE SHALL BE AS PER IS : 2102
(DETAIL AS PER GR UNLESS UNTILL SPECIFIED)
HOT DIP GALVANISED AS PER IS : 2629

DESCRIPTION	METERIAL	REF. Spec	Qty.
1 CLAMP	MILD STEEL GALVANISED	IS : 2062	1 SET
2 BOLT & NUT M 16	MILD STEEL GALVANISED	IS : 1363	4
3 RIVET 16	MILD STEEL GALVANISED	IS : 2016	4
4 WASHER	MILD STEEL GALVANISED	IS : 2016	8
5 SPILT PIN	STAINLESS STEEL	IS : 549	8 SET

POLE COLLAR CLAMP (R)	
NOT TO SCALE	UNIT - MM

FIG - 5



DIMENSIONS IN MM :

L1	L2	L3	D
177	75	50	12

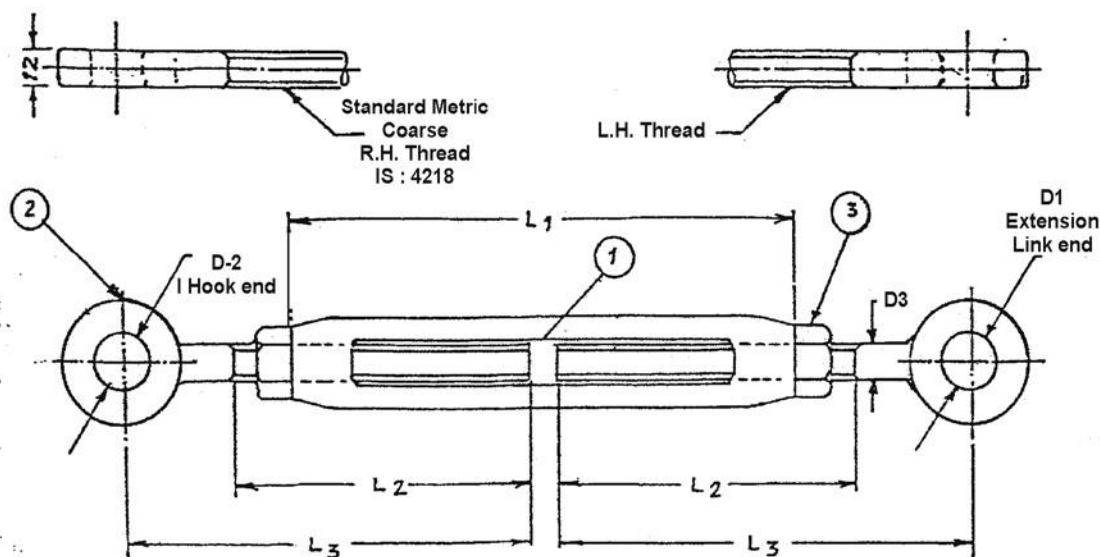
NOTE :- TOLERANCE SHALL BE AS PER IS : 2102
(DETAIL AS PER GR, UNLESS UNTILL SPECIFIED)

TO BE USED HERE C-BRACKET IS AVAILABLE ON POLE FOR FITMENT OF TENSION HOOK
HOT DIP GALVANISED AS PER IS : 2629

DESCRIPTION	MATERIAL	REF. Spec.	Qty.
1 BODY	ALLOY STEEL GALVANISED	IS : 2004	1
2 NUT	MILD STEEL GALVANISED	IS : 1363	1
3 PLAIN WASHER	MILD STEEL GALVANISED	IS : 2016	1
4 SPRING WASHER	SPRING STEEL GALVANISED	IS : 3063	1
5 SPLIT PIN	STAINLESS STEEL	IS : 549	1

TENSION HOOK	
NOT TO SCALE	UNIT - MM

FIG - 6



DIMENSIONS IN MM :

L1	L2	L3	D1	D2	D3
170	100	140	18	18	12

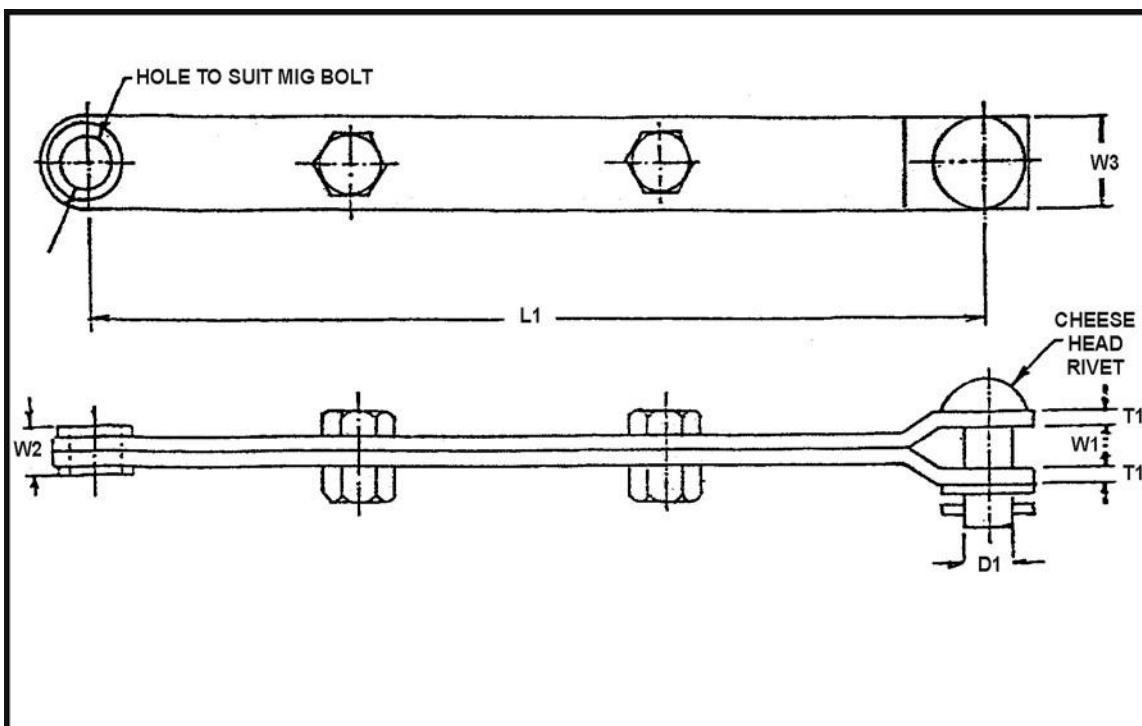
NOTE :- TOLERANCE SHALL BE AS PER IS : 2102
(DETAIL AS PER GR, UNLESS UNTILL SPECIFIED)

MIN. LENGTH : 290 MM
MAX. LENGTH : 400 MM
RANGE OF ADJ. : 110 MM
HOT DIP. GALVANISED AS PER IS : 2629

DESCRIPTION	METERIAL	REF. Spec.	Qty.
1 BODY	MILD STEEL FORGED GLAV.	IS : 2004	1
2 NUT BOLT	MILD STEEL FORGED GLAV.	IS : 2062	2
3 NUT	MILD STEEL	IS : 1363	2

TURN BUCKLE	
NOT TO SCALE	UNIT - MM

FIG - 7



DIMENSIONS IN MM :

L1	T1	W1	W2	W3	D1
465	5	14	16	30	16

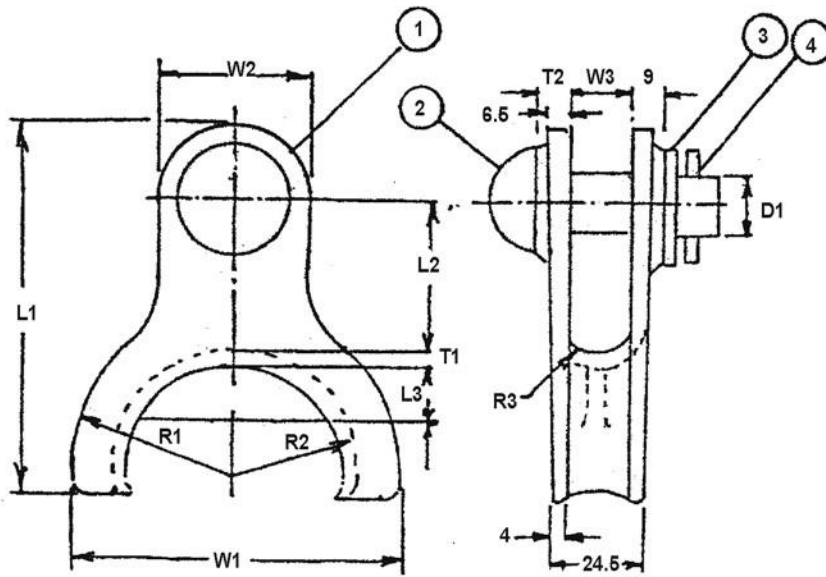
NOTE :- TOLERANCE SHALL BE AS PER IS : 2102
(DETAIL AS PER GR, UNLESS UNTILL SPECIFIED)

HOT DIP GALVANISED AS PER IS : 2629

DESCRIPTION	METERIAL	REF. Spec.	Qty.
1 STRAP	MILD STEEL GALVANISED.	IS : 2067	1
2 RIVET & WASHER	MILD STEEL GALVANISED	IS : 2016	1
3 SPLIT PIN	STAINLESS STEEL	IS : 549	1
4 BOLT & NUT M 16	MILD STEEL GALVANISED	IS : 1363	1

EXTENSION LINK	
NOT TO SCALE	UNIT - MM

FIG - 8



DIMENSIONS IN MM :

L1	L2	L3	T1	T2	R1	R2	R3	W1	W2	W3	D1
102	42	15	4	9	23	15	8	92	40	18	16

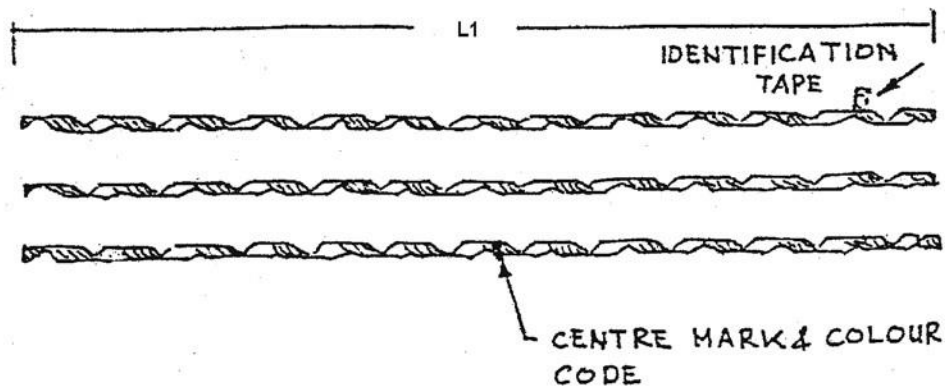
NOTE :- TOLERANCE SHALL BE AS PER IS : 2102
(DETAIL AS PER GR, UNLESS UNTILL SPECIFIED)

FEROUS PARTS ARE HOR DIP GALVANISED
AS PER IS : 2629

DESCRIPTION	METERIAL	REF. Spec.	Qty.
1 CLAMP	ALUMINIUM ALLOY GDC.	IS : 617	1
2 RIVET M16 x 45	GALV. STEEL	IS : 2016	1
3 WASHER	GALV. STEEL	IS : 2016	1
4 SPLIT PIN	STAINLESS STEEL	IS : 549	1

CLEVIS THIMBLE	
NOT TO SCALE	UNIT - MM

FIG - 9



FOR EXAMLE
DIMENSIONS (FOR CABLE SIZE, D - 14.4 MM)

- I. DIA OF EACH WIRE - 3.2 ± 0.1
- II. NO. OF SETS - 3
- III. NO. OF WIRE PER SET - 5
- IV. LENGTH OF HELIX - 1400

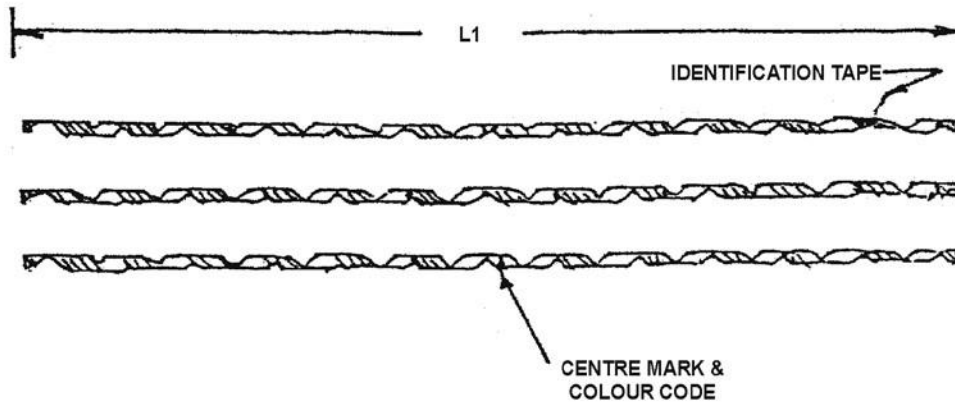
DIMENTION DETAILS FOR OTHER CABLE SIZE SHALL BE INDICATED BY THE
MANUFACTURER INCLUDING THE PITCH OF HELIX

NOTE : ENDS OF RODS SHALL BE DEBURRED TOLERANCE SHALL BE AS PER IS : 2102
(DETAIL AS PER GR, UNLESS UNTILL SPECIFIED)

DESCRIPTION	METERIAL	REF. Spec.	Qty.
1 PROTECTIVE HELIX	ALUMINIUM ALLOY 6061		

PROTECTIVE HELIX (S)	
NOT TO SCALE	UNIT - MM

FIG - 10



FOR EXAMLE
DIMENSIONS (FOR CABLE SIZE, D - 14.4 MM)

- I. DIA. OF EACH WIRE - 3.2 ± 0.1
- II. NO. OF SETS - 3
- III. NO. OF WIRE PER SET - 5
- IV. LENGTH OF HELIX - 1000

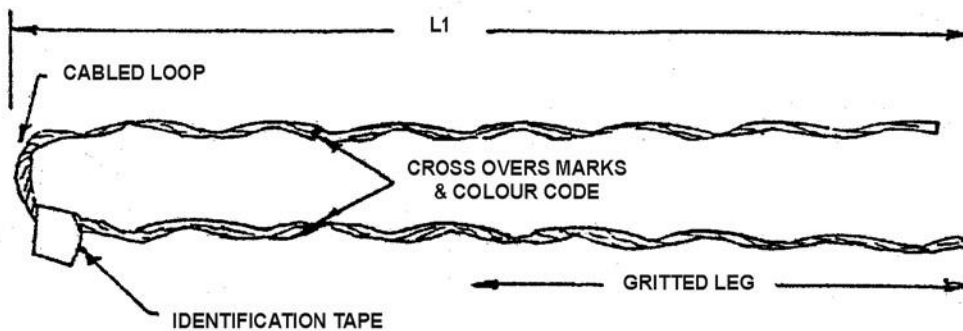
DIMENTION DETAILS FOR OTHER CABLE SIZE SHALL BE INDICATED BY THE
MANUFACTURER INCLUDING THE PITCH OF HELIX

NOTE : ENDS OF RODS SHALL BE DEBURRED TOLERANCE SHALL BE AS PER IS : 2102
(DETAIL AS PER GR, UNLESS UNTILL SPECIFIED)

DESCRIPTION	METERIAL	REF. Spec.	Qty.
1 PROTECTIVE HELIX	ALUMINIUM ALLOY 6061		

PROTECTIVE HELIX (T)	
NOT TO SCALE	UNIT - MM

FIG - 11



DIMENSIONS
FOR EXAMPLE

L1	T1
1000	2.2±0.1

D IS DIA OF EACH WIRE ROD
NO. OF WIRES USED 5

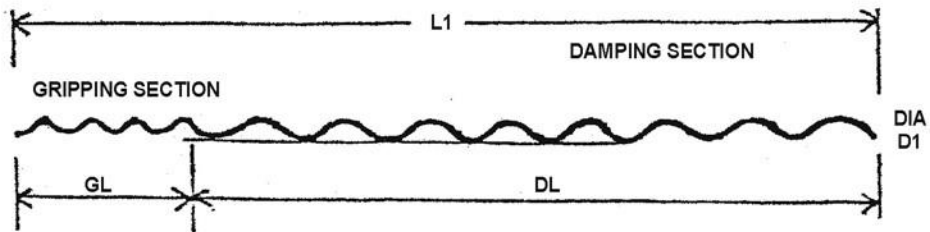
NOTE : TOLERANCE SHALL BE PER IS : 2102
(DETAIL AS PER GR, UNLESS UNTILL SPECIFIED)

DIMENSION DETAIL FOR DIFFERE CABLE SIZES TO BE DECIDED AP TYPE TEST APPROVAL
FOR EXAMPLE CABLE SIZE
ENDS OF RODS SHALL BE DEBUR LENGTH OF TERMINATING HELIX 1000 MM,
TER MINATING HELIX TO BE USED WITH THIMBLE C DIA - 14.4 MM

DESCRIPTION	METERIAL	REF. Spec.	Qty.
1 DEADEHD GRIP	ALUMINISED STEEL		

TERMINATING HELIX	
NOT TO SCALE	UNIT - MM

FIG - 12



DIMENSIONS IN MM

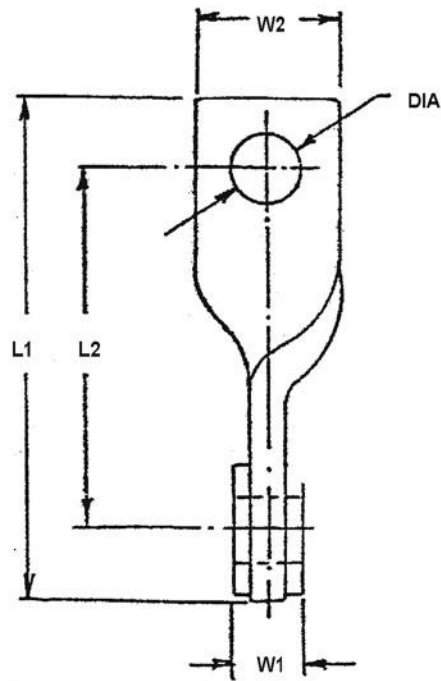
L1	GL	DL	D1
1346	446	900	12 $\pm$ 1

NOTE : TOLERANCE SHALL BEAS PER IS : 2102
(DETAIL AS PER GR, UNLESS UNTILL SPECIFIED)

DESCRIPTION	METERIAL	REF. Spec.	Qty.
1 SPIRAL VISRATION DAMPER	POLYVINYL COKPOUNDED		

SPIRAL VIBRATION DEMPER	
NOT TO SCALE	UNIT - MM

FIG - 13



DIMENSIONS IN MM

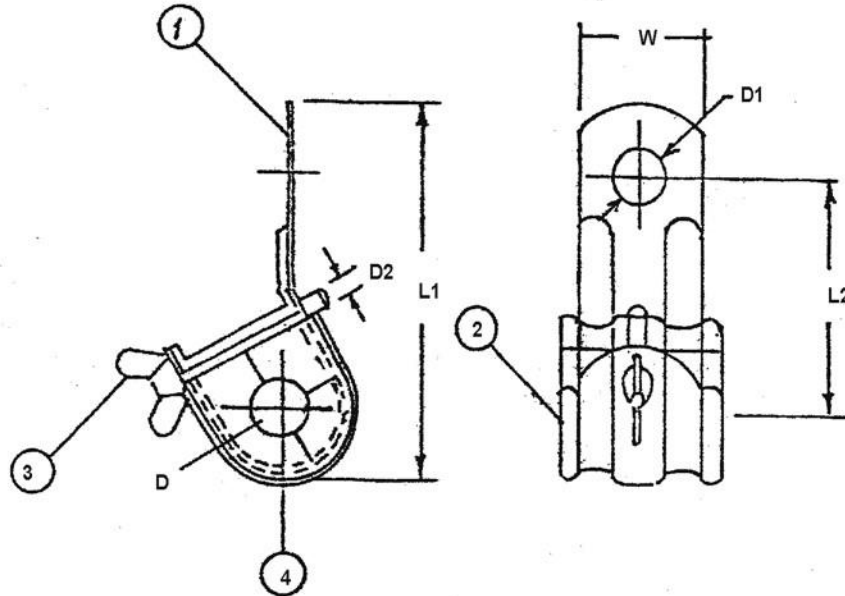
L1	L2	W1	W2	DIA
138	100	27	38	18

NOTE : TOLERANCE SHALL BE AS PER IS : 2102
(DETAIL AS PER GR, UNLESS UNTILL SPECIFIED)
HOT DIP GAVANISED AS PER IS : 2629

DESCRIPTION	METERIAL	REF. Spec.	Qty.
1 LINK	MILD STEEL	IS : 2062	1

TWISTED EYE LINK	
NOT TO SCALE	UNIT - MM

FIG - 14



DIMENSIONS IN MM

L1	L2	D1	D2	W
105	65	17.5	5-6	35

DIMENSIONS IN MM OF INSERT PAD

L	INNER DIA	OUTER DIA
40	15	30

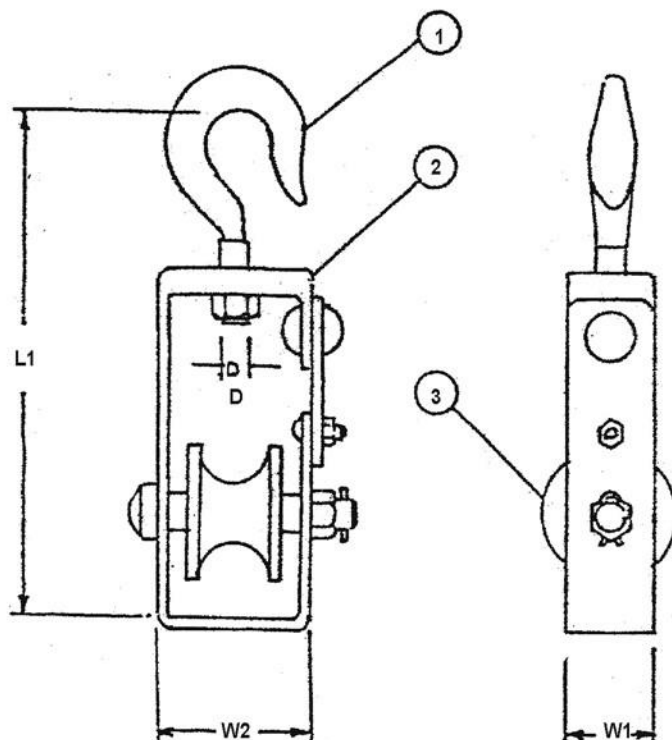
NOTE : TOLERANCE SHALL BE AS PER IS : 2102
(DETAIL AS PER GR, UNLESS UNTILL SPECIFIED)

INSERT IN TOW HALVES D TO SUIT CABLE DIA FERROUS PARTS ARE HOT DIP GALVASIED AS PER IS : 2629

DESCRIPTION	METERIAL	REF. Spec.	Qty.
1 STRAP	MILD STEEL GALY	IS : 2062	1
2 INSERT	POLYCHLORADPRENE COMPOUNDE	D	1
3 WING BOLT	MILD STEEL GALY	IS 2062	1

JUMPER CABLE CLAMP	
NOT TO SCALE	UNIT - MM

FIG - 15



DIMENSIONS IN MM

L1	W1	W2	D
280	50	92	12

NOTE : TOLERANCE SHALL BE AS PER IS : 2102
(DETAIL AS PER GR, UNLESS UNTILL SPECIFIED)
FEFFOUS PARTS ARE HOT DIP GALVANISED AS PER IS : 2629

DESCRIPTION	METERIAL	REF. Spec.	Qty.
1 HOOK	GALVANISED STEEL		
2 BODY	GALVANISED STEEL		1 SET
3 SPOOL	ALUMINIUM COATED NEOPRENE		

DEMOUNTABLE PULLEY	
NOT TO SCALE	UNIT - MM

FIG - 16

4. Post based, ADSS on LT/HT Electrical Poles

4.1 Overview

- (a) The location of the tensioner and puller relative to the structure must be selected so that the pole is not overloaded. Where possible, a pulling slope of 75° to 80° is considered good practice. This ratio will minimize the load on the cable, traveler, sheave, or quadrant block, and pole. It may be necessary to place temporary guys to prevent overloading support poles. The reel must be placed in-line with the first two poles of the run to prevent twisting of the cable or any damage to the cable caused by rubbing the sides of the traveler, sheave, or quadrant block groove.
- (b) Anchors and pole hardware must be rated above the expected environmental load of the cable, plus a safety factor. In installations where aeolian vibration could be an issue, the safety factor should be increased. At locations where the cable is tensioned to achieve proper sag, the pole may require a temporary down-guy and anchor to prevent overloading the pole.
- (c) Travelers, sheaves, or quadrant blocks are normally attached directly to the support pole. The pole attachment, used to support the traveler, sheave, or quadrant block must be consistent with the working load and rating of the traveler, sheave, or quadrant block.
- (d) The pulling grip shall be rated above the maximum pulling tension anticipated. Use the manufacturer's instructions for the proper application. When properly installed, no special preparation of the cable end, or aramid yarns, are required. A matching clevis type swivel should be used to help prevent twisting of the cable during pull-in. The swivel should be of the type that has a break-away tension less than or equal to the cable's rated maximum pulling tension to prevent over tensioning the cable.
- (e) Aeolian vibration is a resonant vibration caused by low velocity wind blowing across a cylindrical cable that is under tension. This vibration can cause severe degradation of the cable support hardware. Vibration dampers can be very effective in controlling aeolian vibrations when used on ADSS cable. Both resonant and interference type vibration control systems will work when properly applied.
- (f) Splice locations require additional cable be provided to accommodate lowering the cable to the ground with enough slack to allow splicing inside a splicing van or trailer.

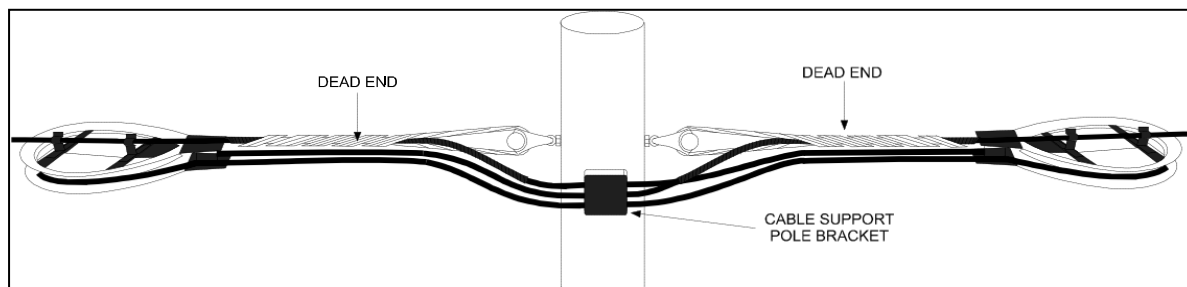


Figure: C – Cable Slack Storage

- (g) All slack cable storage locations require the installation of slack cable storage

brackets. The strand cable storage bracket insures a proper bending radius for the stored fiber optic cable and provides for horizontal storage and tiering for storage of multiple cables and loops. Figure 3 below illustrates slack cable storage.

4.2 ADSS Cable Support Hardware:

There are two general types of ADSS cable support hardware: dead ends and tangent assemblies.

4.2.1 Dead-end assemblies:

- (a) Deadend assemblies are used at the point of cable termination, or where the cable angle is greater than 20°. See Figure 4 below for illustration of a Deadend Assembly.
- (b) The Structural Reinforcement Layer (SRL) is a subset of armor rod that is the first layer applied to the ADSS cable. They are spiraled in a precise twist lay to match the diameter and load of a specific cable. They are normally grouped together in a sub-set of four to five rods, with grit applied to the inside for slip resistance.
- (c) The Deadend Grip itself is a set of armor rods that have been formed in a double spiral with a loop at one end. Its precise twist is designed to perfectly match the diameter of the SRL as it lay over the cable. The length of the deadend grip is dependent upon the maximum load. It too has grit applied to the inside for slip resistance.

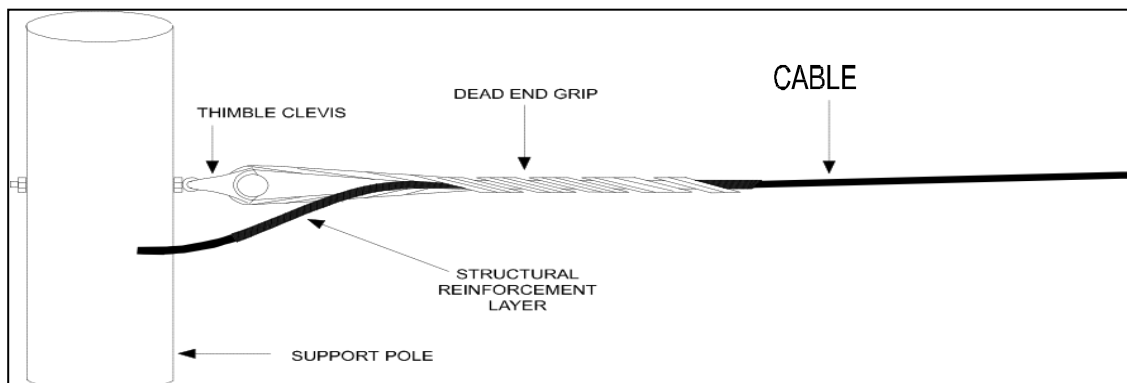


Figure: C – Cable Slack Storage

- (d) The Thimble Clevis is made of cast aluminum or steel and is used to maintain the seat diameter of the deadend loop.
- (e) The deadend hardware is assembled in the following manner:
 - (i) The SRL rod is assembled on the cable first. The end with the color band is assembled towards the end of the span. Wind on one set of rods at a time. The rods should be placed close together so that there is enough room for them all.
 - (ii) The tips of the SRL rods should align at the end. Do not force the rods or use tools to install them. Forcing the rods or using tools may damage the cable jacket.
 - (iii) Align the color band on the deadend with the color band on the SRL and wind one leg of the deadend on approximately two feet.

- (iv) Insert the thimble clevis into the loop.
- (v) Align the color band on the second deadend leg with the color band on the first deadend. Wind the second deadend leg over the SRL for approximately two feet. Continue winding the deadend legs over the SRL until both legs are snapped in place.
- (vi) Connect the thimble clevis to the hardware (or to the extension link and then the hardware) mounted on the pole

4.2.2 Tangent Assemblies:

Tangent hardware is normally installed after the span has been tensioned. Figure D below illustrates a front and side view of a Tangent Support. To install the cable, open the hinged top and insert the bottom pad. Then place the cable on the pad, place the top pad over the cable, close the top and tighten the bolt to hold the cable in place.

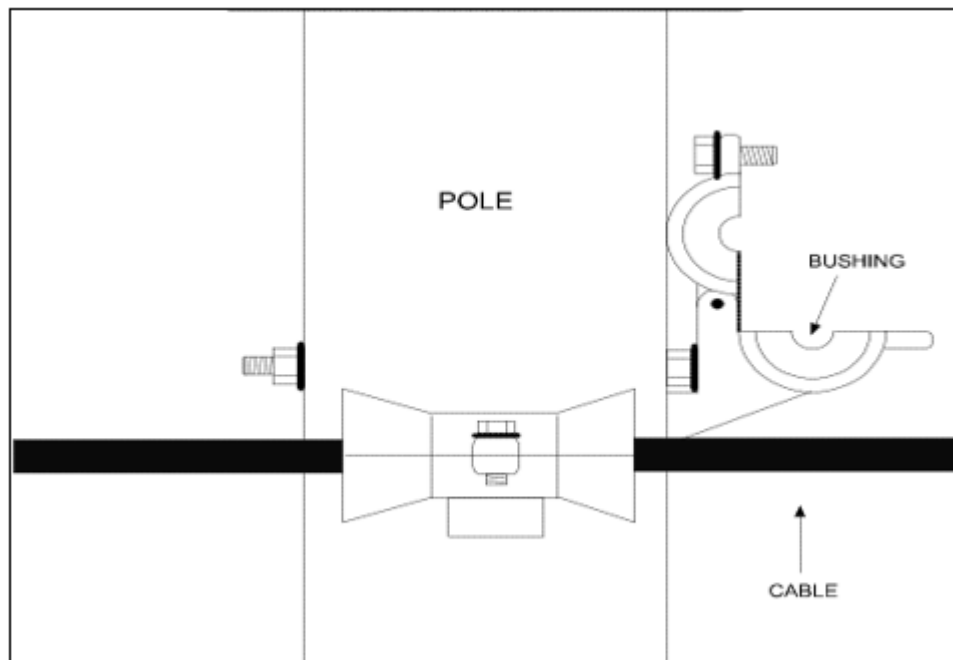


Figure: D

4.2.3 ADSS Sagging and Tensioning:

- (a) Upon completion of placing the entire run of cable, sagging and tensioning can now be started. Sagging and tensioning the run is worked progressively from one end of the run towards the opposite end. Normally the slack is worked back in the direction of the reel in order to recover as much cable as possible. Sagging and tensioning should be conducted according to the cable manufacturer's recommendations for the cable just installed.
- (b) The cable run is broken down into subsections for sagging and tensioning purposes. The last structure at each end of a section being sagged and tensioned is a deadend assembly. Remove all excess slack cable out of the section of the run being prepared for sagging and

tensioning. To remove the slack, reverse the tensioner and pull the cable back towards the reel, being careful not to exceed the minimum bending radius for the cable under tension.

- (c) Once the slack is out of the cable, install a temporary deadend on the cable approximately 2 deadend assembly lengths away from the support pole. This deadend will be used as a tensioning grip to achieve proper span sag and tension, prior to installing the permanent deadend assembly.
- (d) Attach the tensioning device: a chain hoist or power winch and a dynamometer between the pole and the temporary deadend. Begin to apply tension to the span.
- (e) The cable is normally tensioned from deadend to deadend along the span back to the reel. Once the spans are properly sagged and deadends attached, the suspension or tangent hardware is installed and attached to the poles by working back to the deadend one span at a time.
- (f) With a span's permanent deadend installed and the hardware attached to the poles, the pulling device can now have its tension released and the temporary deadends removed from the cable. When the next permanent deadend is installed on the adjacent span, make sure that the loop formed between the two deadends maintains the minimum bend radius for the cable. Repeat this operation until all spans are sagged and tensioned.

5. Conclusion

As All Dielectric Self-supporting Aerial Cable (ADSS) are made of brittle material, so it can't put too much strain and fiber diameter is very small, so its tensile strength is very weak. In choosing the cable hardware, the principle is not only to meet all the features and characteristics of the cable should be inclusive, but shall take into account the payment of grip strength with uniform, non-metallic sheath degradation, wear, vibration breeze, dancing, exceed the allowable bending stress and reverse parameters. Therefore, the general provisions are "Hardware's squeeze should not exceed with more than two cables design limits, hardware should not be designed for a range of diameters."

Abbreviations:

- 1. ADSS – All Dielectric Self Supporting optical fibre cable
- 2. MASS – Metal Free Aerial self supporting cable
- 3. OFC – Optical Fibre Cable
- 4. OPPC – Optical Phase Conductor
- 5. KV – Kilo Volt
- 6. LT – Low Tension
- 7. HT – High Tension
- 8. FTTH – Fibre To The Home
- 9. dB – decibel

- 10. Km – Kilometre
- 11. TEC GR – Telecommunication Engineering Centre (Department of Telecom, Govt of India) Generic Requirements.
- 12. IEEE – Institution of Electrical and Electronics Engineers
- 13. IEC – International Electro technical Commission

- 14. Aeolian vibration : Wind induced (Aeolian) vibrations of conductors and overhead shield wires (OHSW) on transmission and distribution lines can produce damage that will negatively impact the reliability or serviceability of these lines.

- 15. C- Bracket
- 16. D-Dia of cable
- 17. degree C : Degree Centigrade
- 18. EI : Engineering Instruction
- 19. OF cable : Optical Fibre Cable
- 20. SVD : SPIRAL VIBRATION DAMPER
- 21. TEC GR : Generic Requirements issued by the Telecommunication Engineering Centre New Delhi.

Annexure-D: Technical Specification for GIS Mapping of OFC Routes and Project Management Tool
(whole Annexure D as mentioned in Amendment No. 2)

1. General requirements

1.1 State NOC (S-NOC) Integration with Central NOC (C-NOC)

- PIA shall ensure integration of S-NOC with C-NOC including NMS and all EMSs, such as IP-MPLS routers, RFMS, mini-OLT, alternate technology, etc.
- PIA shall ensure seamless integration of S-NOC applications such as Fault management, Performance management and Trouble ticket management etc. with C-NOC.
- PIA shall establish mechanisms for real-time data synchronization between S-NOC and C-NOC applications. The integration shall be based on open APIs and event-based data shall be pushed by S-NOC to C-NOC on near real time basis.

1.2 Geographical Information System (GIS)

- PIA shall perform GIS based desktop planning, preliminary design, detailed video graphic survey, GIS data collection during execution for creation of digital As Built Drawing (ABD) on GIS.
- PIA shall collect and maintain the inventory of both physical and logical resources of OSP (outside plant - fibre, chamber, splice-closure, coupler etc.), ISP (Inside Plant: room, rack equipment's and their connectivity) and power infra.
- PIA shall maintain and store all details of deployed network infrastructure till the readiness of C-NOC. After readiness of C-NOC, PIA shall upload all GIS data.
- PIA shall upload all required GIS details such as data files, videos, photos, etc. on C-NOC GIS application.
- PIA shall provide all required information related to network to C-NOC for fibre inventory management.

Note: The specific functional criteria listed in clause no. 2 below for the GIS mapping of OFC routes.

1.3 Asset management

- PIA shall maintain a detailed inventory of all BharatNet network assets, including but not limited to routers, switches, OFC, RFMS and other infrastructure components. This inventory will be validated by the Independent Engineer (IE) and then approved by the BSNL.

- PIA shall manage the entire asset lifecycle of BharatNet infrastructure. PIA in consultation with BSNL shall assign unique identifiers or tags to network assets and infrastructure elements in the field, such as routers, switches, fibre cables, splice points, junction boxes, and termination points etc.

1.4 Project Monitoring

- PIA shall provide necessary inputs regarding the progress and status of the project implementation in the Project Monitoring tool to be deployed by BSNL. This input is crucial for creating and overseeing project schedules, milestones tracking, and monitoring of timelines within the project. The detailed requirements are given in clause no. 3 below.

1.5 Network Provisioning and Utilization

- The network shall enable retail, enterprise and wholesale services as per the requirement of BSNL.
- PIA shall provide all necessary support and facilitation to BSNL and designated service provisioning agencies for provisioning and monitoring of services from S-NOC.
- PIA shall be responsible for coordinating and assisting BSNL in provisioning and configuring network resources for effective network operations, service provisioning, assurance and utilization through retail or wholesale enterprise services such as FTTH, leased circuits, dark fibre and bandwidth leasing etc.

2. Functional requirements for GIS Mapping of OFC Routes

- Accuracy: sub meter level accuracy (20cm).
- Format: .shp format with mapping on Geography Coordinate System (GCS) projection system with WGS 84 datum.
- Codification and layer structure will be provided by BSNL. The PIA shall be responsible to create separate layers for all network elements as per the requirement. However, the indicative structure of the shape files for Block, GP, route markers and OFC layers are as given below:

Block Layer (indicative)			
SN	Field	Type	Description
1	Name	String	Block Name
2	Asset Type	String	Block
3	Blk_Name	String	Block Name
4	Blk_Code	String	Block Code
5	Dt_Name	String	District Name
6	Dt_Code	String	District Code
7	St_Name	String	State Name

Block Layer (indicative)			
SN	Field	Type	Description
8	St_Code	String	State Code
9	Lat	Double	Latitude
10	Long	Double	Longitude
11	Cable_Len	Double	Cable Length
12	Remarks	String	if any
13	Obs	String	Observation
14	Status	String	Editing Status/It should be blank
15	Block_ip	String	IP address of BLOCK
16	geo_photo	String	Photo with geo-location
17	Vendor	String	Name of vendor
18	Phase	String	1/2/3
19	Model	String	DBOM
20	Technology	String	IP-MPLS

GP Layer (indicative)			
SN	Field	Type	Description
1.	Name	String	GP Name
2.	Asset Type	String	GP
3.	Asset_Code	String	GP Code
4.	LGD_Code	String	LGD Code for Location
5.	Location	String	Location Name of GP
6.	Loc_Type	String	School, College, GP, PANCHAYAT BHAWAN etc.
7.	GP_Code	String	GP Code
8.	NMSBLOCK_CD	String	NMS BLOCK Code
9.	NMSGP_C D	String	NMS GP Code
10.	Blk_Name	String	Block Name
11.	Blk_Code	String	Block Code
12.	Dt_Name	String	District Name
13.	Dt_Code	String	District Code
14.	St_Name	String	State Name
15.	St_Code	String	State Code
16.	Lat	Double	Latitude
17.	Long	Double	Longitude
18.	Cable_Len	Double	Cable Length
19.	Remarks	String	Remarks from BSNL
20.	Obs	String	Observations
21.	Status	String	Editing Status/It should be blank
22.	Block_ip	String	IP address of Block
23.	GP_mac_id	String	Mac Id of GP
24.	Otdr_len	Double	Length in meters
25.	Conn_str	String	PIC-PON- GP ID
26.	GP_sr_no	String	Device serial no.
27.	Backhaul	String	OFC or R F / Sat

GP Layer (indicative)			
SN	Field	Type	Description
28.	geo_photo	String	Photo with geo-location
29.	Phase	String	1/2/3
30.	Route_code	String	New/Old

OFC Layer (indicative)			
SN	Field	Type	Description
1	Name	String	OFC Route name
2	Asset Type	String	Leased/Incremental
3	Asset_Code	String	Segment Code
4	Blk_Code	String	Block Code
5	Dt_Code	String	District Code
6	St_Code	String	State Code
7	CS	String	Cable Section
8	Seg_Length	Double	Route length
9	Start_Node	String	Starting Asset
10	S_Cable_Len	Double	Starting Cable Length
11	End_Node	String	Ending Asset
12	E_cable_Len	Double	Ending Cable Length
13	num_fibre	String	24/48
14	Status	String	Editing Status/ It should be blank
15	Remarks	String	Remarks from BSNL
16	Obs	String	Observations
17	Traverse	String	FIBRE POSITION e.g. 'U' For Underground, 'O' for Overhead
18	fibre_pos	String	Left/ Right of the road
19	Direction	String	Towards GP or Block
20	Phase	String	1/2/3
21	Route_code	String	New/Old

Route marker (indicative)			
S N	Field	Type	Description
1	Name	String	Route marker NAME
2	Type	String	Asset Type
4	Blk_Name	String	Block Name
5	Blk_Code	String	Block Code
6	Dt_Name	String	District Name
7	Dt_Code	String	District Code
8	St_Name	String	State Name
9	St_Code	String	State Code
10	Lat	Double	Latitude
11	Long	Double	Longitude
12	rd_Offset	Double	Offset from centre of the Road

Route marker (indicative)			
S N	Field	Type	Description
13	CS	String	Cable Section
14	Remarks	String	Remarks from BSNL
15	Obs	String	Observations
16	cable_len	String	if any
17	Status	String	Editing Status/ It should be blank
18	geo_photo	String	Photo with geo-location
19	fibre_pos	String	Left/ Right of the road
20	Direction	String	Towards GP or Block
21	Phase	String	1/2/3
22	Route_code	String	New/Old

Note: For other required layers similar structure may be envisaged.

2.1 GIS data collection

- PIA shall conduct survey of the Block and associated routes from Block to Gram Panchayats (GPs) to evaluate the existing and new fiber cable needs for network implementation.
- PIA shall collect coordinates of landmarks such as culverts, bridges / nallah, water bodies, crossroads, railway crossing, flyovers and public places like temples/mosques, bus-stop, PHC, post office, school/college, shops, police stations, banks, tourist spots, hospitals, etc. to be captured along with the route marker, cable joints, etc. along with the cable routes. One additional reading in the middle of the two manholes / RI should be recorded in the already laid network. Recordings are necessarily to be made at every fibre turn, bend along the route, road/railway crossing, culverts, diversion etc. Sufficient recordings at short intervals on the curvature of the route shall be captured to map it on GIS properly.
- PIA shall collect photos of various assets such as Blocks, GPs, manholes, joint chambers, FDMS, route markers etc. with geo tagged images.
- PIA shall collect information about terminated and spare fibres, loops, cable types/sizes and optical test results for each fibre, utilizing previously recorded data from BSNL. This includes port-by-port fibre configurations, termination details, and OTDR readings for Blocks and Gram Panchayats (GPs) PIA shall collect cement/electronic route marker (lat-long) details for route marker identification.
- PIA shall collect information about road length, width and type (RCC etc.). variation in width of road in meters taking offset from the center of the road.
- PIA shall gather details about authorities such as railway, National Highways (NH) and forest departments within the limits of the OFC path required for RoW permissions.
- The point feature like poles, sewerage manholes, other utility chambers, transformers, bore well etc. shall be captured as a point.
- The record of Block, GP and any utility shall be maintained within a 50-meter corridor with an accuracy of 20 cm (25 meters on each side of the road's center line or within the road's right-of-way, whichever is greater)

- To and fro direction towards village, town, city etc. shall be recorded for all roads.
- The geo coordinates of all road KM stones shall be recorded and shown using symbol provided.
- **Note:** All the asset locations on ground are to be geo-tagged in five photographs (one close-up and four from different directions covering road part and also landmarks, if visible) and videography (zoom & wide angle) to be taken so as to identify the exact point later on. There will be a practical situation where the route markers will be found missing, in such situation a play card with the notional assets no. available RID/ABD to be placed on the identified point.

2.2 Mobile app for data collection from field

PIA shall use BSNL mobile application & video recording solution for the BharatNet Project to accurately document project activities such as trenching, fibre laying, splicing and equipment deployment. The key requirements are given below.

- PIA shall record videos of depth, offset, chainage marking, etc. of overhead or underground alignment type of execution (HDD, OT, Aerial etc.)
- The video should support to record and identify depth, offset, ofc accessories details and landmarks of routes.
- PIA shall ensure that the accuracy of videos and GIS coordinates is within the range of 20 cm. (a sample check of the survey shall be performed on the ground by IE to check the submeter level accuracy (≤ 20 centimeters). BSNL may use CORS system deployed by Survey of India for measuring the accuracy during sample check. The survey data shall be rejected if the accuracy of the sample data is not in accordance with the desired accuracy).
- The PIA should use suitable devices such as GNSS / DGPS (which can be pole-mounted or handheld as necessary), or any other appropriate technology and mobile applications for conducting surveys to capture GIS coordinates, videos, and photos of completed work.
- The BharatNet mobile app can be used as needed for capturing GIS coordinates, videos, and photos of executed work. The GNSS/ DGPS or any other device used by the PIA must be compatible with the BharatNet mobile app. If the PIA opts for its own application than PIA shall upload videos in mp4 format and GIS coordinates in shape file format on BSNL provided GIS application. If the PIA uses the BSNL mobile app, videos and GIS coordinates will be uploaded automatically.
- If PIA used own mobile app, in such case all videos and photos shall be geo tagged and geo location shall be mentioned in file name. The geographical information shall also be available in header file.

2.2.1 Video specifications:

- Format: MP4 format, minimum 720p & and above resolution, and 30 fps/60fps frame rate with HEVC codec for video compression.
- Content: Each video segment shall clearly capture start and end points of activities, depth readings for trenching/drilling, manhole/cable chamber installation, details of OFC blowing/pulling, splicing activities, route markers, and active equipment deployment procedures.
- Continuous recording: Videos shall be recorded continuously without cuts or edits, and file sizes should be optimized for efficient data exchange.
- Visual evidence: Use calibrated vertical measuring tools to display depth in the video frame at every 10 meters for Open Trenching.
- Verbal commentary: Provide running commentary describing activities, depth measurements, and location references.
- Date and time stamp: Automatically embed date and time stamps in recordings.
- File naming: File names should clearly indicate the type of work, block, and route.
- The following details (indicative) shall be captured in videos:
 - Chainage (CH) details
 - Methodology type
 - Depth and Offset details.
 - Lat long of each pit, RI, splice chamber landmarks etc.
 - Crossing of roads
 - 3 reference points of RI, Block and GP
 - Major crossing
 - Forest area, etc.

Note:

1. Requirements for mobile device/ handset for GIS mobile app

- The PIA shall have dedicated mobile for BharatNet program to capture implementation videos.
- Mobile device shall support minimum android version 13.0 & iOS version 15 for operating the GIS mobile application.
- Mobile device shall support minimum camera capacity of 48 MP or higher and have at least 256 GB storage with augmented cloud storage capabilities as well.
- The camera should provide stable footage with minimal shaking or distortion.
- The video recording needs to be captured in sufficient day light and significant speed of maximum 40mtr/minute and minimum of 20mtr/minute.
- The video recorded and uploaded by PIA to BSNL shall also be stored by the PIA for future reference, extending for a duration of one year or until invoicing, whichever is higher.

- Mobile device shall support all the required features to fulfill the video recording requirements as given in clause 2.3.3.

2.3 GIS data upload and validation

- BSNL shall provide online tool and measurement book format for uploading the captured data and information.
- PIA shall upload geotagged images and videos of designated locations in specified formats given in clause 2.4 below. The mobile app of BharatNet shall be used to upload photos and videos to be taken from the sites.
- To upload Block-wise data on GIS application (web and mobile), BSNL will provide base maps to facilitate the upload and optimization of captured data and information, including fibre infrastructure and termination details etc.
- Validation of uploaded data shall be done in two stages:
 - **First stage:** The PIA shall upload and verify the Block wise data/ videos/ photos in the GIS application (web/ mobile)
 - **Second stage:** Second level validation shall be done by IE of respective Block.
- If the data correction is required at any stage, the same shall be sent to the PIA for necessary correction.
- PIA shall be responsible to modify/ correct the data and submit for revalidation by the IE/ BSNL.

2.4 Digital As-Built Drawing (ABD):

- As-Built Drawing (ABD) shall be created digitally on GIS platform.
- PIA shall record details of other operators and utilities such as underground optical fiber cables, utility pipes, transmission cables, and other similar infrastructure, in the digital ABD wherever possible.
- The geo coordinates of all property boundaries within the fibre route corridor shall be recorded and shown in digital ABD.
- PIA shall capture physical OFC asset details and locations in respect of locations/ asset visited for capturing GIS data during scope of work as mentioned in this tender.
- Existing data as per documentations/ details made available to PIA w.r.t. to old OFC laid.
- ABD shall be prepared from Block to GPs during implementation. The ABD for each block shall be prepared separately. ABD may have the following details:

Particulars	Parameters to be captured (indicative)
Cable details	• Make and Size of the cable

Particulars	Parameters to be captured (indicative)
Joint details	• Location of Joint Chamber (Lat/ Long details in decimal degree format up to six-digit precision) • Depth of Joint Chamber Cover from ground level • Details of cable stack at each joint chamber • 3 reference point of joint locations
Route marker	• Location of Route Marker Cement / Electronic (Lat/ Long details in decimal degree format up to six-digit precision) • Route Marker Identification details • 3 reference point of each route marker
OFC Alignment Details	• Offset of cable from centre of the road at every 10 meters (Details to be captured from HDD Graph / digital measurement book) • Details of crossings (road / rail / nala etc) should be provided. • Depth profile of cable at every 10 Meter (Details to be captured from HDD Graph / Measurement Book) • Details of protection with type of protection (Details to be captured from BSNL provided input) • Locations of culvert and bridges with their lengths and scheme of laying of HDPE / PLB pipe thereon
Landmark Details	• Important landmarks to facilitate locating the cable position in future to include important buildings such hospital, religious places, petrol pumps, educational institutes, government offices, commercial complex, major residential complex / building etc
Road feature details	• Electric Pole / Transformer • Telephone Pole • Utility Manhole • KM Milestone • Street Pole / Lamp Post • Median • Divider • Large Tree

- Readings shall be recorded without any exception at interval of 10 meters including every bend on the road, road/railway crossings, culverts, diversion etc. Each section shall record maximum 200 to 250 meter of the route length.
- All the property boundaries within the corridor shall be recorded and shown in drawing. Three point's references need to be shown for every joint chamber/pull through chamber/manholes.

- Collection of data shall also include custodianship of equipment in each Gram Panchayat.
- All the diagrams shall be verified by the PIA (project manager level person) as a proof of accuracy of the details. The ABD may have the following details.
 - Name of the Project Organization
 - Name of the OFC Link with ID
 - Name of the PIA
 - Name of Survey PIA Rep as part of acceptance test
 - Name of BSNL Rep (IE) as part of acceptance test
 - Date of commencement of work.
 - Date of completion of work
- RoW: Railway authority, National highway, Forest authority and any other authority limit along with OFC path shall be captured in ABD (details will be provided in BSNL ancillary input data).
- The PIA shall also be provided option to upload ABD in GIS format (.shp etc.) in the GIS platform through online tool to be provided by BSNL. In such cases, PIA shall prepare ABD in GIS format (shape format) of OFC connectivity from Block location to respective Gram Panchayats (GPs), routes data shall be in soft copy.

3. Functional requirements for PM tool

The project monitoring tool shall enable real-time tracking of project progress, (timelines and milestones) including the status of network infrastructure deployment, equipment installation, and connectivity establishment across all packages of Amended BharatNet program.

- PIA shall provide the input for managing project documents, drawings, specifications, permits, contracts, and other relevant documentation etc.
- PIA shall provide all required information for the application dashboard in standard/ defined format such as measurement book, acceptance test proofs etc. The details shall be, but not restricted to, as under: -
 - Block/GP wise Cable Length.
 - Block /GP wise Duct length.
 - Block /GP wise Trench Length.
 - Total as build OSP network elements count/details of FDMS/ Handhole/ Manhole/ Site/ Splice Closure etc.
 - Total Planned OSP network elements count/details of FDMS/ Handhole/ Manhole/ Router/ Site/Splice Closure etc.

- Total ISP network Elements count/details of Router/ Switch/OLT /Repeater /Equipment's etc.
- PIA shall be responsible to update the project progress in the project monitoring tool, enabling the system to automatically create milestone-based proforma invoices.

3.1 **Digital measurement book**

- Digital measurement book module of BharatNet C-NOC shall automatically calculate and update the work completed data including route length in RKM, depth etc. based on the videos uploaded during the execution of the work.
- PIA shall be responsible to provide/ update the measurement book information in the PM tool MB module via mobile application to record work details in the C-NOC MB module if required. The recorded, reading in the MB cannot be deleted. The MB data shall be validated by the (approved/ rejected) by the IE. PIA shall maintain and store all details of measurement book till the completion of C-NOC application. After completion of C-NOC, PIA shall upload all required data in PM tool BSNL.
- PIA shall also get an option for manual entry of records in digital measurement book of PM tool in case of any issue faced in automated process.

3.2 **Inspection and audit module**

PIA shall have access of PM tool inspection and audit module, this module shall be utilized by IE to validate the high- and low-level network design, inspect the project and identify any lapses/defect etc. The PIA shall provide comments on the observations and describe the necessary actions required, including specific timelines for completion.

SECTION-V: Schedule of Requirement (SOR)

(whole Section V (SOR – all packages) and notes as per Amendment No. 26.7)

TABLE: V. (1): SoR for IP-MPLS ring in Package - 1 (MP and DNH & DD)

Sr No.	Item Description	Unit	Total Quantity (Madhya Pradesh)	Total Quantity (DNH & DD)
1	Package Summary			
1.1	No. of Blocks	Nos	313	3
1.2	No. of GPs	Nos	22,858	38
1.2a	No. of GPs for creation	Nos	5,046	-
1.2b	No. of GPs for upgradation	Nos	17,812	38
1.3	No. of Villages for last mile connectivity	Nos	29,706	63
2	Existing Network			
2.1	Total GPs (Connected on OFC)	Nos	17,812	38
2.2	Total GPs (Connected on Satellite)	Nos	38	-
2.3	Existing leased RKM from BSNL	RKM	15,616	32
2.4	Total incremental 24F RKM	RKM	35,980	102
2.5	Total incremental 48F RKM	RKM	25,835	-
2.6	OLT installed (Nos.)	Nos	807	4
2.7	ONT installed	Nos	17,812	38
3	Passive Infrastructure			
3.1	Fibre Distribution Management System Type I at Block location	Nos	313	3
3.2	Fibre Termination Box/FDMS Type-IIIA & IIIB – 48F at GP locations	Nos	22,858	38
4	Underground Fibre Services			
4.1	Supply of 24F OFC, duct and accessories including all the services, as described at serial No.-1 in the Table: V. (17)	RKM	44,518	134
4.2	Supply of 48F OFC, duct and accessories including all the services, as described at serial No.-2 in the Table: V. (17)	RKM	20,991	-

Sr No.	Item Description	Unit	Total Quantity (Madhya Pradesh)	Total Quantity (DNH & DD)
5	Aerial Fibre Services			
5.1	Supply of 24F ADSS OFC and accessories including all the services (using existing power poles OR including supply of Poles), as described at serial No.-3 in the Table: V. (17)	RKM	-	5
6	Passive Infrastructure (Rack)			
6.1	Rack at Block locations (as per Section (IV C), Annexure-B, VI)	Nos	313	3
6.2	Rack at GP locations (as per Section (IV C), Annexure-B, VI)	Nos	22,858	38
7	Active Infrastructure (Router at Block Location)			
7.1	IP-MPLS Router at Block location Supply of router at Block locations with accessories including installation, integration, testing and commissioning (as per Section (IV C), Annexure-B, II & III)	Nos	313	3
7.2	SFP 100G (with 40km / 80km) pluggable	Nos	626	6
7.3	SFP 10G (with 10km/40km/80km) pluggable	Nos	15,024	54
7.4	SFP 1G with 10km pluggable			
7.5	EMS for Block routers (including H/W, S/W & licenses)	No. of network elements		158
7.6	EMS additional license including H/W and S/W upgradation	No. of network elements		158
8	Active Infrastructure (Router GP Location)			
8.1	IP-MPLS Router at GP location Supply of router at GP locations with accessories including installation, integration, testing and commissioning (as per Section (IV C), Annexure-B, II & III)	Nos	22,858	38
8.2	SFP 10G with 10Km pluggable		2,97,154	494
8.3	SFP 1G with 10 km pluggable			
8.4	EMS for GP routers (including H/W, S/W & licenses)	No. of		11,448

Sr No.	Item Description	Unit	Total Quantity (Madhya Pradesh)	Total Quantity (DNH & DD)
		network elements		
8.5	EMS additional licenses including H/W and S/W upgradation	No. of network elements		11,448
9	Active Infrastructure (RFMS)			
9.1	Remote Fibre Monitoring System (RFMS) system including necessary hardware and software with accessories including installation, integration, testing and commissioning (as per Section (IV C), Annexure-B, V)	Nos	313	3
9.2	EMS for RFMS (including H/W, S/W & licenses)	No. of RTUs		158
9.3	EMS additional license including H/W and S/W upgradation	No. of RTUs		158
10	State NOC			
10.1	State NOC as per details and specification given at Section (IV C), Annexure-B, IV)	Nos		1
11	Passive Infrastructure (Power)			
11.1	Power System with backup provisions at GP locations with accessories including installation, integration, testing and commissioning with provision of MPPT Card including solar panels (as per Section (IV C), Annexure-B, VIII)	Nos	11,429	11
11.2	Power System with backup provisions at GP locations with accessories including installation, integration, testing and commissioning with provision of slot for MPPT Card BUT excluding MPPT Card & solar panels (as per Section (IV C), Annexure-B, VIII)	Nos	11,429	27
11.3	MPPT solar module of 1 KW (as per sub section VIII of Annexure B of Section IV C - Amendment no. 12)	Nos	4,572	8

Sr No.	Item Description	Unit	Total Quantity (Madhya Pradesh)	Total Quantity (DNH & DD)
12	Supply of 6F Aerial drop OFC including services for last mile connectivity, as described at serial No.-4 in the Table: V. (17)	Km	75,156	158
13	Supply, installation including services of RCC Poles – 7/8 meter working load of 115 Kgs for last mile connectivity	Nos	1,50,312	316
14	Supply and installation of Joint Chamber as per E.I. for restoration of existing network	Nos	61,815	102
15	Supply, installation of Joint Closure, testing and splicing 24 F for Dark Fibre Provisioning and/or attending OFC fault for the first time in a joint as per TEC GR/ E.I. for restoration of existing network	Nos		61,917

TABLE: V. (2): SoR for IP-MPLS ring in Package - 2 (Rajasthan)

Sr No.	Item Description	Unit	Total Quantity (Rajasthan)
1	Package Summary		
1.1	No. of Blocks	Nos	352
1.2	No. of GPs	Nos	11,352
1.2a	No. of GPs for creation	Nos	2,606
1.2b	No. of GPs for upgradation	Nos	8,746
1.3	No. of Villages for last mile connectivity	Nos	35,002
2	Existing Network		
2.1	Total GPs (Connected on OFC)	Nos	8,746
2.2	Total GPs (Connected on Satellite)	Nos	30
2.3	Existing leased RKM from BSNL	RKM	27,543
2.4	Total incremental 24F RKM	RKM	27,875
2.5	Total incremental 48F RKM	RKM	-
2.6	OLT installed	Nos	632
2.7	ONT installed	Nos	8,746

Sr No.	Item Description	Unit	Total Quantity (Rajasthan)
3	Passive Infrastructure		
3.1	Fibre Distribution Management System Type I at Block location	Nos	352
3.2	Fibre Termination Box/FDMS Type-IIIA & IIIB – 48F at GP locations	Nos	11,352
4	Underground Fibre Services		
4.1	Supply of 24F OFC, duct and accessories including all the services, as described at serial No.-1 in the Table: V. (17)	RKM	49,009
4.2	Supply of 48F OFC, duct and accessories including all the services, as described at serial No.-2 in the Table: V. (17)	RKM	7,488
5	Aerial Fibre Services		
5.1	Supply of 24F ADSS OFC and accessories including all the services (using existing power poles OR including supply of Poles), as described at serial No.-3 in the Table: V. (17)	RKM	1,046
6	Passive Infrastructure (Rack)		
6.1	Rack at Block locations (as per Section (IV C), Annexure-B, VI)	Nos	352
6.2	Rack at GP locations (as per Section (IV C), Annexure-B, VI)	Nos	11,352
7	Active Infrastructure (Router at Block Location)		
7.1	IP-MPLS Router at Block location Supply of router at Block locations with accessories including installation, integration, testing and commissioning (as per Section (IV C), Annexure-B, II & III)	Nos	352
7.2	SFP 100G (with 40km / 80km) pluggable	Nos	704
7.3	SFP 10G (with 10km/40km/80km) pluggable	Nos	9,328
7.4	SFP 1G with 10km pluggable	Nos	
7.5	EMS for Block routers (including H/W, S/W & licenses)	No. of network elements	176
7.6	EMS additional license including H/W and S/W upgradation	No. of network elements	176

Sr No.	Item Description	Unit	Total Quantity (Rajasthan)
8	Active Infrastructure (Router GP Location)		
8.1	IP-MPLS Router at GP location Supply of router at GP locations with accessories including installation, integration, testing and commissioning (as per Section (IV C), Annexure-B, II & III)	Nos	11,352
8.2	SFP 10G with 10Km pluggable	Nos	1,47,576
8.3	SFP 1G with 10km pluggable	Nos	
8.4	EMS for GP routers (including H/W, S/W & licenses)	No. of network elements	5,676
8.5	EMS additional licenses including H/W and S/W upgradation	No. of network elements	5,676
9	Active Infrastructure (RFMS)		
9.1	Remote Fibre Monitoring System (RFMS) system including necessary hardware and software with accessories including installation, integration, testing and commissioning (as per Section (IV C), Annexure-B, V)	Nos	352
9.2	EMS for RFMS (including H/W, S/W & licenses)	No. of RTUs	176
9.3	EMS additional license including H/W and S/W upgradation	No. of RTUs	176
10	State NOC		
10.1	State NOC as per details and specification given at Section (IV C), Annexure-B, IV)	Nos	1
11	Passive Infrastructure (Power)		
11.1	Power System with backup provisions at GP locations with accessories including installation, integration, testing and commissioning with provision of MPPT Card including solar panels (as per Section (IV C), Annexure-B, VIII)	Nos	3,406
11.2	Power System with backup provisions at GP locations with accessories including installation, integration, testing and commissioning with provision of slot for MPPT Card BUT excluding MPPT Card & solar panels (as per Section (IV C), Annexure-B, VIII)	Nos	7,946

Sr No.	Item Description	Unit	Total Quantity (Rajasthan)
11.3	MPPT solar module of 1 KW (as per sub section VIII of Annexure B of Section IV C - Amendment no. 12)	Nos	2,271
12	Supply of 6F Aerial drop OFC including services for last mile connectivity, as described at serial No.-4 in the Table: V. (17)	Km	1,13,056
13	Supply, installation including services of RCC Poles – 7/8 meter working load of 115 Kgs for last mile connectivity	Nos	2,26,112
14	Supply and installation of Joint Chamber as per E.I. for restoration of existing network	Nos	27,875
15	Supply, installation of Joint Closure, testing and splicing 24 F for Dark Fibre Provisioning and/or attending OFC fault for the first time in a joint as per TEC GR/ E.I. for restoration of existing network	Nos	27,875

TABLE: V. (3): SoR for IP-MPLS ring in Package - 3 (UP - E)

Sr No.	Item Description	Unit	Total Quantity-UP(E)
1	Package Summary		
1.1	No. of Blocks	Nos	587
1.2	No. of GPs	Nos	43,072
1.2a	No. of GPs for creation	Nos	8,644
1.2b	No. of GPs for upgradation	Nos	34,428
1.3	No. of Villages for last mile connectivity	Nos	34,770
2	Existing Network		
2.1	Total GPs (Connected on OFC)	Nos	34,428
2.2	Total GPs (Connected on Satellite)	Nos	11
2.3	Existing leased RKM from BSNL	RKM	6,343
2.4	Total incremental 24F RKM	RKM	33,367
2.5	Total incremental 48F RKM	RKM	37,355
2.6	OLT installed (Nos.)	Nos	1,111
2.7	ONT installed	Nos	34,428
3	Passive Infrastructure		
3.1	Fibre Distribution Management System Type I at Block location	Nos	587
3.2	Fibre Termination Box/FDMS Type-IIIA & IIIB – 48F at GP locations	Nos	43,072
4	Underground Fibre Services		
4.1	Supply of 24F OFC, duct and accessories including all the services, as described at serial No.-1 in the Table: V. (17)	RKM	24,882
4.2	Supply of 48F OFC, duct and accessories including all the services, as described at serial No.-2 in the Table: V. (17)	RKM	31,405
5	Aerial Fibre Services		
5.1	Supply of 24F ADSS OFC and accessories including all the services (using existing power poles OR including supply of Poles), as described at serial No.-3 in the Table: V. (17)	RKM	56
6	Passive Infrastructure (Rack)		
6.1	Rack at Block locations (as per Section (IV C), Annexure-B, VI)	Nos	587

Sr No.	Item Description	Unit	Total Quantity-UP(E)
6.2	Rack at GP locations (as per Section (IV C), Annexure-B, VI)	Nos	43,072
7	Active Infrastructure (Router at Block Location)		
7.1	IP-MPLS Router at Block location Supply of router at Block locations with accessories including installation, integration, testing and commissioning (as per Section (IV C), Annexure-B, II & III)	Nos	587
7.2	SFP 100G (with 40km / 80km) pluggable	Nos	1,174
7.3	SFP 10G (with 10km/40km/80km) pluggable	Nos	19,371
7.4	SFP 1G with 10km pluggable	Nos	
7.5	EMS for Block routers (including H/W, S/W & licenses)	No. of network elements	294
7.6	EMS additional license including H/W and S/W upgradation	No. of network elements	293
8	Active Infrastructure (Router GP Location)		
8.1	IP-MPLS Router at GP location Supply of router at GP locations with accessories including installation, integration, testing and commissioning (as per Section (IV C), Annexure-B, II & III)	Nos	43,072
8.2	SFP 10G with 10Km pluggable	Nos	5,59,936
8.3	SFP 1G with 10km pluggable	Nos	
8.4	EMS for GP routers (including H/W, S/W & licenses)	No. of network elements	21,536
8.5	EMS additional licenses including H/W and S/W upgradation	No. of network elements	21,536
9	Active Infrastructure (RFMS)		
9.1	Remote Fibre Monitoring System (RFMS) system including	Nos	587

Sr No.	Item Description	Unit	Total Quantity-UP(E)
	necessary hardware and software with accessories including installation, integration, testing and commissioning (as per Section (IV C), Annexure-B, V)		
9.2	EMS for RFMS (including H/W, S/W & licenses)	No. of RTUs	294
9.3	EMS additional license including H/W and S/W upgradation	No. of RTUs	293
10	State NOC		
10.1	State NOC as per details and specification given at Section (IV C), Annexure-B, IV)	Nos	1
11	Passive Infrastructure (Power)		
11.1	Power System with backup provisions at GP locations with accessories including installation, integration, testing and commissioning with provision of MPPT Card including solar panels (as per Section (IV C), Annexure-B, VIII)	Nos	17,229
11.2	Power System with backup provisions at GP locations with accessories including installation, integration, testing and commissioning with provision of slot for MPPT Card BUT excluding MPPT Card & solar panels (as per Section (IV C), Annexure-B, VIII)	Nos	25,843
11.3	MPPT solar module of 1 KW (as per sub section VIII of Annexure B of Section IV C - Amendment no. 12)	Nos	8,615
12	Supply of 6F Aerial drop OFC including services for last mile connectivity, as described at serial No.-4 in the Table: V. (17)	Km	62,586
13	Supply, installation including services of RCC Poles – 7/8 meter working load of 115 Kgs for last mile connectivity	Nos	1,25,172
14	Supply and installation of Joint Chamber as per E.I. for restoration of existing network	Nos	70,722
15	Supply, installation of Joint Closure, testing and splicing 24 F for Dark Fibre Provisioning and/or attending OFC fault for the first time in a joint as per TEC GR/ E.I. for restoration of existing network	Nos	70,722

TABLE: V. (4): SoR for IP-MPLS ring in Package - 4 (Karnataka, Goa, Puducherry)

Sr No.	Item Description	Unit	Total Quantity (Karnataka)	Total Quantity (Goa)	Total Quantity (Puducherry)
1	Package Summary				
1.1	No. of Blocks	Nos	227	12	6
1.2	No. of GPs	Nos	6,090	191	110
1.2a	No. of GPs for creation	Nos	6	191	12
1.2b	No. of GPs for upgradation	Nos	6,084	-	98
1.3	No. of Villages for last mile connectivity	Nos	26,042	205	9
2	Existing Network				
2.1	Total GPs (Connected on OFC)	Nos	6,084	-	98
2.2	Total GPs (Connected on Satellite)	Nos	-	-	-
2.3	Existing leased RKM from BSNL	RKM	33,160	-	344
2.4	Total incremental 24F RKM	RKM	12,928	-	85
2.5	Total incremental 48F RKM	RKM	-	-	-
2.6	OLT installed (Nos.)	Nos	495	-	4
2.7	ONT installed	Nos	6,084	-	98
3	Passive Infrastructure				
3.1	Fibre Distribution Management System Type I at Block location	Nos	227	12	6
3.2	Fibre Termination Box/FDMS Type-IIIA & IIIB – 48F at GP locations	Nos	6,090	191	110

Sr No.	Item Description	Unit	Total Quantity (Karnataka)	Total Quantity (Goa)	Total Quantity (Puducherry)
4	Underground Fibre Services				
4.1	Supply of 24F OFC, duct and accessories including all the services, as described at serial No.-1 in the Table: V. (17)	RKM	49,930	-	324
4.2	Supply of 48F OFC, duct and accessories including all the services, as described at serial No.-2 in the Table: V. (17)	RKM	-	1,000	-
5	Aerial Fibre Services				
5.1	Supply of 24F ADSS OFC and accessories including all the services (using existing power poles OR including supply of Poles), as described at serial No.-3 in the Table: V. (17)	RKM	-	250	-
6	Passive Infrastructure (Rack)				
6.1	Rack at Block locations (as per Section (IV C), Annexure-B, VI)	Nos	227	12	6
6.2	Rack at GP locations (as per Section (IV C), Annexure-B, VI)	Nos	6,090	191	110
7	Active Infrastructure (Router at Block Location)				
7.1	IP-MPLS Router at Block location Supply of router at Block locations with accessories including installation, integration, testing and commissioning (as per Section (IV C), Annexure-B, II & III)	Nos	227	12	6
7.2	SFP 100G (with 40km / 80km) pluggable	Nos	454	24	12
7.3	SFP 10G (with 10km/40km/80km) pluggable	Nos	9,262	216	80
7.4	SFP 1G with 10km pluggable	Nos			
7.5	EMS for Block routers (including H/W, S/W & licenses)	No. of network elements	123		
7.6	EMS additional license including H/W and S/W upgradation	No. of network elements	122		

Sr No.	Item Description	Unit	Total Quantity (Karnataka)	Total Quantity (Goa)	Total Quantity (Puducherry)
8	Active Infrastructure (Router GP Location)				
8.1	IP-MPLS Router at GP location Supply of router at GP locations with accessories including installation, integration, testing and commissioning (as per Section (IV C), Annexure-B, II & III)	Nos	6,090	191	110
8.2	SFP 10G with 10Km pluggable	Nos	79,170	2,483	1,430
8.3	SFP 1G with 10km pluggable				
8.4	EMS for GP routers (including H/W, S/W & licenses)	No. of network elements	3,196		
8.5	EMS additional licenses including H/W and S/W upgradation	No. of network elements	3,195		
9	Active Infrastructure (RFMS)				
9.1	Remote Fibre Monitoring System (RFMS) system including necessary hardware and software with accessories including installation, integration, testing and commissioning (as per Section (IV C), Annexure-B, V)	Nos	227	12	6
9.2	EMS for RFMS (including H/W, S/W & licenses)	No. of RTUs	123		
9.3	EMS additional license including H/W and S/W upgradation	No. of RTUs	122		
10	State NOC				
10.1	State NOC as per details and specification given at Section (IV C), Annexure-B, IV)	Nos	1		
11	Passive Infrastructure (Power)				
11.1	Power System with backup provisions at GP locations with accessories including installation, integration, testing and commissioning with provision of MPPT Card including solar panels (as per Section (IV C),	Nos	2,436	57	11

Sr No.	Item Description	Unit	Total Quantity (Karnataka)	Total Quantity (Goa)	Total Quantity (Puducherry)
	Annexure-B, VIII)				
11.2	Power System with backup provisions at GP locations with accessories including installation, integration, testing and commissioning with provision of slot for MPPT Card BUT excluding MPPT Card & solar panels (as per Section (IV C), Annexure-B, VIII)	Nos	3,654	134	99
11.3	MPPT solar module of 1 KW (as per sub section VIII of Annexure B of Section IV C - Amendment no. 12)	Nos	1,218	39	22
12	Supply of 6F Aerial drop OFC including services for last mile connectivity, as described at serial No.-4 in the Table: V. (17)	Km	70,313	820	19
13	Supply, installation including services of RCC Poles – 7/8 meter working load of 115 Kgs for last mile connectivity	Nos	1,40,626	1640	38
14	Supply and installation of Joint Chamber as per E.I. for restoration of existing network	Nos	12,928	-	85
15	Supply, installation of Joint Closure, testing and splicing 24 F for Dark Fibre Provisioning and/or attending OFC fault for the first time in a joint as per TEC GR/ E.I. for restoration of existing network	Nos	13,013		

TABLE: V. (5): SoR for IP-MPLS ring in Package - 5 (Uttarakhand)

Sr No.	Item Description	Unit	Total Quantity (Uttarakhand)
1	Package Summary		
1.1	No. of Blocks	Nos	95
1.2	No. of GPs	Nos	7,937
1.2a	No. of GPs for creation	Nos	6,118
1.2b	No. of GPs for upgradation	Nos	1,819
1.3	No. of Villages for last mile connectivity	Nos	8,151
2	Existing Network		
2.1	Total GPs (Connected on OFC)	Nos	1,819
2.2	Total GPs (Connected on Satellite)	Nos	175
2.3	Existing leased RKM from BSNL	RKM	1,699
2.4	Total incremental 24F RKM	RKM	3,845
2.5	Total incremental 48F RKM	RKM	-
2.6	OLT installed (Nos.)	Nos	71
2.7	ONT installed	Nos	1,819
3	Passive Infrastructure		
3.1	Fibre Distribution Management System Type I at Block location	Nos	95
3.2	Fibre Termination Box/FDMS Type-IIIA & IIIB – 48F at GP locations	Nos	7,937
4	Underground Fibre Services		
4.1	Supply of 24F OFC, duct and accessories including all the services, as described at serial No.-1 in the Table: V. (17)	RKM	1,242
4.2	Supply of 48F OFC, duct and accessories including all the services, as described at serial No.-2 in the Table: V. (17)	RKM	2,117
5	Aerial Fibre Services		
5.1	Supply of 24F ADSS OFC and accessories including all the services (using existing power poles OR including supply of Poles), as described at serial No.-3 in the Table: V. (17)	RKM	23,340
6	Passive Infrastructure (Rack)		
6.1	Rack at Block locations (as per Section (IV C), Annexure-B, VI)	Nos	95

Sr No.	Item Description	Unit	Total Quantity (Uttarakhand)
6.2	Rack at GP locations (as per Section (IV C), Annexure-B, VI)	Nos	7,937
7	Active Infrastructure (Router at Block Location)		
7.1	IP-MPLS Router at Block location Supply of router at Block locations with accessories including installation, integration, testing and commissioning (as per Section (IV C), Annexure-B, II & III)	Nos	95
7.2	SFP 100G (with 40km / 80km) pluggable	Nos	190
7.3	SFP 10G (with 10km/40km/80km) pluggable	Nos	4,579
7.4	SFP 1G with 10km pluggable	Nos	
7.5	EMS for Block routers (including H/W, S/W & licenses)	No. of network elements	48
7.6	EMS additional license including H/W and S/W upgradation	No. of network elements	47
8	Active Infrastructure (Router GP Location)		
8.1	IP-MPLS Router at GP location Supply of router at GP locations with accessories including installation, integration, testing and commissioning (as per Section (IV C), Annexure-B, II & III)	Nos	7,937
8.2	SFP 10G with 10Km pluggable	Nos	1,03,181
8.3	SFP 1G with 10km pluggable		
8.4	EMS for GP routers (including H/W, S/W & licenses)	No. of network elements	3,969
8.5	EMS additional licenses including H/W and S/W upgradation	No. of network elements	3,968
9	Active Infrastructure (RFMS)		
9.1	Remote Fibre Monitoring System (RFMS) system including necessary hardware and software with accessories including installation, integration, testing and commissioning (as per Section (IV C), Annexure-B, V)	Nos	95
9.2	EMS for RFMS (including H/W, S/W & licenses)	No. of RTUs	48

Sr No.	Item Description	Unit	Total Quantity (Uttarakhand)
9.3	EMS additional license including H/W and S/W upgradation	No. of RTUs	47
10	State NOC		
10.1	State NOC as per details and specification given at Section (IV C), Annexure-B, IV)	Nos	1
11	Passive Infrastructure (Power)		
11.1	Power System with backup provisions at GP locations with accessories including installation, integration, testing and commissioning with provision of MPPT Card including solar panels (as per Section (IV C), Annexure-B, VIII)	Nos	3,175
11.2	Power System with backup provisions at GP locations with accessories including installation, integration, testing and commissioning with provision of slot for MPPT Card BUT excluding MPPT Card & solar panels (as per Section (IV C), Annexure-B, VIII)	Nos	4,762
11.3	MPPT solar module of 1 KW (as per sub section VIII of Annexure B of Section IV C - Amendment no. 12)	Nos	1,588
12	Supply of 6F Aerial drop OFC including services for last mile connectivity, as described at serial No.-4 in the Table: V. (17)	Km	21,519
13	Supply, installation including services of RCC Poles – 7/8 meter working load of 115 Kgs for last mile connectivity	Nos	43,038
14	Supply and installation of Joint Chamber as per E.I. for restoration of existing network	Nos	3,845
15	Supply, installation of Joint Closure, testing and splicing 24 F for Dark Fibre Provisioning and/or attending OFC fault for the first time in a joint as per TEC GR/ E.I. for restoration of existing network	Nos	3,845

TABLE: V. (6): SoR for IP-MPLS ring in Package - 6 (UP - W)

Sr No.	Item Description	Unit	Total Quantity (UP-W)
1	Package Summary		
1.1	No. of Blocks	Nos	240
1.2	No. of GPs	Nos	16,218
1.2a	No. of GPs for creation	Nos	3,769
1.2b	No. of GPs for upgradation	Nos	12,449
1.3	No. of Villages for last mile connectivity	Nos	9,760
2	Existing Network		
2.1	Total GPs (Connected on OFC)	Nos	12,449
2.2	Total GPs (Connected on Satellite)	Nos	23
2.3	Existing leased RKM from BSNL	RKM	6,264
2.4	Total incremental 24F RKM	RKM	20,267
2.5	Total incremental 48F RKM	RKM	6,065
2.6	OLT installed (Nos.)	Nos	259
2.7	ONT installed	Nos	12,449
3	Passive Infrastructure		
3.1	Fibre Distribution Management System Type I at Block location	Nos	240
3.2	Fibre Termination Box/FDMS Type-IIIA & IIIB – 48F at GP locations	Nos	16,218
4	Underground Fibre Services		
4.1	Supply of 24F OFC, duct and accessories including all the services, as described at serial No.-1 in the Table: V. (17)	RKM	17,397
4.2	Supply of 48F OFC, duct and accessories including all the services, as described at serial No.-2 in the Table: V. (17)	RKM	8,867
5	Aerial Fibre Services		
5.1	Supply of 24F ADSS OFC and accessories including all the services (using existing power poles OR including supply of Poles), as described at serial No.-3 in the Table: V. (17)	RKM	-
6	Passive Infrastructure (Rack)		
6.1	Rack at Block locations (as per Section (IV C), Annexure-B, VI)	Nos	240

Sr No.	Item Description	Unit	Total Quantity (UP-W)
6.2	Rack at GP locations (as per Section (IV C), Annexure-B, VI)	Nos	16,218
7	Active Infrastructure (Router at Block Location)		
7.1	IP-MPLS Router at Block location Supply of router at Block locations with accessories including installation, integration, testing and commissioning (as per Section (IV C), Annexure-B, II & III)	Nos	240
7.2	SFP 100G (with 40km / 80km) pluggable	Nos	480
7.4	SFP 10G (with 10km/40km/80km) pluggable	Nos	7,128
7.5	SFP 1G with 10km pluggable		
7.5	EMS for Block routers (including H/W, S/W & licenses)	No. of network elements	120
7.6	EMS additional license including H/W and S/W upgradation	No. of network elements	120
8	Active Infrastructure (Router GP Location)		
8.1	IP-MPLS Router at GP location Supply of router at GP locations with accessories including installation, integration, testing and commissioning (as per Section (IV C), Annexure-B, II & III)	Nos	16,218
8.2	SFP 10G with 10Km pluggable	Nos	2,10,834
8.3	SFP 1G with 10km pluggable		
8.4	EMS for GP routers (including H/W, S/W & licenses)	No. of network elements	8,109
8.5	EMS additional licenses including H/W and S/W upgradation	No. of network elements	8,109
9	Active Infrastructure (RFMS)		
9.1	Remote Fibre Monitoring System (RFMS) system including necessary hardware and software with accessories including installation,	Nos	240

Sr No.	Item Description	Unit	Total Quantity (UP-W)
	integration, testing and commissioning (as per Section (IV C), Annexure-B, V)		
9.2	EMS for RFMS (including H/W, S/W & licenses)	No. of RTUs	120
9.3	EMS additional license including H/W and S/W upgradation	No. of RTUs	120
10	State NOC		
10.1	State NOC as per details and specification given at Section (IV C), Annexure-B, IV)	Nos	1
11	Passive Infrastructure (Power)		
11.1	Power System with backup provisions at GP locations with accessories including installation, integration, testing and commissioning with provision of MPPT Card including solar panels (as per Section (IV C), Annexure-B, VIII)	Nos	6,487
11.2	Power System with backup provisions at GP locations with accessories including installation, integration, testing and commissioning with provision of slot for MPPT Card BUT excluding MPPT Card & solar panels (as per Section (IV C), Annexure-B, VIII)	Nos	9,731
11.3	MPPT solar module of 1 KW (as per sub section VIII of Annexure B of Section IV C - Amendment no. 12)	Nos	3,244
12	Supply of 6F Aerial drop OFC including services for last mile connectivity, as described at serial No.-4 in the Table: V. (17)	Km	13,274
13	Supply, installation including services of RCC Poles – 7/8 meter working load of 115 Kgs for last mile connectivity	Nos	26,548
14	Supply and installation of Joint Chamber as per E.I. for restoration of existing network	Nos	26,332
15	Supply, installation of Joint Closure, testing and splicing 24 F for Dark Fibre Provisioning and/or attending OFC fault for the first time in a joint as per TEC GR/ E.I. for restoration of existing network	Nos	26,332

TABLE: V. (7): SoR for IP-MPLS ring in Package - 7 (Bihar)

Sr No.	Item Description	Unit	Total Quantity (Bihar)
1	Package Summary		
1.1	No. of Blocks	Nos	534
1.2	No. of GPs	Nos	8,405
1.2a	No. of GPs for creation	Nos	81
1.2b	No. of GPs for upgradation	Nos	8,324
1.3	No. of Villages for last mile connectivity	Nos	36,807
2	Existing Network		
2.1	Total GPs (Connected on OFC)	Nos	8,324
2.2	Total GPs (Connected on Satellite)	Nos	16
2.3	Existing leased RKM from BSNL	RKM	5,664
2.4	Total incremental 24F RKM	RKM	14,958
2.5	Total incremental 48F RKM	RKM	9,988
2.6	OLT installed (Nos.)	Nos	551
2.7	ONT installed	Nos	8,324
3	Passive Infrastructure		
3.1	Fibre Distribution Management System Type I at Block location	Nos	534
3.2	Fibre Termination Box/FDMS Type-IIIA & IIIB – 48F at GP locations	Nos	8,405
4	Underground Fibre Services		
4.1	Supply of 24F OFC, duct and accessories including all the services, as described at serial No.-1 in the Table: V. (17)	RKM	17,187
4.2	Supply of 48F OFC, duct and accessories including all the services, as described at serial No.-2 in the Table: V. (17)	Kms	4,447
5	Aerial Fibre Services		
5.1	Supply of 24F ADSS OFC and accessories including all the services (using existing power poles OR including supply of Poles), as described at serial No.-3 in the Table: V. (17)	RKM	1,030
6	Passive Infrastructure (Rack)		
6.1	Rack at Block locations (as per Section (IV C), Annexure-B, VI)	Nos	534
6.2	Rack at GP locations (as per Section (IV C), Annexure-B, VI)	Nos	8,405

Sr No.	Item Description	Unit	Total Quantity (Bihar)
7	Active Infrastructure (Router at Block Location)		
7.1	IP-MPLS Router at Block location Supply of router at Block locations with accessories including installation, integration, testing and commissioning (as per Section (IV C), Annexure-B, II & III)	Nos	534
7.2	SFP 100G (with 40km / 80km) pluggable	Nos	1068
7.3	SFP 10G (with 10km/40km/80km) pluggable	Nos	6,408
7.4	SFP 1G with 10km pluggable		
7.5	EMS for Block routers (including H/W, S/W & licenses)	No. of network elements	267
7.6	EMS additional license including H/W and S/W upgradation	No. of network elements	267
8	Active Infrastructure (Router GP Location)		
8.1	IP-MPLS Router at GP location Supply of router at GP locations with accessories including installation, integration, testing and commissioning (as per Section (IV C), Annexure-B, II & III)	Nos	8,405
8.2	SFP 10G with 10Km pluggable	Nos	1,09,265
8.3	SFP 1G with 10km pluggable		
8.4	EMS for GP routers (including H/W, S/W & licenses)	No. of network elements	4,203
8.5	EMS additional licenses including H/W and S/W upgradation	No. of network elements	4,202
9	Active Infrastructure (RFMS)		
9.1	Remote Fibre Monitoring System (RFMS) system including necessary hardware and software with accessories including installation, integration, testing and commissioning (as per Section (IV C),	Nos	534

Sr No.	Item Description	Unit	Total Quantity (Bihar)
	Annexure-B, V)		
9.2	EMS for RFMS (including H/W, S/W & licenses)	No. of RTUs	267
9.3	EMS additional license including H/W and S/W upgradation	No. of RTUs	267
10	State NOC		
10.1	State NOC as per details and specification given at Section (IV C), Annexure-B, IV)	Nos	1
11	Passive Infrastructure (Power)		
11.1	Power System with backup provisions at GP locations with accessories including installation, integration, testing and commissioning with provision of MPPT Card including solar panels (as per Section (IV C), Annexure-B, VIII)	Nos	4,203
11.2	Power System with backup provisions at GP locations with accessories including installation, integration, testing and commissioning with provision of slot for MPPT Card BUT excluding MPPT Card & solar panels (as per Section (IV C), Annexure-B, VIII)	Nos	4,202
11.3	MPPT solar module of 1 KW (as per sub section VIII of Annexure B of Section IV C - Amendment no. 12)	Nos	1,681
12	Supply of 6F Aerial drop OFC including services for last mile connectivity, as described at serial No.-4 in the Table: V. (17)	Km	50,794
13	Supply, installation including services of RCC Poles – 7/8 meter working load of 115 Kgs for last mile connectivity	Nos	1,01,588
14	Supply and installation of Joint Chamber as per E.I. for restoration of existing network	Nos	24,946
15	Supply, installation of Joint Closure, testing and splicing 24 F for Dark Fibre Provisioning and/or attending OFC fault for the first time in a joint as per TEC GR/ E.I. for restoration of existing network	Nos	24,946

TABLE: V. (8): SoR for IP-MPLS ring in Package - 8 (Himachal Pradesh)

Sr No.	Item Description	Unit	Total Quantity - Himachal Pradesh
1	Package Summary		
1.1	No. of Blocks	Nos	80
1.2	No. of GPs	Nos	3,615
1.2a	No. of GPs for creation	Nos	3,363
1.2b	No. of GPs for upgradation	Nos	252
1.3	No. of Villages for last mile connectivity	Nos	15,538
2	Existing Network		
2.1	Total GPs (Connected on OFC)	Nos	252
2.2	Total GPs (Connected on Satellite)	Nos	159
2.3	Existing leased RKM from BSNL	RKM	115
2.4	Total incremental 24F RKM	RKM	713
2.5	Total incremental 48F RKM	RKM	-
2.6	OLT installed	Nos	9
2.7	ONT installed	Nos	252
3	Passive Infrastructure		
3.1	Fibre Distribution Management System Type I at Block location	Nos	80
3.2	Fibre Termination Box/FDMS Type-IIIA & IIIB – 48F at GP locations	Nos	3,615
4	Underground Fibre Services		
4.1	Supply of 24F OFC, duct and accessories including all the services, as described at serial No.-1 in the Table: V. (17)	RKM	94
4.2	Supply of 48F OFC, duct and accessories including all the services, as described at serial No.-2 in the Table: V. (17)	Kms	-
5	Aerial Fibre Services		
5.1	Supply of 24F ADSS OFC and accessories including all the services (using existing power poles OR including supply of Poles), as described at serial No.-3 in the Table: V. (17)	Kms	20,021
6	Passive Infrastructure (Rack)		

Sr No.	Item Description	Unit	Total Quantity - Himachal Pradesh
6.1	Rack at Block locations (as per Section (IV C), Annexure-B, VI)	Nos	80
6.2	Rack at GP locations (as per Section (IV C), Annexure-B, VI)	Nos	3,615
7	Active Infrastructure (Router at Block Location)		
7.1	IP-MPLS Router at Block location Supply of router at Block locations with accessories including installation, integration, testing and commissioning (as per Section (IV C), Annexure-B, II & III)	Nos	80
7.2	SFP 100G (with 40km / 80km) pluggable	Nos	160
7.3	SFP 10G (with 10km/40km/80km) pluggable	Nos	5,056
7.4	SFP 1G with 10km pluggable		
7.5	EMS for Block routers (including H/W, S/W & licenses)	No. of network elements	40
7.6	EMS additional license including H/W and S/W upgradation	No. of network elements	40
8	Active Infrastructure (Router GP Location)		
8.1	IP-MPLS Router at GP location Supply of router at GP locations with accessories including installation, integration, testing and commissioning (as per Section (IV C), Annexure-B, II & III)	Nos	3,615
8.2	SFP 10G with 10Km pluggable	Nos	46,995
8.3	SFP 1G with 10km pluggable		
8.4	EMS for GP routers (including H/W, S/W & licenses)	No. of network elements	1,808
8.5	EMS additional licenses including H/W and S/W upgradation	No. of network elements	1,807
9	Active Infrastructure (RFMS)		
9.1	Remote Fibre Monitoring System (RFMS) system including necessary hardware and software with accessories including installation, integration, testing and commissioning (as per Section (IV C), Annexure-B, V)	Nos	80

Sr No.	Item Description	Unit	Total Quantity - Himachal Pradesh
9.2	EMS for RFMS (including H/W, S/W & licenses)	No. of RTUs	40
9.3	EMS additional license including H/W and S/W upgradation	No. of RTUs	40
10	State NOC		
10.1	State NOC as per details and specification given at Section (IV C), Annexure-B, IV)	Nos	1
11	Passive Infrastructure (Power)		
11.1	Power System with backup provisions at GP locations with accessories including installation, integration, testing and commissioning with provision of MPPT Card including solar panels (as per Section (IV C), Annexure-B, VIII)	Nos	1,808
11.2	Power System with backup provisions at GP locations with accessories including installation, integration, testing and commissioning with provision of slot for MPPT Card BUT excluding MPPT Card & solar panels (as per Section (IV C), Annexure-B, VIII)	Nos	1,807
11.3	MPPT solar module of 1 KW (as per sub section VIII of Annexure B of Section IV C - Amendment no. 12)	Nos	723
12	Supply of 6F Aerial drop OFC including services for last mile connectivity, as described at serial No.-4 in the Table: V. (17)	Km	36,670
13	Supply, installation including services of RCC Poles – 7/8 meter working load of 115 Kgs for last mile connectivity	Nos	73,340
14	Supply and installation of Joint Chamber as per E.I. for restoration of existing network	Nos	713
15	Supply, installation of Joint Closure, testing and splicing 24 F for Dark Fibre Provisioning and/or attending OFC fault for the first time in a joint as per TEC GR/ E.I. for restoration of existing network	Nos	713

TABLE: V. (9): SoR for IP-MPLS ring in Package - 9 (West Bengal and Andaman & Nicobar)

Sr No.	Item Description	Unit	Total Quantity -West Bengal	Total Quantity -A&N
1	Package Summary			
1.1	No. of Blocks	Nos	344	9
1.2	No. of GPs	Nos	3,340	72
1.2a	No. of GPs for creation	Nos	664	4
1.2b	No. of GPs for upgradation	Nos	2,676	68
1.3	No. of Villages for last mile connectivity	Nos	35,848	297
2	Existing Network			
2.1	Total GPs (Connected on OFC)	Nos	2,676	68
2.2	Total GPs (Connected on Satellite)	Nos	3	4
2.3	Existing leased RKM from BSNL	RKM	8,795	30
2.4	Total incremental 24F RKM	RKM	10,375	471
2.5	Total incremental 48F RKM	RKM	-	-
2.6	OLT installed	Nos	277	8
2.7	ONT installed	Nos	2,676	68
3	Passive Infrastructure			
3.1	Fibre Distribution Management System Type I at Block location	Nos	344	9
3.2	Fibre Termination Box/FDMS Type-IIIA & IIIB – 48F at GP locations	Nos	3,340	72
4	Underground Fibre Services			
4.1	Supply of 24F OFC, duct and accessories including all the services, as described at serial No.-1 in the Table: V. (17)	RKM	14,376	59
4.2	Supply of 48F OFC, duct and accessories including all the services, as described at serial No.-2 in the Table: V. (17)	RKM	3,712	-
5	Aerial Fibre Services			
5.1	Supply of 24F ADSS OFC and accessories including all the services (using existing power poles OR including supply of	RKM	678	-

Sr No.	Item Description	Unit	Total Quantity -West Bengal	Total Quantity -A&N
	Poles), as described at serial No.-3 in the Table: V. (17)			
6	Passive Infrastructure (Rack)			
6.1	Rack at Block locations (as per Section (IV C), Annexure-B, VI)	Nos	344	9
6.2	Rack at GP locations (as per Section (IV C), Annexure-B, VI)	Nos	3,340	72
7	Active Infrastructure (Router at Block Location)			
7.1	IP-MPLS Router at Block location Supply of router at Block locations with accessories including installation, integration, testing and commissioning (as per Section (IV C), Annexure-B, II & III)	Nos	344	9
7.2	SFP 100G (with 40km / 80km) pluggable	Nos	688	18
7.3	SFP 10G (with 10km/40km/80km) pluggable	Nos	7,086	120
7.4	SFP 1G with 10km pluggable			
7.5	EMS for Block routers (including H/W, S/W & licenses)	No. of network elements		177
7.6	EMS additional license including H/W and S/W upgradation	No. of network elements		176
8	Active Infrastructure (Router GP Location)			
8.1	IP-MPLS Router at GP location Supply of router at GP locations with accessories including installation, integration, testing and commissioning (as per Section (IV C), Annexure-B, II & III)	Nos	3,340	72
8.2	SFP 10G with 10Km pluggable	Nos	43,420	936
8.3	SFP 1G with 10km pluggable			
8.4	EMS for GP routers (including H/W, S/W & licenses)	No. of network elements		1,706
8.5	EMS additional licenses including H/W and S/W	No. of		1,706

Sr No.	Item Description	Unit	Total Quantity -West Bengal	Total Quantity -A&N
	upgradation	network elements		
9	Active Infrastructure (RFMS)			
9.1	Remote Fibre Monitoring System (RFMS) system including necessary hardware and software with accessories including installation, integration, testing and commissioning (as per Section (IV C), Annexure-B, V)	Nos	344	9
9.2	EMS for RFMS (including H/W, S/W & licenses)	No. of RTUs		177
9.3	EMS additional license including H/W and S/W upgradation	No. of RTUs		176
10	State NOC			
10.1	State NOC as per details and specification given at Section (IV C), Annexure-B, IV)	Nos		1
11	Passive Infrastructure (Power)			
11.1	Power System with backup provisions at GP locations with accessories including installation, integration, testing and commissioning with provision of MPPT Card including solar panels (as per Section (IV C), Annexure-B, VIII)	Nos	1002	29
11.2	Power System with backup provisions at GP locations with accessories including installation, integration, testing and commissioning with provision of slot for MPPT Card BUT excluding MPPT Card & solar panels (as per Section (IV C), Annexure-B, VIII)	Nos	2,338	43
11.3	MPPT solar module of 1 KW (as per sub section VIII of Annexure B of Section IV C - Amendment no. 12)	Nos	668	15
12	Supply of 6F Aerial drop OFC including services for last mile connectivity, as described at serial No.-4 in the Table: V. (17)	Km	62,017	594
13	Supply, installation including services of RCC Poles – 7/8	Nos	1,24,034	1,188

Sr No.	Item Description	Unit	Total Quantity -West Bengal	Total Quantity -A&N
	meter working load of 115 Kgs for last mile connectivity			
14	Supply and installation of Joint Chamber as per E.I. for restoration of existing network	Nos	10,375	471
15	Supply, installation of Joint Closure, testing and splicing 24 F for Dark Fibre Provisioning and/or attending OFC fault for the first time in a joint as per TEC GR/ E.I. for restoration of existing network	Nos		10,846

TABLE: V. (10): SoR for IP-MPLS ring in Package - 10 (Haryana)

Sr No.	Item Description	Unit	Total Quantity Haryana
1	Package Summary		
1.1	No. of Blocks	Nos	142
1.2	No. of GPs	Nos	6,256
1.2a	No. of GPs for creation	Nos	174
1.2b	No. of GPs for upgradation	Nos	6,082
1.3	No. of Villages for last mile connectivity	Nos	758
2	Existing Network		
2.1	Total GPs (Connected on OFC)	Nos	6,082
2.2	Total GPs (Connected on Satellite)	Nos	-
2.3	Existing leased RKM from BSNL	RKM	8,023
2.4	Total incremental 24F RKM	RKM	10,819
2.5	Total incremental 48F RKM	RKM	-
2.6	OLT installed	Nos	189
2.7	ONT installed	Nos	6,082
3	Passive Infrastructure		
3.1	Fibre Distribution Management System Type I at Block location	Nos	142
3.2	Fibre Termination Box/FDMS Type-IIIA & IIIB – 48F at GP locations	Nos	6,256
4	Underground Fibre Services		
4.1	Supply of 24F OFC, duct and accessories including all the services, as described at serial No.-1 in the Table: V. (17)	RKM	18,023
4.2	Supply of 48F OFC, duct and accessories including all the services, as described at serial No.-2 in the Table: V. (17)	RKM	-
5	Aerial Fibre Services		
5.1	Supply of 24F ADSS OFC and accessories including all the services (using existing power poles OR including supply of Poles), as described at serial No.-3 in the Table: V. (17)	RKM	-

Sr No.	Item Description	Unit	Total Quantity Haryana
6	Passive Infrastructure (Rack)		
6.1	Rack at Block locations (as per Section (IV C), Annexure-B, VI)	Nos	142
6.2	Rack at GP locations (as per Section (IV C), Annexure-B, VI)	Nos	6,256
7	Active Infrastructure (Router at Block Location)		
7.1	IP-MPLS Router at Block location Supply of router at Block locations with accessories including installation, integration, testing and commissioning (as per Section (IV C), Annexure-B, II & III)	Nos	142
7.2	SFP 100G (with 40km / 80km) pluggable	Nos	284
7.3	SFP 10G (with 10km/40km/80km) pluggable	Nos	2,982
7.4	SFP 1G with 10km pluggable		
7.5	EMS for Block routers (including H/W, S/W & licenses)	No. of network elements	71
7.6	EMS additional license including H/W and S/W upgradation	No. of network elements	71
8	Active Infrastructure (Router GP Location)		
8.1	IP-MPLS Router at GP location Supply of router at GP locations with accessories including installation, integration, testing and commissioning (as per Section (IV C), Annexure-B, II & III)	Nos	6,256
8.2	SFP 10G with 10Km pluggable	Nos	81,328
8.3	SFP 1G with 10km pluggable		
8.4	EMS for GP routers (including H/W, S/W & licenses)	No. of network elements	3,128
8.5	EMS additional licenses including H/W and S/W upgradation	No. of network elements	3,128
9	Active Infrastructure (RFMS)		
9.1	Remote Fibre Monitoring System (RFMS) system including necessary hardware and	Nos	142

Sr No.	Item Description	Unit	Total Quantity Haryana
	software with accessories including installation, integration, testing and commissioning (as per Section (IV C), Annexure-B, V)		
9.2	EMS for RFMS (including H/W, S/W & licenses)	No. of RTUs	71
9.3	EMS additional license including H/W and S/W upgradation	No. of RTUs	71
10	State NOC		
10.1	State NOC as per details and specification given at Section (IV C), Annexure-B, IV)	Nos	1
11	Passive Infrastructure (Power)		
11.1	Power System with backup provisions at GP locations with accessories including installation, integration, testing and commissioning with provision of MPPT Card including solar panels (as per Section (IV C), Annexure-B, VIII)	Nos	2,190
11.2	Power System with backup provisions at GP locations with accessories including installation, integration, testing and commissioning with provision of slot for MPPT Card BUT excluding MPPT Card & solar panels (as per Section (IV C), Annexure-B, VIII)	Nos	4,066
11.3	MPPT solar module of 1 KW (as per sub section VIII of Annexure B of Section IV C - Amendment no. 12)	Nos	1,252
12	Supply of 6F Aerial drop OFC including services for last mile connectivity, as described at serial No.-4 in the Table: V. (17)	Km	1,933
13	Supply, installation including services of RCC Poles – 7/8 meter working load of 115 Kgs for last mile connectivity	Nos	3,866
14	Supply and installation of Joint Chamber as per E.I. for restoration of existing network	Nos	10,819
15	Supply, installation of Joint Closure, testing and splicing 24 F for Dark Fibre Provisioning and/or attending OFC fault for the first time in a joint as per TEC GR/ E.I. for restoration of existing network	Nos	10,819

TABLE: V. (11): SoR for IP-MPLS ring in Package - 11 (NER - I)

Sr No.	Item Description	Unit	Total quantity - NER-I (Mizoram, Tripura, Meghalaya)
1	Package Summary		
1.1	No. of Blocks	Nos	130
1.2	No. of GPs	Nos	3,817
1.2a	No. of GPs for creation	Nos	3,056
1.2b	No. of GPs for upgradation	Nos	761
1.3	No. of Villages for last mile connectivity	Nos	5,107
2	Existing Network		
2.1	Total GPs (Connected on OFC)	Nos	761
2.2	Total GPs (Connected on Satellite)	Nos	1,239
2.3	Existing leased RKM from BSNL	RKM	623
2.4	Total incremental 24F RKM	RKM	1,398
2.5	Total incremental 48F RKM	RKM	-
2.6	OLT installed	Nos	66
2.7	ONT installed	Nos	761
3	Passive Infrastructure		
3.1	Fibre Distribution Management System Type I at Block location	Nos	130
3.2	Fibre Termination Box/FDMS Type-IIIA & IIIB – 48F at GP locations	Nos	3,817
4	Underground Fibre Services		
4.1	Supply of 24F OFC, duct and accessories including all the services, as described at serial No.-1 in the Table: V. (17)	RKM	5,032
4.2	Supply of 48F OFC, duct and accessories including all the services, as described at serial No.-2 in the Table: V. (17)	RKM	-
5	Aerial Fibre Services		
5.1	Supply of 24F ADSS OFC and accessories including all the services (using existing power poles OR including supply of Poles), as described at serial No.-	RKM	10,591

Sr No.	Item Description	Unit	Total quantity - NER-I (Mizoram, Tripura, Meghalaya)
	3 in the Table: V. (17)		
6	Passive Infrastructure (Rack)		
6.1	Rack at Block locations (as per Section (IV C), Annexure-B, VI)	Nos	130
6.2	Rack at GP locations (as per Section (IV C), Annexure-B, VI)	Nos	3,817
7	Active Infrastructure (Router at Block Location)		
7.1	IP-MPLS Router at Block location Supply of router at Block locations with accessories including installation, integration, testing and commissioning (as per Section (IV C), Annexure-B, II & III)	Nos	130
7.2	SFP 100G (with 40km / 80km) pluggable	Nos	260
7.3	SFP 10G (with 10km/40km/80km) pluggable	Nos	3,258
7.4	SFP 1G with 10km pluggable		
7.5	EMS for Block routers (including H/W, S/W & licenses)	No. of network elements	65
7.6	EMS additional license including H/W and S/W upgradation	No. of network elements	65
8	Active Infrastructure (Router GP Location)		
8.1	IP-MPLS Router at GP location Supply of router at GP locations with accessories including installation, integration, testing and commissioning (as per Section (IV C), Annexure-B, II & III)	Nos	3,817
8.2	SFP 10G with 10Km pluggable	Nos	49,621
8.3	SFP 1G with 10km pluggable		
8.4	EMS for GP routers (including H/W, S/W & licenses)	No. of network elements	1,909
8.5	EMS additional licenses including H/W and S/W upgradation	No. of network elements	1,908
9	Active Infrastructure (RFMS)		

Sr No.	Item Description	Unit	Total quantity - NER-I (Mizoram, Tripura, Meghalaya)
9.1	Remote Fibre Monitoring System (RFMS) system including necessary hardware and software with accessories including installation, integration, testing and commissioning (as per Section (IV C), Annexure-B, V)	Nos	130
9.2	EMS for RFMS (including H/W, S/W & licenses)	No. of RTUs	65
9.3	EMS additional license including H/W and S/W upgradation	No. of RTUs	65
10	State NOC		
10.1	State NOC as per details and specification given at Section (IV C), Annexure-B, IV)	Nos	1
11	Passive Infrastructure (Power)		
11.1	Power System with backup provisions at GP locations with accessories including installation, integration, testing and commissioning with provision of MPPT Card including solar panels (as per Section (IV C), Annexure-B, VIII)	Nos	1,909
11.2	Power System with backup provisions at GP locations with accessories including installation, integration, testing and commissioning with provision of slot for MPPT Card BUT excluding MPPT Card & solar panels (as per Section (IV C), Annexure-B, VIII)	Nos	1,908
11.3	MPPT solar module of 1 KW (as per sub section VIII of Annexure B of Section IV C - Amendment no. 12)	Nos	764
12	Supply of 6F Aerial drop OFC including services for last mile connectivity, as described at serial No.-4 in the Table: V. (17)	Km	13,156
13	Supply, installation including services of RCC Poles – 7/8 meter working load of 115 Kgs for last mile connectivity	Nos	26,312
14	Supply and installation of Joint Chamber as per E.I. for restoration of existing network	Nos	1,398
15	Supply, installation of Joint Closure, testing and splicing 24 F for Dark Fibre Provisioning and/or attending OFC fault for the first time in a joint as per TEC GR/ E.I. for restoration of existing network	Nos	1,398

TABLE: V. (12): SoR for IP-MPLS ring in Package - 12 (Punjab)

Sr No.	Item Description	Unit	Total Quantity - Punjab
1	Package Summary		
1.1	No. of Blocks	Nos	151
1.2	No. of GPs	Nos	13,337
1.2a	No. of GPs for creation	Nos	673
1.2b	No. of GPs for upgradation	Nos	12,664
1.3	No. of Villages for last mile connectivity	Nos	-
2	Existing Network		
2.1	Total GPs (Connected on OFC)	Nos	12,664
2.2	Total GPs (Connected on Satellite)	Nos	4
2.3	Existing leased RKM from BSNL	RKM	7,421
2.4	Total incremental 24F RKM	RKM	11,447
2.5	Total incremental 48F RKM	RKM	10,792
2.6	OLT installed (Nos.)	Nos	294
2.7	ONT installed	Nos	12,664
3	Passive Infrastructure		
3.1	Fibre Distribution Management System Type I at Block location	Nos	151
3.2	Fibre Termination Box/FDMS Type-IIIA & IIIB – 48F at GP locations	Nos	13,337
4	Underground Fibre Services		
4.1	Supply of 24F OFC, duct and accessories including all the services, as described at serial No.-1 in the Table: V. (17)	RKM	11,204
4.2	Supply of 48F OFC, duct and accessories including all the services, as described at serial No.-2 in the Table: V. (17)	RKM	4,118
5	Aerial Fibre Services		
5.1	Supply of 24F ADSS OFC and accessories including all the services (using existing power poles OR including supply of Poles), as described at serial	RKM	99

Sr No.	Item Description	Unit	Total Quantity - Punjab
	No.-3 in the Table: V. (17)		
6	Passive Infrastructure (Rack)		
6.1	Rack at Block locations (as per Section (IV C), Annexure-B, VI)	Nos	151
6.2	Rack at GP locations (as per Section (IV C), Annexure-B, VI)	Nos	13,337
7	Active Infrastructure (Router at Block Location)		
7.1	IP-MPLS Router at Block location Supply of router at Block locations with accessories including installation, integration, testing and commissioning (as per Section (IV C), Annexure-B, II & III)	Nos	151
7.2	SFP 100G (with 40km / 80km) pluggable	Nos	302
7.3	SFP 10G (with 10km/40km/80km) pluggable	Nos	4,832
7.4	SFP 1G with 10km pluggable		
7.5	EMS for Block routers (including H/W, S/W & licenses)	No. of network elements	76
7.6	EMS additional license including H/W and S/W upgradation	No. of network elements	75
8	Active Infrastructure (Router GP Location)		
8.1	IP-MPLS Router at GP location Supply of router at GP locations with accessories including installation, integration, testing and commissioning (as per Section (IV C), Annexure-B, II & III)	Nos	13,337
8.2	SFP 10G with 10Km pluggable	Nos	1,73,381
8.3	SFP 1G with 10km pluggable		
8.4	EMS for GP routers (including H/W, S/W & licenses)	No. of network elements	6,669
8.5	EMS additional licenses including H/W and S/W upgradation	No. of network elements	6,668
9	Active Infrastructure (RFMS)		

Sr No.	Item Description	Unit	Total Quantity - Punjab
9.1	Remote Fibre Monitoring System (RFMS) system including necessary hardware and software with accessories including installation, integration, testing and commissioning (as per Section (IV C), Annexure-B, V)	Nos	151
9.2	EMS for RFMS (including H/W, S/W & licenses)	No. of RTUs	76
9.3	EMS additional license including H/W and S/W upgradation	No. of RTUs	75
10	State NOC		
10.1	State NOC as per details and specification given at Section (IV C), Annexure-B, IV)	Nos	1
11	Passive Infrastructure (Power)		
11.1	Power System with backup provisions at GP locations with accessories including installation, integration, testing and commissioning with provision of MPPT Card including solar panels (as per Section (IV C), Annexure-B, VIII)	Nos	3,334
11.2	Power System with backup provisions at GP locations with accessories including installation, integration, testing and commissioning with provision of slot for MPPT Card BUT excluding MPPT Card & solar panels (as per Section (IV C), Annexure-B, VIII)	Nos	10,003
11.3	MPPT solar module of 1 KW (as per sub section VIII of Annexure B of Section IV C - Amendment no. 12)	Nos	2,668
12	Supply of 6F Aerial drop OFC including services for last mile connectivity, as described at serial No.-4 in the Table: V. (17)	Km	-
13	Supply, installation including services of RCC Poles – 7/8 meter working load of 115 Kgs for last mile connectivity	Nos	-
14	Supply and installation of Joint Chamber as per E.I. for restoration of existing network	Nos	22,239
15	Supply, installation of Joint Closure, testing and splicing 24 F for Dark Fibre Provisioning and/or attending OFC fault for the first time in a joint as per TEC GR/ E.I. for restoration of existing network	Nos	22,239

TABLE: V. (13): SoR for IP-MPLS ring in Package - 13 (Jammu & Kashmir and Ladakh)

Sr No.	Item Description	Unit	Total Quantity - J&K	Total Quantity - Ladakh
1	Package Summary			
1.1	No. of Blocks	Nos	287	31
1.2	No. of GPs	Nos	4,299	193
1.2a	No. of GPs for creation	Nos	3,886	193
1.2b	No. of GPs for upgradation	Nos	413	-
1.3	No. of Villages for last mile connectivity	Nos	2,574	51
2	Existing Network			
2.1	Total GPs (Connected on OFC)	Nos	413	-
2.2	Total GPs (Connected on Satellite)	Nos	692	193
2.3	Existing leased RKM from BSNL	RKM	308	-
2.4	Total incremental 24F RKM	RKM	782	-
2.5	Total incremental 48F RKM	RKM	-	-
2.6	OLT installed	Nos	18	-
2.7	ONT installed	Nos	413	-
3	Passive Infrastructure			
3.1	Fibre Distribution Management System Type I at Block location	Nos	287	31
3.2	Fibre Termination Box/FDMS Type-IIIA & IIIB – 48F at GP locations	Nos	4,299	193
4	Underground Fibre Services			
4.1	Supply of 24F OFC, duct and accessories including all the services, as described at serial No.-1 in the Table: V. (17)	RKM	6,536	735
4.2	Supply of 48F OFC, duct and accessories including all the services, as described at serial No.-2 in the Table: V. (17)	RKM	4,813	117
5	Aerial Fibre Services			
5.1	Supply of 24F ADSS OFC and accessories including all the services (using	RKM	438	669

Sr No.	Item Description	Unit	Total Quantity - J&K	Total Quantity - Ladakh
	existing power poles OR including supply of Poles), as described at serial No.-3 in the Table: V. (17)			
6	Passive Infrastructure (Rack)			
6.1	Rack at Block locations (as per Section (IV C), Annexure-B, VI)	Nos	287	31
6.2	Rack at GP locations (as per Section (IV C), Annexure-B, VI)	Nos	4,299	193
7	Active Infrastructure (Router at Block Location)			
7.1	IP-MPLS Router at Block location Supply of router at Block locations with accessories including installation, integration, testing and commissioning (as per Section (IV C), Annexure-B, II & III)	Nos	287	31
7.2	SFP 100G (with 40km / 80km) pluggable	Nos	574	62
7.3	SFP 10G (with 10km/40km/80km) pluggable	Nos	3,329	316
7.4	SFP 1G with 10km pluggable			
7.5	EMS for Block routers (including H/W, S/W & licenses)	No. of network elements		159
7.6	EMS additional license including H/W and S/W upgradation	No. of network elements		159
8	Active Infrastructure (Router GP Location)			
8.1	IP-MPLS Router at GP location Supply of router at GP locations with accessories including installation, integration, testing and commissioning (as per Section (IV C), Annexure-B, II & III)	Nos	4,299	193
8.2	SFP 10G with 10Km pluggable	Nos	55,887	2,509
8.3	SFP 1G with 10km pluggable			
8.4	EMS for GP routers (including H/W, S/W & licenses)	No. of network		2,246

Sr No.	Item Description	Unit	Total Quantity - J&K	Total Quantity - Ladakh
		elements		
8.5	EMS additional licenses including H/W and S/W upgradation	No. of network elements		2,246
9	Active Infrastructure (RFMS)			
9.1	Remote Fibre Monitoring System (RFMS) system including necessary hardware and software with accessories including installation, integration, testing and commissioning (as per Section (IV C), Annexure-B, V)	Nos	287	31
9.2	EMS for RFMS (including H/W, S/W & licenses)	No. of RTUs		159
9.3	EMS additional license including H/W and S/W upgradation	No. of RTUs		159
10	State NOC			
10.1	State NOC as per details and specification given at Section (IV C), Annexure-B, IV)	Nos		1
11	Passive Infrastructure (Power)			
11.1	Power System with backup provisions at GP locations with accessories including installation, integration, testing and commissioning with provision of MPPT Card including solar panels (as per Section (IV C), Annexure-B, VIII)	Nos	2,150	97
11.2	Power System with backup provisions at GP locations with accessories including installation, integration, testing and commissioning with provision of slot for MPPT Card BUT excluding MPPT Card & solar panels (as per Section (IV C), Annexure-B, VIII)	Nos	2,149	96
11.3	MPPT solar module of 1 KW (as per sub section VIII of Annexure B of Section IV C - Amendment no. 12)	Nos	860	39
12	Supply of 6F Aerial drop OFC including services for last mile connectivity, as described at serial No.-4 in the Table: V. (17)	Km	4,530	90

Sr No.	Item Description	Unit	Total Quantity - J&K	Total Quantity - Ladakh
13	Supply, installation including services of RCC Poles – 7/8 meter working load of 115 Kgs for last mile connectivity	Nos	9,060	180
14	Supply and installation of Joint Chamber as per E.I. for restoration of existing network	Nos	782	-
15	Supply, installation of Joint Closure, testing and splicing 24 F for Dark Fibre Provisioning and/or attending OFC fault for the first time in a joint as per TEC GR/ E.I. for restoration of existing network	Nos		782

TABLE: V. (14): SoR for IP-MPLS ring in Package - 14 (Assam)

Sr No.	Item Description	Unit	Total Quantity Assam
1	Package Summary		
1.1	No. of Blocks	Nos	229
1.2	No. of GPs	Nos	2,665
1.2a	No. of GPs for creation	Nos	1,163
1.2b	No. of GPs for upgradation	Nos	1,502
1.3	No. of Villages for last mile connectivity	Nos	25,250
2	Existing Network		
2.1	Total GPs (Connected on OFC)	Nos	1,502
2.2	Total GPs (Connected on Satellite)	Nos	5
2.3	Existing leased RKM from BSNL	RKM	3,324
2.4	Total incremental 24F RKM	RKM	4,435
2.5	Total incremental 48F RKM	RKM	-
2.6	OLT installed	Nos	134
2.7	ONT installed	Nos	1,502
3	Passive Infrastructure		
3.1	Fibre Distribution Management System Type I at Block location	Nos	229
3.2	Fibre Termination Box/FDMS Type-IIIA & IIIB – 48F at GP locations	Nos	2,665
4	Underground Fibre Services		
4.1	Supply of 24F OFC, duct and accessories including all the services, as described at serial No.-1 in the Table: V. (17)	RKM	12,324
4.2	Supply of 48F OFC, duct and accessories including all the services, as described at serial No.-2 in the Table: V. (17)	RKM	-
5	Aerial Fibre Services		
5.1	Supply of 24F ADSS OFC and accessories including all the services (using existing power poles OR including supply of Poles), as described at serial No.-3 in the Table: V. (17)	RKM	-
6	Passive Infrastructure (Rack)		

Sr No.	Item Description	Unit	Total Quantity Assam
6.1	Rack at Block locations (as per Section (IV C), Annexure-B, VI)	Nos	229
6.2	Rack at GP locations (as per Section (IV C), Annexure-B, VI)	Nos	2,665
7	Active Infrastructure (Router at Block Location)		
7.1	IP-MPLS Router at Block location Supply of router at Block locations with accessories including installation, integration, testing and commissioning (as per Section (IV C), Annexure-B, II & III)	Nos	229
7.2	SFP 100G (with 40km / 80km) pluggable	Nos	458
7.3	SFP 10G (with 10km/40km/80km) pluggable	Nos	7,557
7.4	SFP 1G with 10km pluggable		
7.5	EMS for Block routers (including H/W, S/W & licenses)	No. of network elements	115
7.6	EMS additional license including H/W and S/W upgradation	No. of network elements	114
8	Active Infrastructure (Router GP Location)		
8.1	IP-MPLS Router at GP location Supply of router at GP locations with accessories including installation, integration, testing and commissioning (as per Section (IV C), Annexure-B, II & III)	Nos	2,665
8.2	SFP 10G with 10Km pluggable	Nos	34,645
8.3	SFP 1G with 10km pluggable		
8.4	EMS for GP routers (including H/W, S/W & licenses)	No. of network elements	1,333
8.5	EMS additional licenses including H/W and S/W upgradation	No. of network elements	1,332
9	Active Infrastructure (RFMS)		
9.1	Remote Fibre Monitoring System (RFMS) system including necessary hardware and software with accessories including installation, integration, testing and commissioning (as	Nos	229

Sr No.	Item Description	Unit	Total Quantity Assam
	per Section (IV C), Annexure-B, V)		
9.2	EMS for RFMS (including H/W, S/W & licenses)	No. of RTUs	115
9.3	EMS additional license including H/W and S/W upgradation	No. of RTUs	114
10	State NOC		
10.1	State NOC as per details and specification given at Section (IV C), Annexure-B, IV)	Nos	1
11	Passive Infrastructure (Power)		
11.1	Power System with backup provisions at GP locations with accessories including installation, integration, testing and commissioning with provision of MPPT Card including solar panels (as per Section (IV C), Annexure-B, VIII)	Nos	1,066
11.2	Power System with backup provisions at GP locations with accessories including installation, integration, testing and commissioning with provision of slot for MPPT Card BUT excluding MPPT Card & solar panels (as per Section (IV C), Annexure-B, VIII)	Nos	1,599
11.3	MPPT solar module of 1 KW (as per sub section VIII of Annexure B of Section IV C - Amendment no. 12)	Nos	533
12	Supply of 6F Aerial drop OFC including services for last mile connectivity, as described at serial No.-4 in the Table: V. (17)	Km	34,845
13	Supply, installation including services of RCC Poles – 7/8 meter working load of 115 Kgs for last mile connectivity	Nos	69,690
14	Supply and installation of Joint Chamber as per E.I. for restoration of existing network	Nos	4,435
15	Supply, installation of Joint Closure, testing and splicing 24 F for Dark Fibre Provisioning and/or attending OFC fault for the first time in a joint as per TEC GR/ E.I. for restoration of existing network	Nos	4,435

TABLE: V. (15): SoR for IP-MPLS ring in Package - 15 (NER - II)

Sr No.	Item Description	Unit	Total quantity -NER-II (Arunchal Pradesh, Nagaland, Manipur)
1	Package Summary		
1.1	No. of Blocks	Nos	258
1.2	No. of GPs	Nos	5,902
1.2a	No. of GPs for creation	Nos	5,394
1.2b	No. of GPs for upgradation	Nos	508
1.3	No. of Villages for last mile connectivity	Nos	5,407
2	Existing Network		
2.1	Total GPs (Connected on OFC)	Nos	508
2.2	Total GPs (Connected on Satellite)	Nos	2,420
2.3	Existing leased RKM from BSNL	RKM	190
2.4	Total incremental 24F RKM	RKM	733
2.5	Total incremental 48F RKM	RKM	-
2.6	OLT installed (Nos.)	Nos	66
2.7	ONT installed	Nos	508
3	Passive Infrastructure		
3.1	Fibre Distribution Management System Type I at Block location	Nos	258
3.2	Fibre Termination Box/FDMS Type-IIIA & IIIB – 48F at GP locations	Nos	5,902
4	Underground Fibre Services		
4.1	Supply of 24F OFC, duct and accessories including all the services, as described at serial No.-1 in the Table: V. (17)	RKM	1,819
4.2	Supply of 48F OFC, duct and accessories including all the services, as described at serial No.-2 in the Table: V. (17)	RKM	24
5	Aerial Fibre Services		
5.1	Supply of 24F ADSS OFC and accessories including all the services (using existing power poles OR including supply of Poles), as described at serial	RKM	10,347

Sr No.	Item Description	Unit	Total quantity -NER-II (Arunchal Pradesh, Nagaland, Manipur)
	No.-3 in the Table: V. (17)		
6	Passive Infrastructure (Rack)		
6.1	Rack at Block locations (as per Section (IV C), Annexure-B, VI)	Nos	258
6.2	Rack at GP locations (as per Section (IV C), Annexure-B, VI)	Nos	5,902
7	Active Infrastructure (Router at Block Location)		
7.1	IP-MPLS Router at Block location Supply of router at Block locations with accessories including installation, integration, testing and commissioning (as per Section (IV C), Annexure-B, II & III)	Nos	258
7.2	SFP 100G (with 40km / 80km) pluggable	Nos	516
7.3	SFP 10G (with 10km/40km/80km) pluggable	Nos	4,533
7.4	SFP 1G with 10km pluggable		
7.5	EMS for Block routers (including H/W, S/W & licenses)	No. of network elements	129
7.6	EMS additional license including H/W and S/W upgradation	No. of network elements	129
8	Active Infrastructure (Router GP Location)		
8.1	IP-MPLS Router at GP location Supply of router at GP locations with accessories including installation, integration, testing and commissioning (as per Section (IV C), Annexure-B, II & III)	Nos	5,902
8.2	SFP 10G with 10Km pluggable	Nos	76,726
8.3	SFP 1G with 10km pluggable		
8.4	EMS for GP routers (including H/W, S/W & licenses)	No. of network elements	2,951

Sr No.	Item Description	Unit	Total quantity -NER-II (Arunchal Pradesh, Nagaland, Manipur)
8.5	EMS additional licenses including H/W and S/W upgradation	No. of network elements	2,951
9	Active Infrastructure (RFMS)		
9.1	Remote Fibre Monitoring System (RFMS) system including necessary hardware and software with accessories including installation, integration, testing and commissioning (as per Section (IV C), Annexure-B, V)	Nos	258
9.2	EMS for RFMS (including H/W, S/W & licenses)	No. of RTUs	129
9.3	EMS additional license including H/W and S/W upgradation	No. of RTUs	129
10	State NOC		
10.1	State NOC as per details and specification given at Section (IV C), Annexure-B, IV)	Nos	1
11	Passive Infrastructure (Power)		
11.1	Power System with backup provisions at GP locations with accessories including installation, integration, testing and commissioning with provision of MPPT Card including solar panels (as per Section (IV C), Annexure-B, VIII)	Nos	2,951
11.2	Power System with backup provisions at GP locations with accessories including installation, integration, testing and commissioning with provision of slot for MPPT Card BUT excluding MPPT Card & solar panels (as per Section (IV C), Annexure-B, VIII)	Nos	2,951
11.3	MPPT solar module of 1 KW (as per sub section VIII of Annexure B of Section IV C - Amendment no. 12)	Nos	1,181
12	Supply of 6F Aerial drop OFC including services for last mile connectivity, as described at serial No.-4 in the Table: V. (17)	Km	23,932
13	Supply, installation including services of RCC Poles – 7/8 meter working load of 115 Kgs for last mile connectivity	Nos	47,864
14	Supply and installation of Joint Chamber as per E.I. for restoration of existing network	Nos	733

Sr No.	Item Description	Unit	Total quantity -NER-II (Arunchal Pradesh, Nagaland, Manipur)
15	Supply, installation of Joint Closure, testing and splicing 24 F for Dark Fibre Provisioning and/or attending OFC fault for the first time in a joint as per TEC GR/ E.I. for restoration of existing network	Nos	733

TABLE: V. (16): SoR for IP-MPLS ring in Package - 16 (Kerala)

Sr No.	Item Description	Unit	Total Quantity (Kerala)
1	Package Summary		
1.1	No. of Blocks	Nos	152
1.2	No. of GPs	Nos	978
1.2a	No. of GPs for creation	Nos	1
1.2b	No. of GPs for upgradation	Nos	977
1.3	No. of Villages for last mile connectivity	Nos	392
2	Existing Network		
2.1	Total GPs (Connected on OFC)	Nos	977
2.2	Total GPs (Connected on Satellite)	Nos	1
2.3	Existing leased RKM from BSNL	RKM	7,431
2.4	Total incremental 24F RKM	RKM	754
2.5	Total incremental 48F RKM	RKM	-
2.6	OLT installed	Nos	146
2.7	ONT installed	Nos	977
3	Passive Infrastructure		
3.1	Fibre Distribution Management System Type I at Block location	Nos	152
3.2	Fibre Termination Box/FDMS Type-IIIA & IIIB – 48F at GP locations	Nos	978
4	Underground Fibre Services		
4.1	Supply of 24F OFC, duct and accessories including all the services, as described at serial No.-1 in the Table: V. (17)	RKM	8,492
4.2	Supply of 48F OFC, duct and accessories including all the services, as described at serial No.-2 in the Table: V. (17)	RKM	-
5	Aerial Fibre Services		
5.1	Supply of 24F ADSS OFC and accessories including all the services (using existing power poles OR including supply of Poles), as described at serial No.-3 in the Table: V. (17)	RKM	8
6	Passive Infrastructure (Rack)		
6.1	Rack at Block locations (as per Section (IV C), Annexure-B, VI)	Nos	152

Sr No.	Item Description	Unit	Total Quantity (Kerala)
6.2	Rack at GP locations (as per Section (IV C), Annexure-B, VI)	Nos	978
7	Active Infrastructure (Router at Block Location)		
7.1	IP-MPLS Router at Block location Supply of router at Block locations with accessories including installation, integration, testing and commissioning (as per Section (IV C), Annexure-B, II & III)	Nos	152
7.2	SFP 100G (with 40km / 80km) pluggable	Nos	304
7.3	SFP 10G (with 10km/40km/80km) pluggable	Nos	1,824
7.4	SFP 1G with 10km pluggable		
7.5	EMS for Block routers (including H/W, S/W & licenses)	No. of network elements	76
7.6	EMS additional license including H/W and S/W upgradation	No. of network elements	76
8	Active Infrastructure (Router GP Location)		
8.1	IP-MPLS Router at GP location Supply of router at GP locations with accessories including installation, integration, testing and commissioning (as per Section (IV C), Annexure-B, II & III)	Nos	978
8.2	SFP 10G with 10Km pluggable	Nos	12,714
8.3	SFP 1G with 10km pluggable		
8.4	EMS for GP routers (including H/W, S/W & licenses)	No. of network elements	489
8.5	EMS additional licenses including H/W and S/W upgradation	No. of network elements	489
9	Active Infrastructure (RFMS)		
9.1	Remote Fibre Monitoring System (RFMS) system including necessary hardware and software with accessories including installation, integration, testing and commissioning (as per Section (IV C), Annexure-B, V)	Nos	152

Sr No.	Item Description	Unit	Total Quantity (Kerala)
9.2	EMS for RFMS (including H/W, S/W & licenses)	No. of RTUs	76
9.3	EMS additional license including H/W and S/W upgradation	No. of RTUs	76
10	State NOC		
10.1	State NOC as per details and specification given at Section (IV C), Annexure-B, IV)	Nos	1
11	Passive Infrastructure (Power)		
11.1	Power System with backup provisions at GP locations with accessories including installation, integration, testing and commissioning with provision of MPPT Card including solar panels (as per Section (IV C), Annexure-B, VIII)	Nos	245
11.2	Power System with backup provisions at GP locations with accessories including installation, integration, testing and commissioning with provision of slot for MPPT Card BUT excluding MPPT Card & solar panels (as per Section (IV C), Annexure-B, VIII)	Nos	733
11.3	MPPT solar module of 1 KW (as per sub section VIII of Annexure B of Section IV C - Amendment no. 12)	Nos	196
12	Supply of 6F Aerial drop OFC including services for last mile connectivity, as described at serial No.-4 in the Table: V. (17)	Km	1,756
13	Supply, installation including services of RCC Poles – 7/8 meter working load of 115 Kgs for last mile connectivity	Nos	3,512
14	Supply and installation of Joint Chamber as per E.I. for restoration of existing network	Nos	754
15	Supply, installation of Joint Closure, testing and splicing 24 F for Dark Fibre Provisioning and/or attending OFC fault for the first time in a joint as per TEC GR/ E.I. for restoration of existing network	Nos	754

TABLE: V. (17):
Detailed description of the line items, referred in the SOR of Packages- 1 to 16

S. No.	SOR S. No.	Item Description
1	4.1	Supply of 24F OFC, Duct and Accessories including all the services, as described below: 1. Physical survey of block to GP route, capturing the Latitude-Longitude of OF cable route, electronics infrastructure and power infrastructure, preparation of GIS survey report before execution of works. 2. Supply of 24F armoured optical fibre cable (OFC), duct (40/33 mm) along with accessories and joint chambers, RCC route/ joint indicators, SJC, BJC, FTB/ FDMS or any other accessories required as per TEC-GR including transportation, freight, insurance and warehousing etc. 3. Excavation of trench for PLB pipe laying, backfilling, reinstatement, and compaction after laying of PLB pipe, laying / blowing of optical Fibre Cable inside laid PLB pipe, splicing and jointing of Optical Fibre Cable including supply of As Built Diagram (ABD) of constructed OFC Route. This shall include fixing of joint chamber, manhole, splice closure, Fixing, painting and sign writing of Route /Joint Indicators, termination at FTB/FDMS and all the relevant accessories etc. The work also includes road / bridge crossing, providing protection as per EI wherever required and obtaining Right-of-Way (RoW) permissions. 4. Commissioning, Acceptance Testing and makeover of the routes, commissioning of armoured optical fibre connectivity from the Block PoP to GP room and termination at GP router and end to end testing of dark and lit fibre per GP (for Underground laying) (as per the Engineering Instruction given at Section (IV C), Annexure-C) 5. Capturing the Latitude-Longitude of OF route & joint location after execution of works from Block to GP and capturing coordinates of electronics infrastructure & power infrastructure along with integration of GIS data with As Built Diagram of OF routes, videography and photos as defined in scope of work section of this RFP.
2	4.2	Supply of 48F OFC, Duct and Accessories including all the services, as described below: 1. Physical survey of block to GP route, capturing the Latitude-Longitude of OF cable route, electronics

S. No.	SOR S. No.	Item Description
		infrastructure and power infrastructure, preparation of GIS survey report before execution of works. 2. Supply of 48F Ribbon type armoured Optical Fibre Cable (OFC), duct (40/33 mm) along with accessories and joint chambers, RCC route/joint indicators, SJC, BJC, FTB/FDMS or any other accessories required as per TEC-GR including transportation, freight, insurance and warehousing etc. 3. Excavation of trench for PLB pipe laying, backfilling, reinstatement and compaction after laying of PLB pipe, laying / blowing of optical Fibre Cable inside laid PLB pipe, splicing and jointing of Optical Fibre Cable including supply of As Built Diagram (ABD) of constructed OFC Route. This shall include fixing of joint chamber, manhole, splice closure, Fixing, painting and sign writing of Route /Joint Indicators, termination at FTB/FDMS and all the relevant accessories etc. The work also includes road / bridge crossing, providing protection as per EI wherever required and obtaining Right-of-Way (RoW) permissions. 4. Commissioning, Acceptance Testing and makeover of the routes, commissioning of armoured optical fibre connectivity from the Block PoP to GP room and termination at GP router and end to end testing of dark and lit fibre per GP (for Underground laying) (as per the Engineering Instruction at Section (IV C), Annexure-C). 5. Capturing the Latitude-Longitude of OF route & joint location after execution of works from Block to GP and capturing coordinates of electronics infrastructure & power infrastructure along with integration of GIS data with As Built Diagram of OF routes, videography and photos as defined in scope of work section of this RFP.
3	5.1	Supply of 24F ADSS OFC and accessories including all the services (using existing power poles OR including supply of Poles), as described at serial No.-3 in the Table: V. (17) 1. Physical Survey of block to GP route, capturing the Latitude-Longitude of OF cable route, electronics infrastructure and power infrastructure, preparation of GIS survey report before execution of works. 2. Supply of Self-supporting Metal Free Aerial Optical Fibre Cable (24F ADSS) along with required accessories, including RCC poles and joint chambers, SJC, BJC, FTB/FDMS, or any other accessories as per TEC GR, encompassing transportation, freight, insurance, and warehousing.

S. No.	SOR S. No.	Item Description
		3. Slings / Laying and commissioning of 24 core optical fibre connectivity from Block PoP to GP room and termination at GP Router. The cost shall include laying, fittings, splicing, splitting, splice closure, Pole clamping installation, termination at FTB/FDMS & all the relevant accessories etc. and end to end testing of dark and lit fibre per GP (For Aerial laying) of Optical Fibre Cable. Supply of As Built Diagram (ABD) of constructed OFC Route and Acceptance Testing, commissioning and makeover of the routes. The work also includes road / bridge crossing, providing protection as per EI wherever required and obtaining Right-of-Way (RoW) permissions. (As per the Engineering Instruction at Section (IV C), Annexure-C) 4. Installation by utilizing existing power infrastructure of State Discoms upto extent maximum possible OR RCC Poles swaged of the length 7/8 meters (includes installation) not utilizing existing power infrastructure of State Discoms 5. Capturing the Latitude-Longitude of OF route & joint location after execution of works from Block to GP and capturing coordinates of electronics infrastructure & power infrastructure along with integration of GIS data with As Built Diagram of OF routes, videography and photos as defined in scope of work section of this RFP
4	12	Supply of 6F Aerial Drop OFC and Accessories including all the services as per clause 3.10 Last mile connectivity of Section IV-B

Note 1: The quantities mentioned in SOR and Price Bid Format are only indicative. The actual quantities may vary as per the field survey and requirement. Initially, only the UP GPs and corresponding OFC routes shall be made over to the PIA. The PIA will be bound to take over the network, on as is where is basis, irrespective of the number of GPs and associated OFC route length. The GPs and associated OFC routes shall be made over progressively as and when the required optical power in the faulty GPs is made available by BSNL. The estimated quantities in the SOR are ultimate quantities for the entire network when all the GPs shall be UP and made over to the PIA.

Note 2: If the outgoing PMA/FMA fails to make some GPs, the PIA shall be bound to take over the same and make the GPs UP by carrying out restoration activities as per Pre-Defined rates and start the O&M of such restored GPs.

Note 3: RKM is the Route Kilometres. The RKM shall be measured through GIS system as mentioned in the Amendment#2. However, RKM shall be measured by Rodo Meter till the implementation of GIS system.

Note 4: Normally, the length of Duct used is almost 6% higher than the RKM and OFC Kms is higher by around 10%. The bidders, while quoting the rates must account for the same.

Note 5: BSNL may or may not procure the EMS for active equipment as per SOR items at Sr. Nos. 7.5, 7.6, 8.4, 8.5, 9.2 and 9.3. However, quoted rates of these items shall be part of package price for bid evaluation. BSNL may decide to order one EMS of an OEM in any one package to cater more than one packages, based on actual requirement, along with additional licenses for integrating the network elements of other packages. PIA of the package where the EMS has been procured shall be obliged to integrate the network elements of other packages as decided by BSNL and also to facilitate the integration of the EMS with the S-NOC of such other packages for enabling the O&M by the PIA of such other packages. BSNL may procure any number of additional licenses in multiple of 100 licenses. Similarly, the PIA of the package from whom the EMS has not been procured, shall integrate all its network elements and S-NOC with the EMS of the package where the same has been procured by BSNL. In such case, BSNL shall provide the DCN connectivity required to establish this integration for smooth functioning of network.

Note 6: Any other item required for completion of the project as per scope of work including but not limited to patch cords, connectors, installation material, adapters, attenuators, software, hardware etc. shall be supplied by the PIA without any additional cost to BSNL

Note 7: Regarding ADSS OFC implementation (as per item# 5 of SoR of all packages), the PIA may use GI poles also as per BIS standard No. BIS-2713 in place of RCC poles without any extra cost to BSNL.

Note-8 - Regarding ADSS OFC implementation (as per item# 5 of SoR of all packages), if the PIA needs to install some additional poles, such requirement shall be submitted to the Independent Engineer. BSNL shall consider such requirement on the case-to-case basis, based on recommendations of IE and the cost of such additional poles shall be paid as per Amendment No.- 10.4.3 (regarding cost of Pole to be used in Last Mile Connectivity).

Note-9 – In case of areas which are prone to heavy snow fall in the States of Himachal Pradesh, Uttarakhand, NE-I circle & NE-II circle, the PIA can use OFC with Ice Loading (in place of OFC without ice loading) for which BSNL shall pay additional amount of Rs. 10/- per Meter, however quantity of such OFC (with Ice Loading) shall not exceed 5% of the total quantity in the State. There shall be no such limit in the UTs of J&K and Ladakh.

Note-10 – Since the OFC, to be used, is armoured; in order to trace the faults, suitable Cable Locator with each FRT is to be provided by the PIA.

Note-11 – The GPs connected on Satellite (as per item # 2.2) are considered for providing connectivity under “No. of GPs for creation (as per item # 1.2a)”.

Note-12 – PIA shall ensure provisioning of additional RFMS/ ports in case of multiple rings in a block

SECTION-VI: BID FORM

(whole Bid Form {with Annexure} as per Amendment No. 23.11)

Date:

To

From,

.....
.....
.....

Ref: Your Tender Enquiry No.

Dated

Having examined the above mentioned tender enquiry document including amendment/ clarification/ addenda Nos dated the receipt of which is hereby duly acknowledged, we, the undersigned, offer to supply and deliver in conformity with the said drawings, conditions of contract and specifications for the sum shown in the schedule of prices attached herewith and made part of this Bid.

1. We undertake, if our Bid is accepted, to complete delivery of all the items and perform all the services specified in the contract in accordance with the delivery schedule specified in the General Commercial Conditions, read with modification, if any, in (Section - IV – “Special Conditions of Contract”).
2. If our Bid is accepted, we will provide you with a performance guarantee of a nationalized/Scheduled Bank(except co-operative banks), in accordance with clause-4 of Section-III of this tender document, for the due performance of the contract. *(As mentioned in corrigendum dated 08/06/2024, point 2 revised to changes as per Amendment No. 6.37)*
3. We agree to abide by this Bid for a period of **180 days** from the date fixed for Bid opening or for subsequently extended period, if any, agreed to by us. This bid shall remain binding upon us upto the aforesaid period and may be accepted at any time before the expiration of that period.
4. Until a formal Purchase Order of Contract is prepared and executed, this Bid together with your written acceptance thereof in your notification of award shall constitute a binding contract between us.
5. Bid submitted by us is properly sealed and prepared so as to prevent any subsequent alteration and replacement.
6. We understand that you are not bound to accept the lowest or any bid, you may receive.
7. This bid is being submitted through a legally bound consortium and we hereby submit our irrevocable undertaking (**as per Annexure**) for using the technical experience and turnover of each consortium member to be used to meet the eligibility conditions for

the Package Number: <Package serial number with name of States>

Note: Para-7 may be strike-off, if the bid is being submitted by a sole bidder.

We understand that the Bid document so submitted is the true copy of BSNL tender documents available on BSNL website/ e-tendering portal. Any deviation will result in the rejection of the bid.

Dated this day of 20...

Name and Signature In the capacity of

Duly authorized to sign the bid for and on behalf of bidder

Witness Address.....

Signature

ANNEXURE TO BID FORM

S. NO.	Member of consortium	Total Average Annual Turnover (in Rs Crores)	Turnover to be considered for this package (in Rs Crores)	Technical experience regarding EPC OFC Network Construction		Technical experience regarding O&M of OFC network		Technical experience regarding Telecommunication equipment installation and commissioning	
				Total experience (in Kms)	Experience to be considered for this package (in Kms)	Total experience (in “Year Kms)	Experience to be considered for this package (in Year Kms)	Total experience (No. of Active Nodes)	Experience to be considered for this package (No. of Active Nodes)
A	B	C	D	E	F	G	H	I	J
1	Lead bidder								
2	Consortium Partner -X								
3	Consortium Partner -Y								
	TOTAL								

We undertake that we will abide by the above submissions, especially the figures of experience and turnover to be considered and consumed against this package (<Package Serial No.>) from the total experience & turnover possessed by each of us and shall not represent against disqualification arising in any further package(s) due to shortfall of experience and/ or turnover due to consumption of the same in this package.

Signature (Authorized signatory)
Lead Member

Signature (Authorized signatory)
Consortium Partner -X

Signature (Authorized signatory)
Consortium Partner -Y

NOTE: Bidders possessing the minimum requisite average annual turnover & technical experience for participation in all the 16 packages, may fill only the total average annual turnover & technical experience figures I.E. Columns- C, E, G & I, only.

SECTION-VII: PRICE BID FORMAT

{AMENDMENT No.- 26.8}

TABLE: VII. (1): Price Schedule of Package - 1 (MP and DD/DNH)

Sr. No.	Item Description	Unit	Unit cost (INR) (excl. tax)	Quantity- MP and DD/DNH	Total Cost (INR) (Excl. tax)	Rate of CGST	Rate of SGST	Rate of IGST	Total GST (in INR)	Total cost (Inclusive Of GST) (in INR)		HSN/ SAC Code
			A	B	C=A*B	D	E	F	G=C*[(D+E) or F]	H=C+G		
1a	Supply of 24F OFC, Duct and Accessories including all the services, as described at Serial No.-1 in the Table: VII. (17).	RKM	A	44,652						X1		
1b	Supply of 48F OFC, Duct and Accessories including all the services, as described at Serial No.-2 in the Table: VII. (17).	RKM	1.1 A	20,991						X2		
1c	Supply of 24F ADSS OFC and Accessories including all the services (using existing power Poles), as described at Serial No.-3 in the Table: VII. (17).	RKM	B	3						X3		
1d	Supply of 24F ADSS OFC and Accessories including all the services (7), as described at Serial No.-4 in the Table: VII. (17).	RKM	2.5 B	2						X4		
2	Fibre Distribution Management System Type1 at Block location	Nos	C	316						X5		
3a	IP-MPLS Router at GP location Supply of router at GP locations with accessories including installation, integration, testing and commissioning (as per Section	Nos	D	22,896						X6		

Sr. No.	Item Description	Unit	Unit cost (INR) (excl. tax)	Quantity- MP and DD/DNH	Total Cost (INR) (Excl. tax)	Rate of CGST	Rate of SGST	Rate of IGST	Total GST (in INR)	Total cost (Inclusive Of GST) (in INR)		HSN/ SAC Code
			A	B	C=A*B	D	E	F	G=C*[(D+E) or F]	H=C+G		
	(IV C), Annexure-B, II & III)											
3b	IP-MPLS Router at Block location Supply of router at Block locations with accessories including installation, integration, testing and commissioning (as per Section (IV C), Annexure-B, II & III)	Nos	E	316						X7		
4	SFP 10G with 40 km pluggable	Nos	F	3,12,726						X8		
5	SFP 100G with 40 km pluggable	Nos	G	632						X9		
6a	EMS for GP routers (including H/W, S/W & licenses)	No. of NE	H	11,448						X10		
6b	EMS for Block routers (including H/W, S/W & licenses)	No. of per NE (Ame ndme nt No. 23.9)	I	158						X11		
6c	EMS additional license including H/W and S/W upgradation for GP router	No. of NE	J	11,448						X12		
6d	EMS additional license including H/W and S/W upgradation for Block router	No. of per NE (Ame ndme nt No. 23.9)	K	158						X13		

Sr. No.	Item Description	Unit	Unit cost (INR) (excl. tax)	Quantity- MP and DD/DNH	Total Cost (INR) (Excl. tax)	Rate of CGST	Rate of SGST	Rate of IGST	Total GST (in INR)	Total cost (Inclusive Of GST) (in INR)		HSN/ SAC Code
			A	B	C=A*B	D	E	F	G=C*[(D+E) or F]	H=C+G		
7a	Rack at GP locations (as per Section (IV C), Annexure-B, VI)	Nos	L	22,896						X14		
7b	Rack at Block locations (as per Section (IV C), Annexure-B, VI)	Nos	M	316						X15		
8	Remote Fibre Monitoring System (RFMS) system including necessary hardware and software with accessories including installation, integration, testing and commissioning (as per Section (IV C), Annexure-B, V)	Nos	N	316						X16		
9a	EMS for RFMS (including H/W, S/W & licenses)	No. of RTU	O	158						X17		
9b	EMS additional license including H/W and S/W upgradation for RFMS	No. of RTUs (Amendment No. 23.9)	P	158						X18		
10	State NOC as per details and specification given at Section (IV C), Annexure-B, IV)	Nos	Q	1						X19		
11a	Power System with backup provisions at GP locations with accessories including installation, integration, testing and commissioning with provision of MPPT Card including solar panels (as per Section (IV C), Annexure-B, VIII)	Nos	R	11,440						X20		
11b	Power System with backup	Nos	S	11,456						X21		

Sr. No.	Item Description	Unit	Unit cost (INR) (excl. tax)	Quantity- MP and DD/DNH	Total Cost (INR) (Excl. tax)	Rate of CGST	Rate of SGST	Rate of IGST	Total GST (in INR)	Total cost (Inclusive Of GST) (in INR)		HSN/ SAC Code
			A	B	C=A*B	D	E	F	G=C*[(D+E) or F]	H=C+G		
	provisions at GP locations with accessories including installation, integration, testing and commissioning with provision of slot for MPPT Card BUT excluding MPPT Card & solar panels (as per Section (IV C), Annexure-B, VIII)											
11c	MPPT solar module of 1 KW (as per sub section VIII of Annexure B of Section IV C - Amendment no. 12)	Nos	T	4,580						X22		
12	Supply of 6F Aerial drop OFC including services for last mile connectivity as per TEC GR as described at Serial No. 5 at Table : VII (17)	Km	U	75,314						X23		
13	Supply, installation including services of RCC Poles – 7/8 meter working load of 115 Kgs for last mile connectivity	Nos	V	150,628						X24		
14	Supply and installation of Joint Chamber as per E.I. for restoration of existing network (As per Clause 3.2.9 k) of Section – IV B)	Nos	W	61,917						X25		
15	Supply, installation of Joint Closure, testing and splicing 24 F for Dark Fibre Provisioning and/or attending OFC fault for the first time in a joint as per TEC GR/ E.I. for restoration of existing	Per splicing location	X	61,917						X26		

Sr. No.	Item Description	Unit	Unit cost (INR) (excl. tax)	Quantity- MP and DD/DNH	Total Cost (INR) (Excl. tax)	Rate of CGST	Rate of SGST	Rate of IGST	Total GST (in INR)	Total cost (Inclusive Of GST) (in INR)		HSN/ SAC Code
			A	B	C=A*B	D	E	F	G=C*[(D+E) or F]	H=C+G		
	network (As per Clause 3.2.9 k) of Section – IV B)											
16	Unlicensed Band Radio (UBR) 5.X with 27dbi Antenna, mounting fixture including all installation material and services without mast on either end (equipment to be supplied in pair to be installed at both ends of a link)	Nos		1								
17	Digital Microwave -15GHz 2+0 XPIC 2KQAM with 0.6m Antenna, mounting fixture including all installation material and services without mast on either end (equipment to be supplied in pair to be installed at both ends of a link)	Nos		1								
18	MARR type mast (15 Mtr height) for UBR/DMW	Nos		1								
19	Total cost in INR (X1+X2+X3...+X26)											
	Total cost in word											

TABLE: VII. (2): Price Schedule of Package - 2 (Rajasthan)

Sr. No.	Item Description	Unit	Unit cost (INR) (excl. tax)	Quantity	Total Cost (INR) (Excl. tax)	Rate of CGST	Rate of SGST	Rate of IGST	Total GST (in INR)	Total cost (Inclusive Of GST) (in INR)		HSN/ SAC Code
			A	B	C=A*B	D	E	F	G=C*[(D+E) or F]	H=C+G		
1a	Supply of 24F OFC, Duct and Accessories including all the services, as described at Serial No.-1 in the Table: VII. (17).	RKM	A	49,009						X1		
1b	Supply of 48F OFC, Duct and Accessories including all the services, as described at Serial No.-2 in the Table: VII. (17).	RKM	1.1 A	7,488						X2		
1c	Supply of 24F ADSS OFC and Accessories including all the services (using existing power Poles), as described at Serial No.-3 in the Table: VII. (17).	RKM	B	523						X3		
1d	Supply of 24F ADSS OFC and Accessories including all the services (including supply of Poles), as described at Serial No.-4 in the Table: VII. (17).	RKM	2.5 B	523						X4		
2	Fibre Distribution Management System Type1 at Block location	Nos	C	352						X5		
3a	IP-MPLS Router at GP location Supply of router at GP locations with accessories including installation, integration, testing and	Nos	D	11,352						X6		

Sr. No.	Item Description	Unit	Unit cost (INR) (excl. tax)	Quantity	Total Cost (INR) (Excl. tax)	Rate of CGST	Rate of SGST	Rate of IGST	Total GST (in INR)	Total cost (Inclusive Of GST) (in INR)		HSN/ SAC Code
			A	B	C=A*B	D	E	F	G=C*[(D+E) or F]	H=C+G		
	commissioning (as per Section (IV C), Annexure-B, II & III)											
3b	IP-MPLS Router at Block location Supply of router at Block locations with accessories including installation, integration, testing and commissioning (as per Section (IV C), Annexure-B, II & III)	Nos	E	352						X7		
4	SFP 10G with 40 km pluggable	Nos	F	1,56,904						X8		
5	SFP 100G with 40 km pluggable	Nos	G	704						X9		
6a	EMS for GP routers (including H/W, S/W & licenses)	No. of NE	H	5,676						X10		
6b	EMS for Block routers (including H/W, S/W & licenses)	No. of per NE	I	176						X11		
6c	EMS additional license including H/W and S/W upgradation for GP router	No. of NE	J	5,676						X12		
6d	EMS additional license including H/W and S/W upgradation for Block router	No. of per NE	K	176						X13		
7a	Rack at GP locations (as per Section (IV C), Annexure-B, VI)	Nos	L	11,352						X14		
7b	Rack at Block locations (as	Nos	M	352						X15		

Sr. No.	Item Description	Unit	Unit cost (INR) (excl. tax)	Quantity	Total Cost (INR) (Excl. tax)	Rate of CGST	Rate of SGST	Rate of IGST	Total GST (in INR)	Total cost (Inclusive Of GST) (in INR)		HSN/ SAC Code
			A	B	C=A*B	D	E	F	G=C*[(D+E) or F]	H=C+G		
	per Section (IV C), Annexure-B, VI)											
8	Remote Fibre Monitoring System (RFMS) system including necessary hardware and software with accessories including installation, integration, testing and commissioning (as per Section (IV C), Annexure-B, V)	Nos	N	352						X16		
9a	EMS for RFMS (including H/W, S/W & licenses)	No. of RTU	O	176						X17		
9b	EMS additional license including H/W and S/W upgradation for RFMS	No. of RTUs	P	176						X18		
10	State NOC as per details and specification given at Section (IV C), Annexure-B, IV)	Nos	Q	1						X19		
11a	Power System with backup provisions at GP locations with accessories including installation, integration, testing and commissioning with provision of MPPT Card including solar panels (as per Section (IV C), Annexure-B, VIII)	Nos	R	3,406						X20		
11b	Power System with backup provisions at GP locations with accessories including installation, integration,	Nos	S	7,946						X21		

Sr. No.	Item Description	Unit	Unit cost (INR) (excl. tax)	Quantity	Total Cost (INR) (Excl. tax)	Rate of CGST	Rate of SGST	Rate of IGST	Total GST (in INR)	Total cost (Inclusive Of GST) (in INR)		HSN/ SAC Code
			A	B	C=A*B	D	E	F	G=C*[(D+E) or F]	H=C+G		
	testing and commissioning with provision of slot for MPPT Card BUT excluding MPPT Card & solar panels (as per Section (IV C), Annexure-B, VIII)											
11c	MPPT solar module of 1 KW (as per sub section VIII of Annexure B of Section IV C - Amendment no. 12)	Nos	T	2,271						X22		
12	Supply of 6F Aerial drop OFC including services for last mile connectivity as per TEC GR as described at Serial No. 5 at Table : VII (17)	Km	U	1,13,056						X23		
13	Supply, installation including services of RCC Poles – 7/8 meter working load of 115 Kgs for last mile connectivity	Nos	V	2,26,112						X24		
14	Supply and installation of Joint Chamber as per E.I. for restoration of existing network (As per Clause 3.2.9 k) of Section – IV B)	Nos	W	27,875						X25		
15	Supply, installation of Joint Closure, testing and splicing 24 F for Dark Fibre Provisioning and/or attending OFC fault for the first time in a joint as per TEC GR/ E.I.	Per splicing location	X	27,875						X26		

Sr. No.	Item Description	Unit	Unit cost (INR) (excl. tax)	Quantity	Total Cost (INR) (Excl. tax)	Rate of CGST	Rate of SGST	Rate of IGST	Total GST (in INR)	Total cost (Inclusive Of GST) (in INR)		HSN/ SAC Code
			A	B	C=A*B	D	E	F	G=C*[(D+E) or F]	H=C+G		
	for restoration of existing network (As per Clause 3.2.9 k) of Section - IV B)											
16	Unlicensed Band Radio (UBR) 5.X with 27dbi Antenna, mounting fixture including all installation material and services without mast on either end (equipment to be supplied in pair to be installed at both ends of a link)	Nos		1								
17	Digital Microwave -15GHz 2+0 XPIC 2KQAM with 0.6m Antenna, mounting fixture including all installation material and services without mast on either end (equipment to be supplied in pair to be installed at both ends of a link)	Nos		1								
18	MARR type mast (15 Mtr height) for UBR/DMW	Nos		1								
19	Total cost in INR (X1+X2+X3...+X26)											
	Total cost in word											

TABLE: VII. (3): Price Schedule of Package - 3 (UP - E)

Sr. No.	Item Description	Unit	Unit cost (INR) (excl. tax)	Quantity-UPE	Total Cost (INR) (Excl. tax)	Rate of CGST	Rate of SGST	Rate of IGST	Total GST (in INR)	Total cost (Inclusive Of GST) (in INR)		HSN/ SAC Code
			A	B	C= A*B	D	E	F	G=C*[(D+E) or F]	H=C+G		
1a	Supply of 24F OFC, Duct and Accessories including all the services, as described at Serial No.-1 in the Table: VII. (17).	RKM	A	24,882						X1		
1b	Supply of 48F OFC, Duct and Accessories including all the services, as described at Serial No.-2 in the Table: VII. (17).	RKM	1.1 A	31,405						X2		
1c	Supply of 24F ADSS OFC and Accessories including all the services (using existing power Poles), as described at Serial No.-3 in the Table: VII. (17).	RKM	B	28						X3		
1d	Supply of 24F ADSS OFC and Accessories including all the services (including supply of Poles), as described at Serial No.-4 in the Table: VII. (17).	RKM	2.5 B	28						X4		
2	Fibre Distribution Management System Type1 at Block location	Nos	C	587						X5		
3a	IP-MPLS Router at GP location	Nos	D	43,072						X6		

Sr. No.	Item Description	Unit	Unit cost (INR) (excl. tax)	Quantity-UPE	Total Cost (INR) (Excl. tax)	Rate of CGST	Rate of SGST	Rate of IGST	Total GST (in INR)	Total cost (Inclusive Of GST) (in INR)		HSN/ SAC Code
			A	B	C= A*B	D	E	F	G=C*[(D+E) or F]	H=C+G		
	Supply of router at GP locations with accessories including installation, integration, testing and commissioning (as per Section (IV C), Annexure-B, II & III)											
3b	IP-MPLS Router at Block location Supply of router at Block locations with accessories including installation, integration, testing and commissioning (as per Section (IV C), Annexure-B, II & III)	Nos	E	587						X7		
4	SFP 10G with 40 km pluggable	Nos	F	5,79,307						X8		
5	SFP 100G with 40 km pluggable	Nos	G	1,174						X9		
6a	EMS for GP routers (including H/W, S/W & licenses)	No. of NE	H	21,536						X10		
6b	EMS for Block routers (including H/W, S/W & licenses)	No. of per NE	I	294						X11		
6c	EMS additional license including H/W and S/W upgradation for GP router	No. of NE	J	21,536						X12		
6d	EMS additional license	No. of	K	293						X13		

Sr. No.	Item Description	Unit	Unit cost (INR) (excl. tax)	Quantity-UPE	Total Cost (INR) (Excl. tax)	Rate of CGST	Rate of SGST	Rate of IGST	Total GST (in INR)	Total cost (Inclusive Of GST) (in INR)		HSN/ SAC Code
			A	B	C= A*B	D	E	F	G=C*[(D+E) or F]	H=C+G		
	including H/W and S/W upgradation for Block router	per NE										
7a	Rack at GP locations (as per Section (IV C), Annexure-B, VI)	Nos	L	43,072						X14		
7b	Rack at Block locations (as per Section (IV C), Annexure-B, VI)	Nos	M	587						X15		
8	Remote Fibre Monitoring System (RFMS) system including necessary hardware and software with accessories including installation, integration, testing and commissioning (as per Section (IV C), Annexure-B, V)	Nos	N	587						X16		
9a	EMS for RFMS (including H/W, S/W & licenses)	No. of RTU	O	294						X17		
9b	EMS additional license including H/W and S/W upgradation for RFMS	No. of RTUs	P	293						X18		
10	State NOC as per details and specification given at Section (IV C), Annexure-B, IV)	Nos	Q	1						X19		
11a	Power System with backup provisions at GP locations with accessories including	Nos	R	17,229						X20		

Sr. No.	Item Description	Unit	Unit cost (INR) (excl. tax)	Quantity-UPE	Total Cost (INR) (Excl. tax)	Rate of CGST	Rate of SGST	Rate of IGST	Total GST (in INR)	Total cost (Inclusive Of GST) (in INR)		HSN/ SAC Code
			A	B	C= A*B	D	E	F	G=C*[(D+E) or F]	H=C+G		
	installation, integration, testing and commissioning with provision of MPPT Card including solar panels (as per Section (IV C), Annexure-B, VIII)											
11b	Power System with backup provisions at GP locations with accessories including installation, integration, testing and commissioning with provision of slot for MPPT Card BUT excluding MPPT Card & solar panels (as per Section (IV C), Annexure-B, VIII)	Nos	S	25,843						X21		
11c	MPPT solar module of 1 KW (as per sub section VIII of Annexure B of Section IV C - Amendment no. 12)	Nos	T	8,615						X22		
12	Supply of 6F Aerial drop OFC including services for last mile connectivity as per TEC GR as described at Serial No. 5 at Table : VII (17)	Km	U	62,586						X23		
13	Supply, installation including services of RCC	Nos	V	1,25,172						X24		

Sr. No.	Item Description	Unit	Unit cost (INR) (excl. tax)	Quantity- UPE	Total Cost (INR) (Excl. tax)	Rate of CGST	Rate of SGST	Rate of IGST	Total GST (in INR)	Total cost (Inclusive Of GST) (in INR)		HSN/ SAC Code
			A	B	C= A*B	D	E	F	G=C*[(D+E) or F]	H=C+G		
	Poles – 7/8 meter working load of 115 Kgs for last mile connectivity											
14	Supply and installation of Joint Chamber as per E.I. for restoration of existing network (As per Clause 3.2.9 k) of Section – IV B)	Nos	W	70,722						X25		
15	Supply, installation of Joint Closure, testing and splicing 24 F for Dark Fibre Provisioning and/or attending OFC fault for the first time in a joint as per TEC GR/ E.I. for restoration of existing network (As per Clause 3.2.9 k) of Section – IV B)	Per splicing location	X	70,722						X26		
16	Unlicensed Band Radio (UBR) 5.X with 27dbi Antenna, mounting fixture including all installation material and services without mast on either end (equipment to be supplied in pair to be installed at both ends of a link)	Nos		1								
17	Digital Microwave -	Nos		1								

Sr. No.	Item Description	Unit	Unit cost (INR) (excl. tax)	Quantity- UPE	Total Cost (INR) (Excl. tax)	Rate of CGST	Rate of SGST	Rate of IGST	Total GST (in INR)	Total cost (Inclusive Of GST) (in INR)		HSN/ SAC Code
			A	B	C= A*B	D	E	F	G=C*[(D+E) or F]	H=C+G		
	15GHz 2+0 XPIC 2KQAM with 0.6m Antenna, mounting fixture including all installation material and services without mast on either end (equipment to be supplied in pair to be installed at both ends of a link)											
18	MARR type mast (15 Mtr height) for UBR/DMW	Nos		1								
19	Total cost in INR (X1+X2+X3...+X26)											
	Total cost in word											

TABLE: VII. (4): Price Schedule of Package - 4 (KTK, Goa, Puducherry)

Sr. No.	Item Description	Unit	Unit cost (INR) (excl. tax)	Quantity	Total Cost (INR) (Excl. tax)	Rate of CGST	Rate of SGST	Rate of IGST	Total GST (in INR)	Total cost (Inclusive of GST) (in INR)		HSN/ SAC Code
			A	B	C=A*B	D	E	F	G=C*[(D+E) or F]		H=C+G	
1a	Supply of 24F OFC, Duct and Accessories including all the services, as described at Serial No.-1 in the Table: VII. (17).	RKM	A	50,254						X1		
1b	Supply of 48F OFC, Duct and Accessories including all the services, as described at Serial No.-2 in the Table: VII. (17).	RKM	1.1 A	1,000						X2		
1c	Supply of 24F ADSS OFC and Accessories including all the services (using existing power Poles), as described at Serial No.-3 in the Table: VII. (17).	RKM	B	125						X3		
1d	Supply of 24F ADSS OFC and Accessories including all the services (including supply of Poles), as described at Serial No.-4 in the Table: VII. (17).	RKM	2.5 B	125						X4		
2	Fibre Distribution Management System Type1 at Block location	Nos	C	245						X5		
3a	IP-MPLS Router at GP location Supply of router at GP locations with accessories including installation, integration, testing and	Nos	D	6,391						X6		

Sr. No.	Item Description	Unit	Unit cost (INR) (excl. tax)	Quantity	Total Cost (INR) (Excl. tax)	Rate of CGST	Rate of SGST	Rate of IGST	Total GST (in INR)	Total cost (Inclusive of GST) (in INR)		HSN/ SAC Code
			A	B	C=A*B	D	E	F	G=C*[(D+E) or F]		H=C+G	
	commissioning (as per Section (IV C), Annexure-B, II & III)											
3b	IP-MPLS Router at Block location Supply of router at Block locations with accessories including installation, integration, testing and commissioning (as per Section (IV C), Annexure-B, II & III)	Nos	E	245						X7		
4	SFP 10G with 40 km pluggable	Nos	F	92,641						X8		
5	SFP 100G with 40 km pluggable	Nos	G	490						X9		
6a	EMS for GP routers (including H/W, S/W & licenses)	No. of NE	H	3,196						X10		
6b	EMS for Block routers (including H/W, S/W & licenses)	No. of per NE	I	123						X11		
6c	EMS additional license including H/W and S/W upgradation for GP router	No. of NE	J	3,195						X12		
6d	EMS additional license including H/W and S/W upgradation for Block router	No. of per NE	K	122						X13		
7a	Rack at GP locations (as per Section (IV C), Annexure-B, VI)	Nos	L	6,391						X14		
7b	Rack at Block locations (as	Nos	M	245						X15		

Sr. No.	Item Description	Unit	Unit cost (INR) (excl. tax)	Quantity	Total Cost (INR) (Excl. tax)	Rate of CGST	Rate of SGST	Rate of IGST	Total GST (in INR)	Total cost (Inclusive of GST) (in INR)		HSN/ SAC Code
			A	B	C=A*B	D	E	F	G=C*[(D+E) or F]		H=C+G	
	per Section (IV C), Annexure-B, VI)											
8	Remote Fibre Monitoring System (RFMS) system including necessary hardware and software with accessories including installation, integration, testing and commissioning (as per Section (IV C), Annexure-B, V)	Nos	N	245						X16		
9a	EMS for RFMS (including H/W, S/W & licenses)	No. of RTU	O	123						X17		
9b	EMS additional license including H/W and S/W upgradation for RFMS	No. of RTUs	P	122						X18		
10	State NOC as per details and specification given at Section (IV C), Annexure-B, IV)	Nos	Q	1						X19		
11a	Power System with backup provisions at GP locations with accessories including installation, integration, testing and commissioning with provision of MPPT Card including solar panels (as per Section (IV C), Annexure-B, VIII)	Nos	R	2,504						X20		
11b	Power System with backup provisions at GP locations with accessories	Nos	S	3,887						X21		

Sr. No.	Item Description	Unit	Unit cost (INR) (excl. tax)	Quantity	Total Cost (INR) (Excl. tax)	Rate of CGST	Rate of SGST	Rate of IGST	Total GST (in INR)	Total cost (Inclusive of GST) (in INR)		HSN/ SAC Code
			A	B	C=A*B	D	E	F	G=C*[(D+E) or F]		H=C+G	
	including installation, integration, testing and commissioning with provision of slot for MPPT Card BUT excluding MPPT Card & solar panels (as per Section (IV C), Annexure-B, VIII)											
11c	MPPT solar module of 1 KW (as per sub section VIII of Annexure B of Section IV C - Amendment no. 12)	Nos	T	1,279						X22		
12	Supply of 6F Aerial drop OFC including services for last mile connectivity as per TEC GR as described at Serial No. 5 at Table : VII (17)	Km	U	71,152						X23		
13	Supply, installation including services of RCC Poles – 7/8 meter working load of 115 Kgs for last mile connectivity	Nos	V	1,42,304						X24		
14	Supply and installation of Joint Chamber as per E.I. for restoration of existing network (As per Clause 3.2.9 k) of Section – IV B)	Nos	W	13,013						X25		
15	Supply, installation of Joint Closure, testing and splicing 24 F for Dark Fibre Provisioning and/or	Per splicing locati	X	13,013						X26		

Sr. No.	Item Description	Unit	Unit cost (INR) (excl. tax)	Quantity	Total Cost (INR) (Excl. tax)	Rate of CGST	Rate of SGST	Rate of IGST	Total GST (in INR)	Total cost (Inclusive of GST) (in INR)		HSN/ SAC Code
			A	B	C=A*B	D	E	F	G=C*[(D+E) or F]		H=C+G	
	attending OFC fault for the first time in a joint as per TEC GR/ E.I. for restoration of existing network (As per Clause 3.2.9 k) of Section – IV B)	on										
16	Unlicensed Band Radio (UBR) 5.X with 27dbi Antenna, mounting fixture including all installation material and services without mast on either end (equipment to be supplied in pair to be installed at both ends of a link)	Nos		1								
17	Digital Microwave -15GHz 2+0 XPIC 2KQAM with 0.6m Antenna, mounting fixture including all installation material and services without mast on either end (equipment to be supplied in pair to be installed at both ends of a link)	Nos		1								
18	MARR type mast (15 Mtr height) for UBR/DMW	Nos		1								
19	Total cost in INR (X1+X2+X3...+X26)											
	Total cost in word											

TABLE: VII. (5): Price Schedule of Package - 5 (Uttarakhand)

Sr. No.	Item Description	Unit	Unit cost (INR) (excl. tax)	Quantity	Total Cost (Excl. tax)	Rate of CGST	Rate of SGST	Rate of IGST	Total GST	Total cost (INR) (Inclusive Of GST)		HSN/ SAC Code
			A	B	C=A*B	D	E	F	G=C*[(D+E) or F]		H=C+G	
1a	Supply of 24F OFC, Duct and Accessories including all the services, as described at Serial No.-1 in the Table: VII. (17).	RKM	A	1,242						X1		
1b	Supply of 48F OFC, Duct and Accessories including all the services, as described at Serial No.-2 in the Table: VII. (17).	RKM	1.1 A	2,117						X2		
1c	Supply of 24F ADSS OFC and Accessories including all the services (using existing power Poles), as described at Serial No.-3 in the Table: VII. (17).	RKM	B	11,670						X3		
1d	Supply of 24F ADSS OFC and Accessories including all the services (including supply of Poles), as described at Serial No.-4 in the Table: VII. (17).	RKM	2.5 B	11,670						X4		
2	Fibre Distribution Management System Type1 at Block location	Nos	C	95						X5		
3a	IP-MPLS Router at GP location Supply of router at GP locations with accessories including installation, integration, testing and	Nos	D	7,937						X6		

Sr. No.	Item Description	Unit	Unit cost (INR) (excl. tax)	Quantity	Total Cost (Excl. tax)	Rate of CGST	Rate of SGST	Rate of IGST	Total GST	Total cost (INR) (Inclusive Of GST)		HSN/ SAC Code
			A	B	C=A*B	D	E	F	G=C*[(D+E) or F]		H=C+G	
	commissioning (as per Section (IV C), Annexure-B, II & III)											
3b	IP-MPLS Router at Block location Supply of router at Block locations with accessories including installation, integration, testing and commissioning (as per Section (IV C), Annexure-B, II & III)	Nos	E	95						X7		
4	SFP 10G with 40 km pluggable	Nos	F	1,07,760						X8		
5	SFP 100G with 40 km pluggable	Nos	G	190						X9		
6a	EMS for GP routers (including H/W, S/W & licenses)	No. of NE	H	3,969						X10		
6b	EMS for Block routers (including H/W, S/W & licenses)	No. of per NE	I	48						X11		
6c	EMS additional license including H/W and S/W upgradation for GP router	No. of NE	J	3,968						X12		
6d	EMS additional license including H/W and S/W upgradation for Block router	No. of per NE	K	47						X13		
7a	Rack at GP locations (as per Section (IV C), Annexure-B, VI)	Nos	L	7,937						X14		
7b	Rack at Block locations (as	Nos	M	95						X15		

Sr. No.	Item Description	Unit	Unit cost (INR) (excl. tax)	Quantity	Total Cost (Excl. tax)	Rate of CGST	Rate of SGST	Rate of IGST	Total GST	Total cost (INR) (Inclusive Of GST)		HSN/ SAC Code
			A	B	C=A*B	D	E	F	G=C*[(D+E) or F]		H=C+G	
	per Section (IV C), Annexure-B, VI)											
8	Remote Fibre Monitoring System (RFMS) system including necessary hardware and software with accessories including installation, integration, testing and commissioning (as per Section (IV C), Annexure-B, V)	Nos	N	95						X16		
9a	EMS for RFMS (including H/W, S/W & licenses)	No. of RTU	O	48						X17		
9b	EMS additional license including H/W and S/W upgradation for RFMS	No. of RTUs	P	47						X18		
10	State NOC as per details and specification given at Section (IV C), Annexure-B, IV)	Nos	Q	1						X19		
11a	Power System with backup provisions at GP locations with accessories including installation, integration, testing and commissioning with provision of MPPT Card including solar panels (as per Section (IV C), Annexure-B, VIII)	Nos	R	3,175						X20		
11b	Power System with backup provisions at GP locations with accessories	Nos	S	4,762						X21		

Sr. No.	Item Description	Unit	Unit cost (INR) (excl. tax)	Quantity	Total Cost (Excl. tax)	Rate of CGST	Rate of SGST	Rate of IGST	Total GST	Total cost (INR) (Inclusive Of GST)		HSN/ SAC Code
			A	B	C=A*B	D	E	F	G=C*[(D+E) or F]		H=C+G	
	including installation, integration, testing and commissioning with provision of slot for MPPT Card BUT excluding MPPT Card & solar panels (as per Section (IV C), Annexure-B, VIII)											
11c	MPPT solar module of 1 KW (as per sub section VIII of Annexure B of Section IV C - Amendment no. 12)	Nos	T	1,588						X22		
12	Supply of 6F Aerial drop OFC including services for last mile connectivity as per TEC GR as described at Serial No. 5 at Table : VII (17)	Km	U	21,519						X23		
13	Supply, installation including services of RCC Poles – 7/8 meter working load of 115 Kgs for last mile connectivity	Nos	V	43,038						X24		
14	Supply and installation of Joint Chamber as per E.I. for restoration of existing network (As per Clause 3.2.9 k) of Section – IV B)	Nos	W	3,845						X25		
15	Supply, installation of Joint Closure, testing and splicing 24 F for Dark Fibre Provisioning and/or	Per splicing locati	X	3,845						X26		

Sr. No.	Item Description	Unit	Unit cost (INR) (excl. tax)	Quantity	Total Cost (Excl. tax)	Rate of CGST	Rate of SGST	Rate of IGST	Total GST	Total cost (INR) (Inclusive Of GST)		HSN/ SAC Code
			A	B	C=A*B	D	E	F	G=C*[(D+E) or F]		H=C+G	
	attending OFC fault for the first time in a joint as per TEC GR/ E.I. for restoration of existing network (As per Clause 3.2.9 k) of Section – IV B)	on										
16	Unlicensed Band Radio (UBR) 5.X with 27dbi Antenna, mounting fixture including all installation material and services without mast on either end (equipment to be supplied in pair to be installed at both ends of a link)	Nos		1								
17	Digital Microwave -15GHz 2+0 XPIC 2KQAM with 0.6m Antenna, mounting fixture including all installation material and services without mast on either end (equipment to be supplied in pair to be installed at both ends of a link)	Nos		1								
18	MARR type mast (15 Mtr height) for UBR/DMW	Nos		1								
19	Total cost in INR (X1+X2+X3...+X26)											
	Total cost in word											

TABLE: VII. (6): Price Schedule of Package - 6 (UP - W)

Sr. No.	Item Description	Unit	Unit cost (INR) (excl. tax)	Quantity	Total Cost (INR) (Excl. tax)	Rate of CGST	Rate of SGST	Rate of IGST	Total GST (in INR)	Total cost (Inclusive Of GST) (in INR)		HSN/ SAC Code
			A	B	C=A*B	D	E	F	G=C*[(D+E) or F]		H=C+G	
1a	Supply of 24F OFC, Duct and Accessories including all the services, as described at Serial No.-1 in the Table: VII. (17).	RKM	A	17,397						X1		
1b	Supply of 48F OFC, Duct and Accessories including all the services, as described at Serial No.-2 in the Table: VII. (17).	RKM	1.1 A	8,867						X2		
1c	Supply of 24F ADSS OFC and Accessories including all the services (using existing power Poles), as described at Serial No.-3 in the Table: VII. (17).	RKM	B	-						X3		
1d	Supply of 24F ADSS OFC and Accessories including all the services (including supply of Poles), as described at Serial No.-4 in the Table: VII. (17).	RKM	2.5 B	-						X4		
2	Fibre Distribution Management System Type1 at Block location	Nos	C	240						X5		
3a	IP-MPLS Router at GP	Nos	D	16,218						X6		

Sr. No.	Item Description	Unit	Unit cost (INR) (excl. tax)	Quantity	Total Cost (INR) (Excl. tax)	Rate of CGST	Rate of SGST	Rate of IGST	Total GST (in INR)	Total cost (Inclusive Of GST) (in INR)		HSN/ SAC Code
			A	B	C=A*B	D	E	F	G=C*[(D+E) or F]		H=C+G	
	location Supply of router at GP locations with accessories including installation, integration, testing and commissioning (as per Section (IV C), Annexure-B, II & III)											
3b	IP-MPLS Router at Block location Supply of router at Block locations with accessories including installation, integration, testing and commissioning (as per Section (IV C), Annexure-B, II & III)	Nos	E	240						X7		
4	SFP 10G with 40 km pluggable	Nos	F	2,17,962						X8		
5	SFP 100G with 40 km pluggable	Nos	G	480						X9		
6a	EMS for GP routers (including H/W, S/W & licenses)	No. of NE	H	8,109						X10		
6b	EMS for Block routers (including H/W, S/W & licenses)	No. of per NE	I	120						X11		
6c	EMS additional license including H/W and S/W upgradation for GP router	No. of NE	J	8,109						X12		

Sr. No.	Item Description	Unit	Unit cost (INR) (excl. tax)	Quantity	Total Cost (INR) (Excl. tax)	Rate of CGST	Rate of SGST	Rate of IGST	Total GST (in INR)	Total cost (Inclusive Of GST) (in INR)		HSN/ SAC Code
			A	B	C=A*B	D	E	F	G=C*[(D+E) or F]		H=C+G	
6d	EMS additional license including H/W and S/W upgradation for Block router	No. of per NE	K	120						X13		
7a	Rack at GP locations (as per Section (IV C), Annexure-B, VI)	Nos	L	16,218						X14		
7b	Rack at Block locations (as per Section (IV C), Annexure-B, VI)	Nos	M	240						X15		
8	Remote Fibre Monitoring System (RFMS) system including necessary hardware and software with accessories including installation, integration, testing and commissioning (as per Section (IV C), Annexure-B, V)	Nos	N	240						X16		
9a	EMS for RFMS (including H/W, S/W & licenses)	No. of RTU	O	120						X17		
9b	EMS additional license including H/W and S/W upgradation for RFMS	No. of RTUs	P	120						X18		
10	State NOC as per details and specification given at Section (IV C), Annexure-B, IV)	Nos	Q	1						X19		
11a	Power System with backup provisions at GP locations with accessories including	Nos	R	6,487						X20		

Sr. No.	Item Description	Unit	Unit cost (INR) (excl. tax)	Quantity	Total Cost (INR) (Excl. tax)	Rate of CGST	Rate of SGST	Rate of IGST	Total GST (in INR)	Total cost (Inclusive Of GST) (in INR)		HSN/ SAC Code
			A	B	C=A*B	D	E	F	G=C*[(D+E) or F]		H=C+G	
	installation, integration, testing and commissioning with provision of MPPT Card including solar panels (as per Section (IV C), Annexure-B, VIII)											
11b	Power System with backup provisions at GP locations with accessories including installation, integration, testing and commissioning with provision of slot for MPPT Card BUT excluding MPPT Card & solar panels (as per Section (IV C), Annexure-B, VIII)	Nos	S	9,731						X21		
11c	MPPT solar module of 1 KW (as per sub section VIII of Annexure B of Section IV C - Amendment no. 12)	Nos	T	3,244						X22		
12	Supply of 6F Aerial drop OFC including services for last mile connectivity as per TEC GR as described at Serial No. 5 at Table : VII (17)	Km	U	13,274						X23		
13	Supply, installation including services of RCC	Nos	V	26,548						X24		

Sr. No.	Item Description	Unit	Unit cost (INR) (excl. tax)	Quantity	Total Cost (INR) (Excl. tax)	Rate of CGST	Rate of SGST	Rate of IGST	Total GST (in INR)	Total cost (Inclusive Of GST) (in INR)		HSN/ SAC Code
			A	B	C=A*B	D	E	F	G=C*[(D+E) or F]		H=C+G	
	Poles – 7/8 meter working load of 115 Kgs for last mile connectivity											
14	Supply and installation of Joint Chamber as per E.I. for restoration of existing network (As per Clause 3.2.5 of Section – IV B)	Nos	W	26,332						X25		
15	Supply, installation of Joint Closure, testing and splicing 24 F for Dark Fibre Provisioning and/or attending OFC fault for the first time in a joint as per TEC GR/ E.I. for restoration of existing network (As per Clause 3.2.5 of Section – IV B)	Per splicing location	X	26,332						X26		
16	Unlicensed Band Radio (UBR) 5.X with 27dbi Antenna, mounting fixture including all installation material and services without mast on either end (equipment to be supplied in pair to be installed at both ends of a link)	Nos		1								
17	Digital Microwave -	Nos		1								

Sr. No.	Item Description	Unit	Unit cost (INR) (excl. tax)	Quantity	Total Cost (INR) (Excl. tax)	Rate of CGST	Rate of SGST	Rate of IGST	Total GST (in INR)	Total cost (Inclusive Of GST) (in INR)		HSN/ SAC Code
			A	B	C=A*B	D	E	F	G=C*[(D+E) or F]		H=C+G	
	15GHz 2+0 XPIC 2KQAM with 0.6m Antenna, mounting fixture including all installation material and services without mast on either end (equipment to be supplied in pair to be installed at both ends of a link)											
18	MARR type mast (15 Mtr height) for UBR/DMW	Nos		1								
19	Total cost in INR (X1+X2+X3...+X26)											
	Total cost in word											

TABLE: VII. (7): Price Schedule of Package - 7 (Bihar)

Sr. No.	Item Description	Unit	Unit cost (INR) (excl. tax)	Quantity	Total Cost (Excl. tax)	Rate of CGST	Rate of SGST	Rate of IGST	Total GST	Total cost (INR) (Inclusive Of GST)		HSN/ SAC Code
			A	B	C=A*B	D	E	F	G=C*[(D+E) or F]		H=C+G	
1a	Supply of 24F OFC, Duct and Accessories including all the services, as described at Serial No.-1 in the Table: VII. (17).	RKM	A	17,187						X1		
1b	Supply of 48F OFC, Duct and Accessories including all the services, as described at Serial No.-2 in the Table: VII. (17).	RKM	1.1 A	4,447						X2		
1c	Supply of 24F ADSS OFC and Accessories including all the services (using existing power Poles), as described at Serial No.-3 in the Table: VII. (17).	RKM	B	515						X3		
1d	Supply of 24F ADSS OFC and Accessories including all the services (including supply of Poles), as described at Serial No.-4 in the Table: VII. (17).	RKM	2.5 B	515						X4		
2	Fibre Distribution Management System Type1 at Block	Nos	C	534						X5		

Sr. No.	Item Description	Unit	Unit cost (INR) (excl. tax)	Quantity	Total Cost (Excl. tax)	Rate of CGST	Rate of SGST	Rate of IGST	Total GST	Total cost (INR) (Inclusive Of GST)		HSN/ SAC Code
			A	B	C=A*B	D	E	F	G=C*[(D+E) or F]		H=C+G	
	location											
3a	IP-MPLS Router at GP location Supply of router at GP locations with accessories including installation, integration, testing and commissioning (as per Section (IV C), Annexure-B, II & III)	Nos	D	8,405						X6		
3b	IP-MPLS Router at Block location Supply of router at Block locations with accessories including installation, integration, testing and commissioning (as per Section (IV C), Annexure-B, II & III)	Nos	E	534						X7		
4	SFP 10G with 40 km pluggable	Nos	F	1,15,673						X8		
5	SFP 100G with 40 km pluggable	Nos	G	1,068						X9		
6a	EMS for GP routers (including H/W, S/W & licenses)	No. of NE	H	4,203						X10		
6b	EMS for Block routers (including H/W, S/W & licenses)	No. of per NE	I	267						X11		
6c	EMS additional license including H/W and	No. of NE	J	4,202						X12		

Sr. No.	Item Description	Unit	Unit cost (INR) (excl. tax)	Quantity	Total Cost (Excl. tax)	Rate of CGST	Rate of SGST	Rate of IGST	Total GST	Total cost (INR) (Inclusive Of GST)		HSN/ SAC Code
			A	B	C=A*B	D	E	F	G=C*[(D+E) or F]		H=C+G	
	S/W upgradation for GP router											
6d	EMS additional license including H/W and S/W upgradation for Block router	No. of per NE	K	267						X13		
7a	Rack at GP locations (as per Section (IV C), Annexure-B, VI)	Nos	L	8,405						X14		
7b	Rack at Block locations (as per Section (IV C), Annexure-B, VI)	Nos	M	534						X15		
8	Remote Fibre Monitoring System (RFMS) system including necessary hardware and software with accessories including installation, integration, testing and commissioning (as per Section (IV C), Annexure-B, V)	Nos	N	534						X16		
9a	EMS for RFMS (including H/W, S/W & licenses)	No. of RTU	O	267						X17		
9b	EMS additional license including H/W and S/W upgradation for RFMS	No. of RTUs	P	267						X18		
10	State NOC as per	Nos	Q	1						X19		

Sr. No.	Item Description	Unit	Unit cost (INR) (excl. tax)	Quantity	Total Cost (Excl. tax)	Rate of CGST	Rate of SGST	Rate of IGST	Total GST	Total cost (INR) (Inclusive Of GST)		HSN/ SAC Code
			A	B	C=A*B	D	E	F	G=C*[(D+E) or F]		H=C+G	
	details and specification given at Section (IV C), Annexure-B, IV)											
11a	Power System with backup provisions at GP locations with accessories including installation, integration, testing and commissioning with provision of MPPT Card including solar panels (as per Section (IV C), Annexure-B, VIII)	Nos	R	4,203						X20		
11b	Power System with backup provisions at GP locations with accessories including installation, integration, testing and commissioning with provision of slot for MPPT Card BUT excluding MPPT Card & solar panels (as per Section (IV C), Annexure-B, VIII)	Nos	S	4,202						X21		
11c	MPPT solar module of 1 KW (as per sub section VIII of Annexure B of Section	Nos	T	1,681						X22		

Sr. No.	Item Description	Unit	Unit cost (INR) (excl. tax)	Quantity	Total Cost (Excl. tax)	Rate of CGST	Rate of SGST	Rate of IGST	Total GST	Total cost (INR) (Inclusive Of GST)		HSN/ SAC Code
			A	B	C=A*B	D	E	F	G=C*[(D+E) or F]		H=C+G	
	IV C - Amendment no. 12)											
12	Supply of 6F Aerial drop OFC including services for last mile connectivity as per TEC GR as described at Serial No. 5 at Table : VII (17)	Km	U	50,794						X23		
13	Supply, installation including services of RCC Poles – 7/8 meter working load of 115 Kgs for last mile connectivity	Nos	V	1,01,588						X24		
14	Supply and installation of Joint Chamber as per E.I. for restoration of existing network (As per Clause 3.2.9 k) of Section – IV B)	Nos	W	24,946						X25		
15	Supply, installation of Joint Closure, testing and splicing 24 F for Dark Fibre Provisioning and/or attending OFC fault for the first time in a joint as per TEC GR/ E.I. for restoration of existing network (As per Clause 3.2.9 k) of	Per splicing location	X	24,946						X26		

Sr. No.	Item Description	Unit	Unit cost (INR) (excl. tax)	Quantity	Total Cost (Excl. tax)	Rate of CGST	Rate of SGST	Rate of IGST	Total GST	Total cost (INR) (Inclusive Of GST)		HSN/ SAC Code
			A	B	C=A*B	D	E	F	G=C*[(D+E) or F]		H=C+G	
	Section – IV B)											
16	Unlicensed Band Radio (UBR) 5.X with 27dbi Antenna, mounting fixture including all installation material and services without mast on either end (equipment to be supplied in pair to be installed at both ends of a link)	Nos		1								
17	Digital Microwave - 15GHz 2+0 XPIC 2KQAM with 0.6m Antenna, mounting fixture including all installation material and services without mast on either end (equipment to be supplied in pair to be installed at both ends of a link)	Nos		1								
18	MARR type mast (15 Mtr height) for UBR/DMW	Nos		1								
19	Total cost in INR (X1+X2+X3...+X26)											
	Total cost in word											

TABLE: VII. (8): Price Schedule of Package - 8 (HP)

Sr. No.	Item Description	Unit	Unit cost (INR) (excl. tax)	Quantity	Total Cost (INR) (Excl. tax)	Rate of CGST	Rate of SGST	Rate of IGST	Total GST (in INR)	Total cost (Inclusive Of GST) (in INR)		HSN/ SAC Code
			A	B	C=A*B	D	E	F	G=C*[(D+E) or F]		H=C+G	
1a	Supply of 24F OFC, Duct and Accessories including all the services, as described at Serial No.-1 in the Table: VII. (17).	RKM	A	94						X1		
1b	Supply of 48F OFC, Duct and Accessories including all the services, as described at Serial No.-2 in the Table: VII. (17).	RKM	1.1 A	-						X2		
1c	Supply of 24F ADSS OFC and Accessories including all the services (using existing power Poles), as described at Serial No.-3 in the Table: VII. (17).	RKM	B	10,011						X3		
1d	Supply of 24F ADSS OFC and Accessories including all the services (including supply of Poles), as described at Serial No.-4 in the Table: VII. (17).	RKM	2.5 B	10,010						X4		
2	Fibre Distribution Management System Type1 at Block location	Nos	C	80						X5		
3a	IP-MPLS Router at GP	Nos	D	3,615						X6		

Sr. No.	Item Description	Unit	Unit cost (INR) (excl. tax)	Quantity	Total Cost (INR) (Excl. tax)	Rate of CGST	Rate of SGST	Rate of IGST	Total GST (in INR)	Total cost (Inclusive Of GST) (in INR)		HSN/ SAC Code
			A	B	C=A*B	D	E	F	G=C*[(D+E) or F]		H=C+G	
	location Supply of router at GP locations with accessories including installation, integration, testing and commissioning (as per Section (IV C), Annexure-B, II & III)											
3b	IP-MPLS Router at Block location Supply of router at Block locations with accessories including installation, integration, testing and commissioning (as per Section (IV C), Annexure-B, II & III)	Nos	E	80						X7		
4	SFP 10G with 40 km pluggable	Nos	E	52,051						X8		
5	SFP 100G with 40 km pluggable	Nos	F	160						X9		
6a	EMS for GP routers (including H/W, S/W & licenses)	No. of NE	H	1,808						X10		
6b	EMS for Block routers (including H/W, S/W & licenses)	No. of per NE	I	40						X11		
6c	EMS additional license including H/W and S/W upgradation for GP router	No. of NE	J	1,807						X12		

Sr. No.	Item Description	Unit	Unit cost (INR) (excl. tax)	Quantity	Total Cost (INR) (Excl. tax)	Rate of CGST	Rate of SGST	Rate of IGST	Total GST (in INR)	Total cost (Inclusive Of GST) (in INR)		HSN/ SAC Code
			A	B	C=A*B	D	E	F	G=C*[(D+E) or F]		H=C+G	
6d	EMS additional license including H/W and S/W upgradation for Block router	No. of per NE	K	40						X13		
7a	Rack at GP locations (as per Section (IV C), Annexure-B, VI)	Nos	L	3,615						X14		
7b	Rack at Block locations (as per Section (IV C), Annexure-B, VI)	Nos	M	80						X15		
8	Remote Fibre Monitoring System (RFMS) system including necessary hardware and software with accessories including installation, integration, testing and commissioning (as per Section (IV C), Annexure-B, V)	Nos	N	80						X16		
9a	EMS for RFMS (including H/W, S/W & licenses)	No. of RTU	O	40						X17		
9b	EMS additional license including H/W and S/W upgradation for RFMS	No. of RTUs	P	40						X18		
10	State NOC as per details and specification given at Section (IV C), Annexure-B, IV)	Nos	Q	1						X19		
11a	Power System with	Nos	R	1,808						X20		

Sr. No.	Item Description	Unit	Unit cost (INR) (excl. tax)	Quantity	Total Cost (INR) (Excl. tax)	Rate of CGST	Rate of SGST	Rate of IGST	Total GST (in INR)	Total cost (Inclusive Of GST) (in INR)		HSN/ SAC Code
			A	B	C=A*B	D	E	F	G=C*[(D+E) or F]		H=C+G	
	backup provisions at GP locations with accessories including installation, integration, testing and commissioning with provision of MPPT Card including solar panels (as per Section (IV C), Annexure-B, VIII)											
11b	Power System with backup provisions at GP locations with accessories including installation, integration, testing and commissioning with provision of slot for MPPT Card BUT excluding MPPT Card & solar panels (as per Section (IV C), Annexure-B, VIII)	Nos	S	1,807						X21		
11c	MPPT solar module of 1 KW (as per sub section VIII of Annexure B of Section IV C - Amendment no. 12)	Nos	T	723						X22		
12	Supply of 6F Aerial drop OFC including services for last mile connectivity as per TEC GR as described at	Km	U	36,670						X23		

Sr. No.	Item Description	Unit	Unit cost (INR) (excl. tax)	Quantity	Total Cost (INR) (Excl. tax)	Rate of CGST	Rate of SGST	Rate of IGST	Total GST (in INR)	Total cost (Inclusive Of GST) (in INR)		HSN/ SAC Code
			A	B	C=A*B	D	E	F	G=C*[(D+E) or F]		H=C+G	
	Serial No. 5 at Table : VII (17)											
13	Supply, installation including services of RCC Poles – 7/8 meter working load of 115 Kgs for last mile connectivity	Nos	V	73,340						X24		
14	Supply and installation of Joint Chamber as per E.I. for restoration of existing network (As per Clause 3.2.9 k) of Section – IV B)	Nos	W	713						X25		
15	Supply, installation of Joint Closure, testing and splicing 24 F for Dark Fibre Provisioning and/or attending OFC fault for the first time in a joint as per TEC GR/ E.I. for restoration of existing network (As per Clause 3.2.9 k) of Section – IV B)	Per splicing location	X	713						X26		
16	Unlicensed Band Radio (UBR) 5.X with 27dbi Antenna, mounting fixture including all installation material and services without	Nos		1								

Sr. No.	Item Description	Unit	Unit cost (INR) (excl. tax)	Quantity	Total Cost (INR) (Excl. tax)	Rate of CGST	Rate of SGST	Rate of IGST	Total GST (in INR)	Total cost (Inclusive Of GST) (in INR)		HSN/ SAC Code
			A	B	C=A*B	D	E	F	G=C*[(D+E) or F]		H=C+G	
	mast on either end (equipment to be supplied in pair to be installed at both ends of a link)											
17	Digital Microwave - 15GHz 2+0 XPIC 2KQAM with 0.6m Antenna, mounting fixture including all installation material and services without mast on either end (equipment to be supplied in pair to be installed at both ends of a link)	Nos		1								
18	MARR type mast (15 Mtr height) for UBR/DMW	Nos		1								
19	Total cost in INR (X1+X2+X3...+X26)											
	Total cost in word											

TABLE: VII. (9): Price Schedule of Package - 9 (WB, A&N)

Sr. No.	Item Description	Unit	Unit cost (INR) (excl. tax)	Quantity	Total Cost (INR) (Excl. tax)	Rate of CGST	Rate of SGST	Rate of IGST	Total GST (in INR)	Total cost (Inclusive Of GST) (in INR)		HSN/ SAC Code
			A	B	C=A*B	D	E	F	G=C*[(D+E) or F]		H=C+G	
1a	Supply of 24F OFC, Duct and Accessories including all the services, as described at Serial No.-1 in the Table: VII. (17).	RKM	A	14,435						X1		
1b	Supply of 48F OFC, Duct and Accessories including all the services, as described at Serial No.-2 in the Table: VII. (17).	RKM	1.1 A	3,712						X2		
1c	Supply of 24F ADSS OFC and Accessories including all the services (using existing power Poles), as described at Serial No.-3 in the Table: VII. (17).	RKM	B	339						X3		
1d	Supply of 24F ADSS OFC and Accessories including all the services (including supply of Poles), as described at Serial No.-4 in the Table: VII. (17).	RKM	2.5 B	339						X4		
2	Fibre Distribution Management System Type1 at Block location	Nos	C	353						X5		
3a	IP-MPLS Router at GP location	Nos	D	3,412						X6		

Sr. No.	Item Description	Unit	Unit cost (INR) (excl. tax)	Quantity	Total Cost (INR) (Excl. tax)	Rate of CGST	Rate of SGST	Rate of IGST	Total GST (in INR)	Total cost (Inclusive Of GST) (in INR)		HSN/ SAC Code
			A	B	C=A*B	D	E	F	G=C*[(D+E) or F]		H=C+G	
	Supply of router at GP locations with accessories including installation, integration, testing and commissioning (as per Section (IV C), Annexure-B, II & III)											
3b	IP-MPLS Router at Block location Supply of router at Block locations with accessories including installation, integration, testing and commissioning (as per Section (IV C), Annexure-B, II & III)	Nos	E	353						X7		
4	SFP 10G with 40 km pluggable	Nos	F	51,562						X8		
5	SFP 100G with 40 km pluggable	Nos	G	706						X9		
6a	EMS for GP routers (including H/W, S/W & licenses)	No. of NE	H	1,706						X10		
6b	EMS for Block routers (including H/W, S/W & licenses)	No. of per NE	I	177						X11		
6c	EMS additional license including H/W and S/W upgradation for GP router	No. of NE	J	1,706						X12		
6d	EMS additional license	No. of	K	176						X13		

Sr. No.	Item Description	Unit	Unit cost (INR) (excl. tax)	Quantity	Total Cost (INR) (Excl. tax)	Rate of CGST	Rate of SGST	Rate of IGST	Total GST (in INR)	Total cost (Inclusive Of GST) (in INR)		HSN/ SAC Code
			A	B	C=A*B	D	E	F	G=C*[(D+E) or F]		H=C+G	
	including H/W and S/W upgradation for Block router	per NE										
7a	Rack at GP locations (as per Section (IV C), Annexure-B, VI)	Nos	L	3,412						X14		
7b	Rack at Block locations (as per Section (IV C), Annexure-B, VI)	Nos	M	353						X15		
8	Remote Fibre Monitoring System (RFMS) system including necessary hardware and software with accessories including installation, integration, testing and commissioning (as per Section (IV C), Annexure-B, V)	Nos	N	353						X16		
9a	EMS for RFMS (including H/W, S/W & licenses)	No. of RTU	O	177						X17		
9b	EMS additional license including H/W and S/W upgradation for RFMS	No. of RTUs	P	176						X18		
10	State NOC as per details and specification given at Section (IV C), Annexure-B, IV)	Nos	Q	1						X19		
11a	Power System with backup provisions at GP locations with	Nos	R	1,031						X20		

Sr. No.	Item Description	Unit	Unit cost (INR) (excl. tax)	Quantity	Total Cost (INR) (Excl. tax)	Rate of CGST	Rate of SGST	Rate of IGST	Total GST (in INR)	Total cost (Inclusive Of GST) (in INR)		HSN/ SAC Code
			A	B	C=A*B	D	E	F	G=C*[(D+E) or F]		H=C+G	
	accessories including installation, integration, testing and commissioning with provision of MPPT Card including solar panels (as per Section (IV C), Annexure-B, VIII)											
11b	Power System with backup provisions at GP locations with accessories including installation, integration, testing and commissioning with provision of slot for MPPT Card BUT excluding MPPT Card & solar panels (as per Section (IV C), Annexure-B, VIII)	Nos	S	2,381						X21		
11c	MPPT solar module of 1 KW (as per sub section VIII of Annexure B of Section IV C - Amendment no. 12)	Nos	T	683						X22		
12	Supply of 6F Aerial drop OFC including services for last mile connectivity as per TEC GR as described at Serial No. 5 at Table : VII (17)	Km	U	62,611						X23		
13	Supply, installation	Nos	V	1,25,222						X24		

Sr. No.	Item Description	Unit	Unit cost (INR) (excl. tax)	Quantity	Total Cost (INR) (Excl. tax)	Rate of CGST	Rate of SGST	Rate of IGST	Total GST (in INR)	Total cost (Inclusive Of GST) (in INR)		HSN/ SAC Code
			A	B	C=A*B	D	E	F	G=C*[(D+E) or F]		H=C+G	
	including services of RCC Poles – 7/8 meter working load of 115 Kgs for last mile connectivity											
14	Supply and installation of Joint Chamber as per E.I. for restoration of existing network (As per Clause 3.2.9 k) of Section – IV B)	Nos	W	10,846						X25		
15	Supply, installation of Joint Closure, testing and splicing 24 F for Dark Fibre Provisioning and/or attending OFC fault for the first time in a joint as per TEC GR/ E.I. for restoration of existing network (As per Clause 3.2.9 k) of Section – IV B)	Per splicing location	X	10,846						X26		
16	Unlicensed Band Radio (UBR) 5.X with 27dbi Antenna, mounting fixture including all installation material and services without mast on either end (equipment to be supplied in pair to be installed at both ends of	Nos		1								

Sr. No.	Item Description	Unit	Unit cost (INR) (excl. tax)	Quantity	Total Cost (INR) (Excl. tax)	Rate of CGST	Rate of SGST	Rate of IGST	Total GST (in INR)	Total cost (Inclusive Of GST) (in INR)		HSN/ SAC Code
			A	B	C=A*B	D	E	F	G=C*[(D+E) or F]		H=C+G	
	a link)											
17	Digital Microwave - 15GHz 2+0 XPIC 2KQAM with 0.6m Antenna, mounting fixture including all installation material and services without mast on either end (equipment to be supplied in pair to be installed at both ends of a link)	Nos		1								
18	MARR type mast (15 Mtr height) for UBR/DMW	Nos		1								
19	Total cost in INR (X1+X2+X3...+X25)											
	Total cost in word											

TABLE: VII. (10): Price Schedule of Package - 10 (Haryana)

Sr. No.	Item Description	Unit	Unit cost (INR) (excl. tax)	Quantity	Total Cost (INR) (Excl. tax)	Rate of CGST	Rate of SGST	Rate of IGST	Total GST (in INR)	Total cost (Inclusive Of GST) (in INR)		HSN/ SAC Code
			A	B	C=A*B	D	E	F	G=C*[(D+E) or F]		H=C+G	
1a	Supply of 24F OFC, Duct and Accessories including all the services, as described at Serial No.-1 in the Table: VII. (17).	RKM	A	18,023						X1		

Sr. No.	Item Description	Unit	Unit cost (INR) (excl. tax)	Quantity	Total Cost (INR) (Excl. tax)	Rate of CGST	Rate of SGST	Rate of IGST	Total GST (in INR)	Total cost (Inclusive Of GST) (in INR)		HSN/ SAC Code
			A	B	C=A*B	D	E	F	G=C*[(D+E) or F]		H=C+G	
1b	Supply of 48F OFC, Duct and Accessories including all the services, as described at Serial No.-2 in the Table: VII. (17).	RKM	1.1 A	-						X2		
1c	Supply of 24F ADSS OFC and Accessories including all the services (using existing power Poles), as described at Serial No.-3 in the Table: VII. (17).	RKM	B	-						X3		
1d	Supply of 24F ADSS OFC and Accessories including all the services (including supply of Poles), as described at Serial No.-4 in the Table: VII. (17).	RKM	2.5 B	-						X4		
2	Fibre Distribution Management System Type1 at Block location	Nos	C	142						X5		
3a	IP-MPLS Router at GP location Supply of router at GP locations with accessories including installation, integration, testing and commissioning (as per Section (IV C), Annexure-B, II & III)	Nos	D	6,256						X6		

Sr. No.	Item Description	Unit	Unit cost (INR) (excl. tax)	Quantity	Total Cost (INR) (Excl. tax)	Rate of CGST	Rate of SGST	Rate of IGST	Total GST (in INR)	Total cost (Inclusive Of GST) (in INR)		HSN/ SAC Code
			A	B	C=A*B	D	E	F	G=C*[(D+E) or F]		H=C+G	
3b	IP-MPLS Router at Block location Supply of router at Block locations with accessories including installation, integration, testing and commissioning (as per Section (IV C), Annexure-B, II & III)	Nos	E	142						X7		
4	SFP 10G with 40 km pluggable	Nos	F	84,310						X8		
5	SFP 100G with 40 km pluggable	Nos	G	284						X9		
6a	EMS for GP routers (including H/W, S/W & licenses)	No. of NE	H	3,128						X10		
6b	EMS for Block routers (including H/W, S/W & licenses)	No. of per NE	I	71						X11		
6c	EMS additional license including H/W and S/W upgradation for GP router	No. of NE	J	3,128						X12		
6d	EMS additional license including H/W and S/W upgradation for Block router	No. of per NE	K	71						X13		
7a	Rack at GP locations (as per Section (IV C), Annexure-B, VI)	Nos	L	6,256						X14		
7b	Rack at Block locations (as per Section (IV C),	Nos	M	142						X15		

Sr. No.	Item Description	Unit	Unit cost (INR) (excl. tax)	Quantity	Total Cost (INR) (Excl. tax)	Rate of CGST	Rate of SGST	Rate of IGST	Total GST (in INR)	Total cost (Inclusive Of GST) (in INR)		HSN/ SAC Code
			A	B	C=A*B	D	E	F	G=C*[(D+E) or F]		H=C+G	
	Annexure-B, VI)											
8	Remote Fibre Monitoring System (RFMS) system including necessary hardware and software with accessories including installation, integration, testing and commissioning (as per Section (IV C), Annexure-B, V)	Nos	N	142						X16		
9a	EMS for RFMS (including H/W, S/W & licenses)	No. of RTU	O	71						X17		
9b	EMS additional license including H/W and S/W upgradation for RFMS	No. of RTUs	P	71						X18		
10	State NOC as per details and specification given at Section (IV C), Annexure-B, IV)	Nos	Q	1						X19		
11a	Power System with backup provisions at GP locations with accessories including installation, integration, testing and commissioning with provision of MPPT Card including solar	Nos	R	2,190						X20		

Sr. No.	Item Description	Unit	Unit cost (INR) (excl. tax)	Quantity	Total Cost (INR) (Excl. tax)	Rate of CGST	Rate of SGST	Rate of IGST	Total GST (in INR)	Total cost (Inclusive Of GST) (in INR)		HSN/ SAC Code
			A	B	C=A*B	D	E	F	G=C*[(D+E) or F]		H=C+G	
	panels (as per Section (IV C), Annexure-B, VIII)											
11b	Power System with backup provisions at GP locations with accessories including installation, integration, testing and commissioning with provision of slot for MPPT Card BUT excluding MPPT Card & solar panels (as per Section (IV C), Annexure-B, VIII)	Nos	S	4,066						X21		
11c	MPPT solar module of 1 KW (as per sub section VIII of Annexure B of Section IV C - Amendment no. 12)	Nos	T	1,252						X22		
12	Supply of 6F Aerial drop OFC including services for last mile connectivity as per TEC GR as described at Serial No. 5 at Table : VII (17)	Km	U	1,933						X23		
13	Supply, installation including services of RCC Poles – 7/8 meter working load of 115	Nos	V	3,866						X24		

Sr. No.	Item Description	Unit	Unit cost (INR) (excl. tax)	Quantity	Total Cost (INR) (Excl. tax)	Rate of CGST	Rate of SGST	Rate of IGST	Total GST (in INR)	Total cost (Inclusive Of GST) (in INR)		HSN/ SAC Code
			A	B	C=A*B	D	E	F	G=C*[(D+E) or F]		H=C+G	
	Kgs for last mile connectivity											
14	Supply and installation of Joint Chamber as per E.I.	Nos	W	10,819						X25		
15	Supply, installation of Joint Closure, testing and splicing 24 F for Dark Fibre Provisioning and/or attending OFC fault for the first time in a joint as per TEC GR/ E.I.	Per splicing location	X	10,819						X26		
16	Unlicensed Band Radio (UBR) 5.X with 27dbi Antenna, mounting fixture including all installation material and services without mast on either end (equipment to be supplied in pair to be installed at both ends of a link)	Nos		1								
17	Digital Microwave - 15GHz 2+0 XPIC 2KQAM with 0.6m Antenna, mounting fixture including all installation material and services without mast on either end (equipment to be	Nos		1								

Sr. No.	Item Description	Unit	Unit cost (INR) (excl. tax)	Quantity	Total Cost (INR) (Excl. tax)	Rate of CGST	Rate of SGST	Rate of IGST	Total GST (in INR)	Total cost (Inclusive Of GST) (in INR)		HSN/ SAC Code
			A	B	C=A*B	D	E	F	G=C*[(D+E) or F]		H=C+G	
	supplied in pair to be installed at both ends of a link)											
18	MARR type mast (15 Mtr height) for UBR/DMW	Nos		1								
19	Total cost in INR (X1+X2+X3...+X26)											
	Total cost in word											

TABLE: VII. (11): Price Schedule of Package - 11 (NER-I – Mizoram, Tripura, Meghalaya)

Sr. No.	Item Description	Unit	Unit cost (INR) (excl. tax)	Quantity- NER I	Total Cost (INR) (Excl. tax)	Rate of CGST	Rate of SGST	Rate of IGST	Total GST (in INR)	Total cost (Inclusive Of GST) (in INR)		HSN/ SAC Code
			A	B	C=A*B	D	E	F	G=C*[(D+E) or F]		H=C+G	
1a	Supply of 24F OFC, Duct and Accessories including all the services, as described at Serial No.-1 in the Table: VII. (17).	RKM	A	5,032						X1		
1b	Supply of 48F OFC, Duct and Accessories including all the services, as described at Serial No.-2 in the Table: VII. (17).	RKM	1.1 A	-						X2		

Sr. No.	Item Description	Unit	Unit cost (INR) (excl. tax)	Quantity- NER I	Total Cost (INR) (Excl. tax)	Rate of CGST	Rate of SGST	Rate of IGST	Total GST (in INR)	Total cost (Inclusive Of GST) (in INR)		HSN/ SAC Code
			A	B	C=A*B	D	E	F	G=C*[(D+E) or F]		H=C+G	
1c	Supply of 24F ADSS OFC and Accessories including all the services (using existing power Poles), as described at Serial No.-3 in the Table: VII. (17).	RKM	B	5,296						X3		
1d	Supply of 24F ADSS OFC and Accessories including all the services (including supply of Poles), as described at Serial No.-4 in the Table: VII. (17).	RKM	2.5 B	5,295						X4		
2	Fibre Distribution Management System Type1 at Block location	Nos	C	130						X5		
3a	IP-MPLS Router at GP location Supply of router at GP locations with accessories including installation, integration, testing and commissioning (as per Section (IV C), Annexure-B, II & III)	Nos	D	3,817						X6		
3b	IP-MPLS Router at Block location Supply of router at Block locations with accessories including installation, integration, testing and commissioning (as per Section (IV C), Annexure-B, II & III)	Nos	E	130						X7		

Sr. No.	Item Description	Unit	Unit cost (INR) (excl. tax)	Quantity- NER I	Total Cost (INR) (Excl. tax)	Rate of CGST	Rate of SGST	Rate of IGST	Total GST (in INR)	Total cost (Inclusive Of GST) (in INR)		HSN/ SAC Code
			A	B	C=A*B	D	E	F	G=C*[(D+E) or F]		H=C+G	
4	SFP 10G with 40 km pluggable	Nos	F	52,879						X8		
5	SFP 100G with 40 km pluggable	Nos	G	260						X9		
6a	EMS for GP routers (including H/W, S/W & licenses)	No. of NE	H	1,909						X10		
6b	EMS for Block routers (including H/W, S/W & licenses)	No. of per NE	I	65						X11		
6c	EMS additional license including H/W and S/W upgradation for GP router	No. of NE	J	1,908						X12		
6d	EMS additional license including H/W and S/W upgradation for Block router	No. of per NE	K	65						X13		
7a	Rack at GP locations (as per Section (IV C), Annexure-B, VI)	Nos	L	3,817						X14		
7b	Rack at Block locations (as per Section (IV C), Annexure-B, VI)	Nos	M	130						X15		
8	Remote Fibre Monitoring System (RFMS) system including necessary hardware and software with accessories including installation, integration, testing and commissioning (as per Section (IV C), Annexure-B, V)	Nos	N	130						X16		
9a	EMS for RFMS (including	No. of	O	65						X17		

Sr. No.	Item Description	Unit	Unit cost (INR) (excl. tax)	Quantity- NER I	Total Cost (INR) (Excl. tax)	Rate of CGST	Rate of SGST	Rate of IGST	Total GST (in INR)	Total cost (Inclusive Of GST) (in INR)		HSN/ SAC Code
			A	B	C=A*B	D	E	F	G=C*[(D+E) or F]		H=C+G	
	H/W, S/W & licenses)	RTU										
9b	EMS additional license including H/W and S/W upgradation for RFMS	No. of RTUs	P	65						X18		
10	State NOC as per details and specification given at Section (IV C), Annexure-B, IV)	Nos	Q	1						X19		
11a	Power System with backup provisions at GP locations with accessories including installation, integration, testing and commissioning with provision of MPPT Card including solar panels (as per Section (IV C), Annexure-B, VIII)	Nos	R	1,909						X20		
11b	Power System with backup provisions at GP locations with accessories including installation, integration, testing and commissioning with provision of slot for MPPT Card BUT excluding MPPT Card & solar panels (as per Section (IV C), Annexure-B, VIII)	Nos	S	1,908						X21		
11c	MPPT solar module of 1 KW (as per sub section VIII of Annexure B of Section IV C - Amendment no. 12)	Nos	T	764						X22		
12	Supply of 6F Aerial drop OFC including services for	Km	U	13,156						X23		

Sr. No.	Item Description	Unit	Unit cost (INR) (excl. tax)	Quantity- NER I	Total Cost (INR) (Excl. tax)	Rate of CGST	Rate of SGST	Rate of IGST	Total GST (in INR)	Total cost (Inclusive Of GST) (in INR)		HSN/ SAC Code
			A	B	C=A*B	D	E	F	G=C*[(D+E) or F]		H=C+G	
	last mile connectivity as per TEC GR as described at Serial No. 5 at Table : VII (17)											
13	Supply, installation including services of RCC Poles – 7/8 meter working load of 115 Kgs for last mile connectivity	Nos	V	26,312						X24		
14	Supply and installation of Joint Chamber as per E.I. for restoration of existing network (As per Clause 3.2.9 k) of Section – IV B)	Nos	W	1,398						X25		
15	Supply, installation of Joint Closure, testing and splicing 24 F for Dark Fibre Provisioning and/or attending OFC fault for the first time in a joint as per TEC GR/ E.I. for restoration of existing network (As per Clause 3.2.9 k) of Section – IV B)	Per splicing location	X	1,398						X26		
16	Unlicensed Band Radio (UBR) 5.X with 27dbi Antenna, mounting fixture including all installation material and services without mast on either end (equipment to be supplied in pair to be installed at both ends of a link)	Nos		1								

Sr. No.	Item Description	Unit	Unit cost (INR) (excl. tax)	Quantity- NER I	Total Cost (INR) (Excl. tax)	Rate of CGST	Rate of SGST	Rate of IGST	Total GST (in INR)	Total cost (Inclusive Of GST) (in INR)		HSN/ SAC Code
			A	B	C=A*B	D	E	F	G=C*[(D+E) or F]		H=C+G	
17	Digital Microwave -15GHz 2+0 XPIC 2KQAM with 0.6m Antenna, mounting fixture including all installation material and services without mast on either end (equipment to be supplied in pair to be installed at both ends of a link)	Nos		1								
18	MARR type mast (15 Mtr height) for UBR/DMW	Nos		1								
19	Total cost in INR (X1+X2+X3...+X26)											
	Total cost in word											

TABLE: VII. (12): Price Schedule of Package - 12 (Punjab)

Sr. No.	Item Description	Unit	Unit cost (INR) (excl. tax)	Quantity - Punjab	Total Cost (INR) (Excl. tax)	Rate of CGST	Rate of SGST	Rate of IGST	Total GST (in INR)	Total cost (Inclusive Of GST) (in INR)		HSN/ SAC Code
			A	B	C=A*B	D	E	F	G=C*[(D+E) or F]		H=C+G	
1a	Supply of 24F OFC, Duct and Accessories including all the services, as described at Serial No.-1 in the Table:	RKM	A	11,204						X1		

Sr. No.	Item Description	Unit	Unit cost (INR) (excl. tax)	Quantity - Punjab	Total Cost (INR) (Excl. tax)	Rate of CGST	Rate of SGST	Rate of IGST	Total GST (in INR)	Total cost (Inclusive Of GST) (in INR)		HSN/ SAC Code
			A	B	C=A*B	D	E	F	G=C*[(D+E) or F]		H=C+G	
	VII. (17).											
1b	Supply of 48F OFC, Duct and Accessories including all the services, as described at Serial No.-2 in the Table: VII. (17).	RKM	1.1 A	4,118						X2		
1c	Supply of 24F ADSS OFC and Accessories including all the services (using existing power Poles), as described at Serial No.-3 in the Table: VII. (17).	RKM	B	50						X3		
1d	Supply of 24F ADSS OFC and Accessories including all the services (including supply of Poles), as described at Serial No.-4 in the Table: VII. (17).	RKM	2.5 B	49						X4		
2	Fibre Distribution Management System Type1 at Block location	Nos	C	151						X5		
3a	IP-MPLS Router at GP location Supply of router at GP locations with accessories including installation, integration, testing and commissioning (as per Section (IV C), Annexure-B, II & III)	Nos	D	13,337						X6		
3b	IP-MPLS Router at Block location Supply of router at Block	Nos	E	151						X7		

Sr. No.	Item Description	Unit	Unit cost (INR) (excl. tax)	Quantity - Punjab	Total Cost (INR) (Excl. tax)	Rate of CGST	Rate of SGST	Rate of IGST	Total GST (in INR)	Total cost (Inclusive Of GST) (in INR)		HSN/ SAC Code
			A	B	C=A*B	D	E	F	G=C*[(D+E) or F]		H=C+G	
	locations with accessories including installation, integration, testing and commissioning (as per Section (IV C), Annexure-B, II & III)											
4	SFP 10G with 40 km pluggable	Nos	F	1,78,213						X8		
5	SFP 100G with 40 km pluggable	Nos	G	302						X9		
6a	EMS for GP routers (including H/W, S/W & licenses)	No. of NE	H	6,669						X10		
6b	EMS for Block routers (including H/W, S/W & licenses)	No. of per NE	I	76						X11		
6c	EMS additional license including H/W and S/W upgradation for GP router	No. of NE	J	6,668						X12		
6d	EMS additional license including H/W and S/W upgradation for Block router	No. of per NE	K	75						X13		
7a	Rack at GP locations (as per Section (IV C), Annexure-B, VI)	Nos	L	13,337						X14		
7b	Rack at Block locations (as per Section (IV C), Annexure-B, VI)	Nos	M	151						X15		
8	Remote Fibre Monitoring System (RFMS) system including necessary hardware and software	Nos	N	151						X16		

Sr. No.	Item Description	Unit	Unit cost (INR) (excl. tax)	Quantity - Punjab	Total Cost (INR) (Excl. tax)	Rate of CGST	Rate of SGST	Rate of IGST	Total GST (in INR)	Total cost (Inclusive Of GST) (in INR)		HSN/ SAC Code
			A	B	C=A*B	D	E	F	G=C*[(D+E) or F]		H=C+G	
	with accessories including installation, integration, testing and commissioning (as per Section (IV C), Annexure-B, V)											
9a	EMS for RFMS (including H/W, S/W & licenses)	No. of RTU	0	76						X17		
9b	EMS additional license including H/W and S/W upgradation for RFMS	No. of RTUs	P	75						X18		
10	State NOC as per details and specification given at Section (IV C), Annexure-B, IV)	Nos	Q	1						X19		
11a	Power System with backup provisions at GP locations with accessories including installation, integration, testing and commissioning with provision of MPPT Card including solar panels (as per Section (IV C), Annexure-B, VIII)	Nos	R	3,334						X20		
11b	Power System with backup provisions at GP locations with accessories including installation, integration, testing and commissioning with provision of slot for MPPT Card BUT excluding MPPT Card & solar panels (as per Section (IV C), Annexure-B, VIII)	Nos	S	10,003						X21		

Sr. No.	Item Description	Unit	Unit cost (INR) (excl. tax)	Quantity - Punjab	Total Cost (INR) (Excl. tax)	Rate of CGST	Rate of SGST	Rate of IGST	Total GST (in INR)	Total cost (Inclusive Of GST) (in INR)		HSN/ SAC Code
			A	B	C=A*B	D	E	F	G=C*[(D+E) or F]		H=C+G	
11c	MPPT solar module of 1 KW (as per sub section VIII of Annexure B of Section IV C - Amendment no. 12)	Nos	T	2,668						X22		
12	Supply of 6F Aerial drop OFC including services for last mile connectivity as per TEC GR as described at Serial No. 5 at Table : VII (17)	Km	U	-						X23		
13	Supply, installation including services of RCC Poles – 7/8 meter working load of 115 Kgs for last mile connectivity	Nos	V	-						X24		
14	Supply and installation of Joint Chamber as per E.I. for restoration of existing network (As per Clause 3.2.9 k) of Section – IV B)	Nos	W	22,239						X25		
15	Supply, installation of Joint Closure, testing and splicing 24 F for Dark Fibre Provisioning and/or attending OFC fault for the first time in a joint as per TEC GR/ E.I. for restoration of existing network (As per Clause 3.2.9 k) of Section – IV B)	Per splicing location	X	22,339						X26		
16	Unlicensed Band Radio (UBR) 5.X with 27dbi Antenna, mounting fixture	Nos		1								

Sr. No.	Item Description	Unit	Unit cost (INR) (excl. tax)	Quantity - Punjab	Total Cost (INR) (Excl. tax)	Rate of CGST	Rate of SGST	Rate of IGST	Total GST (in INR)	Total cost (Inclusive Of GST) (in INR)		HSN/ SAC Code
			A	B	C=A*B	D	E	F	G=C*[(D+E) or F]		H=C+G	
	including all installation material and services without mast on either end (equipment to be supplied in pair to be installed at both ends of a link)											
17	Digital Microwave -15GHz 2+0 XPIC 2KQAM with 0.6m Antenna, mounting fixture including all installation material and services without mast on either end (equipment to be supplied in pair to be installed at both ends of a link)	Nos		1								
18	MARR type mast (15 Mtr height) for UBR/DMW	Nos		1								
19	Total cost in INR (X1+X2+X3...+X26)											
	Total cost in word											

TABLE: VII. (13): Price Schedule of Package - 13 (J&K, Ladakh)

Sr. No.	Item Description	Unit	Unit cost (INR) (excl. tax)	Quantity	Total Cost (INR) (Excl. tax)	Rate of CGST	Rate of SGST	Rate of IGST	Total GST (in INR)	Total cost (Inclusive Of GST) (in INR)		HSN/ SAC Code
			A	B	C=A*B	D	E	F	G=C*[(D+E) or F]		H=C+G	
1a	Supply of 24F OFC, Duct and Accessories including all the services, as described at Serial No.-1	RKM	A	7,271						X1		

Sr. No.	Item Description	Unit	Unit cost (INR) (excl. tax)	Quantity	Total Cost (INR) (Excl. tax)	Rate of CGST	Rate of SGST	Rate of IGST	Total GST (in INR)	Total cost (Inclusive Of GST) (in INR)		HSN/ SAC Code
			A	B	C=A*B	D	E	F	G=C*[(D+E) or F]		H=C+G	
	in the Table: VII. (17).											
1b	Supply of 48F OFC, Duct and Accessories including all the services, as described at Serial No.-2 in the Table: VII. (17).	RKM	1.1 A	4,930						X2		
1c	Supply of 24F ADSS OFC and Accessories including all the services (using existing power Poles), as described at Serial No.-3 in the Table: VII. (17).	RKM	B	554						X3		
1d	Supply of 24F ADSS OFC and Accessories including all the services (including supply of Poles), as described at Serial No.-4 in the Table: VII. (17).	RKM	2.5 B	553						X4		
2	Fibre Distribution Management System Type1 at Block location	Nos	C	318						X5		
3a	IP-MPLS Router at GP location Supply of router at GP locations with accessories including installation, integration, testing and commissioning (as per Section (IV C), Annexure-B, II & III)	Nos	D	4492						X6		
3b	IP-MPLS Router at Block location	Nos	E	318						X7		

Sr. No.	Item Description	Unit	Unit cost (INR) (excl. tax)	Quantity	Total Cost (INR) (Excl. tax)	Rate of CGST	Rate of SGST	Rate of IGST	Total GST (in INR)	Total cost (Inclusive Of GST) (in INR)		HSN/ SAC Code
			A	B	C=A*B	D	E	F	G=C*[(D+E) or F]		H=C+G	
	Supply of router at Block locations with accessories including installation, integration, testing and commissioning (as per Section (IV C), Annexure-B, II & III)											
4	SFP 10G with 40 km pluggable	Nos	F	62,041						X8		
5	SFP 100G with 40 km pluggable	Nos	G	636						X9		
6a	EMS for GP routers (including H/W, S/W & licenses)	No. of NE	H	2,246						X10		
6b	EMS for Block routers (including H/W, S/W & licenses)	No. of per NE	I	159						X11		
6c	EMS additional license including H/W and S/W upgradation for GP router	No. of NE	J	2,246						X12		
6d	EMS additional license including H/W and S/W upgradation for Block router	No. of per NE	K	159						X13		
7a	Rack at GP locations (as per Section (IV C), Annexure-B, VI)	Nos	L	4,492						X14		
7b	Rack at Block locations (as per Section (IV C), Annexure-B, VI)	Nos	M	318						X15		
8	Remote Fibre Monitoring	Nos	N	318						X16		

Sr. No.	Item Description	Unit	Unit cost (INR) (excl. tax)	Quantity	Total Cost (INR) (Excl. tax)	Rate of CGST	Rate of SGST	Rate of IGST	Total GST (in INR)	Total cost (Inclusive Of GST) (in INR)		HSN/ SAC Code
			A	B	C=A*B	D	E	F	G=C*[(D+E) or F]		H=C+G	
	System (RFMS) system including necessary hardware and software with accessories including installation, integration, testing and commissioning (as per Section (IV C), Annexure-B, V)											
9a	EMS for RFMS (including H/W, S/W & licenses)	No. of RTU	O	159						X17		
9b	EMS additional license including H/W and S/W upgradation for RFMS	No. of RTUs	P	159						X18		
10	State NOC as per details and specification given at Section (IV C), Annexure-B, IV)	Nos	Q	1						X19		
11a	Power System with backup provisions at GP locations with accessories including installation, integration, testing and commissioning with provision of MPPT Card including solar panels (as per Section (IV C), Annexure-B, VIII)	Nos	R	2,247						X20		
11b	Power System with backup provisions at GP locations with accessories including	Nos	S	2,245						X21		

Sr. No.	Item Description	Unit	Unit cost (INR) (excl. tax)	Quantity	Total Cost (INR) (Excl. tax)	Rate of CGST	Rate of SGST	Rate of IGST	Total GST (in INR)	Total cost (Inclusive Of GST) (in INR)		HSN/ SAC Code
			A	B	C=A*B	D	E	F	G=C*[(D+E) or F]		H=C+G	
	installation, integration, testing and commissioning with provision of slot for MPPT Card BUT excluding MPPT Card & solar panels (as per Section (IV C), Annexure-B, VIII)											
11c	MPPT solar module of 1 KW (as per sub section VIII of Annexure B of Section IV C - Amendment no. 12)	Nos	T	899						X22		
12	Supply of 6F Aerial drop OFC including services for last mile connectivity as per TEC GR as described at Serial No. 5 at Table : VII (17)	Km	U	4,620						X23		
13	Supply, installation including services of RCC Poles – 7/8 meter working load of 115 Kgs for last mile connectivity	Nos	V	9,240						X24		
14	Supply and installation of Joint Chamber as per E.I. for restoration of existing network (As per Clause 3.2.9 k) of Section – IV B)	Nos	W	782						X25		
15	Supply, installation of Joint Closure, testing and splicing 24 F for Dark	Per splicing location	X	782						X26		

Sr. No.	Item Description	Unit	Unit cost (INR) (excl. tax)	Quantity	Total Cost (INR) (Excl. tax)	Rate of CGST	Rate of SGST	Rate of IGST	Total GST (in INR)	Total cost (Inclusive Of GST) (in INR)		HSN/ SAC Code
			A	B	C=A*B	D	E	F	G=C*[(D+E) or F]		H=C+G	
	Fibre Provisioning and/or attending OFC fault for the first time in a joint as per TEC GR/ E.I. for restoration of existing network (As per Clause 3.2.9 k) of Section – IV B)											
16	Unlicensed Band Radio (UBR) 5.X with 27dbi Antenna, mounting fixture including all installation material and services without mast on either end (equipment to be supplied in pair to be installed at both ends of a link)	Nos		1								
17	Digital Microwave - 15GHz 2+0 XPIC 2KQAM with 0.6m Antenna, mounting fixture including all installation material and services without mast on either end (equipment to be supplied in pair to be installed at both ends of a link)	Nos		1								
18	MARR type mast (15 Mtr height) for UBR/DMW	Nos		1								
19	Total cost in INR (X1+X2+X3...+X26)											
	Total cost in word											

TABLE: VII. (14): Price Schedule of Package - 14 (Assam)

Sr. No.	Item Description	Unit	Unit cost (INR) (excl . tax)	Quantity	Total Cost (INR) (Excl. tax)	Rate of CGST	Rate of SGST	Rate of IGST	Total GST (in INR)	Total cost (Inclusive Of GST) (in INR)		HSN/ SAC Code
			A	B	C=A*B	D	E	F	G=C*[(D+E) or F]		H=C+G	
1a	Supply of 24F OFC, Duct and Accessories including all the services, as described at Serial No.-1 in the Table: VII. (17).	RKM	A	12,324						X1		
1b	Supply of 48F OFC, Duct and Accessories including all the services, as described at Serial No.-2 in the Table: VII. (17).	RKM	1.1 A	-						X2		
1c	Supply of 24F ADSS OFC and Accessories including all the services (using existing power Poles), as described at Serial No.-3 in the Table: VII. (17).	RKM	B	-						X3		
1d	Supply of 24F ADSS OFC and Accessories including all the services (including supply of Poles), as described at Serial No.-4 in the Table: VII. (17).	RKM	2.5 B	-						X4		
2	Fibre Distribution Management System Type1 at Block location	Nos	C	229						X5		
3a	IP-MPLS Router at GP location Supply of router at GP locations with accessories including installation, integration, testing and commissioning (as per Section (IV C), Annexure-B, II & III)	Nos	D	2,665						X6		
3b	IP-MPLS Router at Block location	Nos	E	229						X7		

Sr. No.	Item Description	Unit	Unit cost (INR) (excl. tax)	Quantity	Total Cost (INR) (Excl. tax)	Rate of CGST	Rate of SGST	Rate of IGST	Total GST (in INR)	Total cost (Inclusive Of GST) (in INR)		HSN/ SAC Code
			A	B	C=A*B	D	E	F	G=C*[(D+E) or F]		H=C+G	
	Supply of router at Block locations with accessories including installation, integration, testing and commissioning (as per Section (IV C), Annexure-B, II & III)											
4	SFP 10G with 40 km pluggable	Nos	F	42,202						X8		
5	SFP 100G with 40 km pluggable	Nos	G	458						X9		
6a	EMS for GP routers (including H/W, S/W & licenses)	No. of NE	H	1,333						X10		
6b	EMS for Block routers (including H/W, S/W & licenses)	No. of per NE	I	115						X11		
6c	EMS additional license including H/W and S/W upgradation for GP router	No. of NE	J	1,332						X12		
6d	EMS additional license including H/W and S/W upgradation for Block router	No. of per NE	K	114						X13		
7a	Rack at GP locations (as per Section (IV C), Annexure-B, VI)	Nos	L	2,665						X14		
7b	Rack at Block locations (as per Section (IV C), Annexure-B, VI)	Nos	M	229						X15		
8	Remote Fibre Monitoring System (RFMS) system including necessary hardware and software with accessories including installation, integration, testing and commissioning (as per Section (IV C), Annexure-B, V)	Nos	N	229						X16		
9a	EMS for RFMS (including H/W,	No. of	O	115						X17		

Sr. No.	Item Description	Unit	Unit cost (INR) (excl. tax)	Quantity	Total Cost (INR) (Excl. tax)	Rate of CGST	Rate of SGST	Rate of IGST	Total GST (in INR)	Total cost (Inclusive Of GST) (in INR)		HSN/ SAC Code
			A	B	C=A*B	D	E	F	G=C*[(D+E) or F]		H=C+G	
	S/W & licenses)	RTU										
9b	EMS additional license including H/W and S/W upgradation for RFMS	No. of RTUs	P	114						X18		
10	State NOC as per details and specification given at Section (IV C), Annexure-B, IV)	Nos	Q	1						X19		
11a	Power System with backup provisions at GP locations with accessories including installation, integration, testing and commissioning with provision of MPPT Card including solar panels (as per Section (IV C), Annexure-B, VIII)	Nos	R	1,066						X20		
11b	Power System with backup provisions at GP locations with accessories including installation, integration, testing and commissioning with provision of slot for MPPT Card BUT excluding MPPT Card & solar panels (as per Section (IV C), Annexure-B, VIII)	Nos	S	1,599						X21		
11c	MPPT solar module of 1 KW (as per sub section VIII of Annexure B of Section IV C - Amendment no. 12)	Nos	T	533						X22		
12	Supply of 6F Aerial drop OFC including services for last mile connectivity as per TEC GR as described at Serial No. 5 at	Km	U	34,845						X23		

Sr. No.	Item Description	Unit	Unit cost (INR) (excl. tax)	Quantity	Total Cost (INR) (Excl. tax)	Rate of CGST	Rate of SGST	Rate of IGST	Total GST (in INR)	Total cost (Inclusive Of GST) (in INR)		HSN/ SAC Code
			A	B	C=A*B	D	E	F	G=C*[(D+E) or F]		H=C+G	
	Table : VII (17)											
13	Supply, installation including services of RCC Poles – 7/8 meter working load of 115 Kgs for last mile connectivity	Nos	V	69,690						X24		
14	Supply and installation of Joint Chamber as per E.I. for restoration of existing network (As per Clause 3.2.9 k) of Section – IV B)	Nos	W	4,435						X25		
15	Supply, installation of Joint Closure, testing and splicing 24 F for Dark Fibre Provisioning and/or attending OFC fault for the first time in a joint as per TEC GR/ E.I. for restoration of existing network (As per Clause 3.2.9 k) of Section – IV B)	Per splicing location	X	4,435						X26		
16	Unlicensed Band Radio (UBR) 5.X with 27dbi Antenna, mounting fixture including all installation material and services without mast on either end (equipment to be supplied in pair to be installed at both ends of a link)	Nos		1								
17	Digital Microwave -15GHz 2+0 XPIC 2KQAM with 0.6m Antenna, mounting fixture including all installation material and services without	Nos		1								

Sr. No.	Item Description	Unit	Unit cost (INR) (excl. tax)	Quantity	Total Cost (INR) (Excl. tax)	Rate of CGST	Rate of SGST	Rate of IGST	Total GST (in INR)	Total cost (Inclusive Of GST) (in INR)		HSN/ SAC Code
			A	B	C=A*B	D	E	F	G=C*[(D+E) or F]		H=C+G	
	mast on either end (equipment to be supplied in pair to be installed at both ends of a link)											
18	MARR type mast (15 Mtr height) for UBR/DMW	Nos		1								
19	Total cost in INR (X1+X2+X3...+X26)											
	Total cost in word											

TABLE: VII. (15): Price Schedule of Package - 15 (NER II - Arunachal Pradesh, Nagaland, Manipur)

Sr. No.	Item Description	Unit	Unit cost (INR) (excl. tax)	Quantity	Total Cost (INR) (Excl. tax)	Rate of CGST	Rate of SGST	Rate of IGST	Total GST (in INR)	Total cost (Inclusive Of GST) (in INR)		HSN/ SAC Code
			A	B	C=A*B	D	E	F	G=C*[(D+E) or F]		H=C+G	
1a	Supply of 24F OFC, Duct and Accessories including all the services, as described at Serial No.-1 in the Table: VII. (17).	RKM	A	1,819						X1		
1b	Supply of 48F OFC, Duct and Accessories including all the services, as described at Serial No.-2 in the Table: VII. (17).	RKM	1.1 A	24						X2		
1c	Supply of 24F ADSS OFC and Accessories including all the services (using existing power Poles), as described at Serial No.-3 in the Table: VII. (17).	RKM	B	5,174						X3		

Sr. No.	Item Description	Unit	Unit cost (INR) (excl. tax)	Quantity	Total Cost (INR) (Excl. tax)	Rate of CGST	Rate of SGST	Rate of IGST	Total GST (in INR)	Total cost (Inclusive Of GST) (in INR)		HSN/ SAC Code
			A	B	C=A*B	D	E	F	G=C*[(D+E) or F]		H=C+G	
1d	Supply of 24F ADSS OFC and Accessories including all the services (including supply of Poles), as described at Serial No.-4 in the Table: VII. (17).	RKM	2.5 B	5,173						X4		
2	Fibre Distribution Management System Type1 at Block location	Nos	C	258						X5		
3a	IP-MPLS Router at GP location Supply of router at GP locations with accessories including installation, integration, testing and commissioning (as per Section (IV C), Annexure-B, II & III)	Nos	D	5,902						X6		
3b	IP-MPLS Router at Block location Supply of router at Block locations with accessories including installation, integration, testing and commissioning (as per Section (IV C), Annexure-B, II & III)	Nos	E	258						X7		
4	SFP 10G with 40 km pluggable	Nos	F	81,259						X8		
5	SFP 100G with 40 km pluggable	Nos	G	516						X9		
6a	EMS for GP routers (including H/jtW, S/W & licenses)	No. of NE	H	2,951						X10		
6b	EMS for Block routers (including H/W, S/W & licenses)	No. of per NE	I	129						X11		
6c	EMS additional license including H/W and S/W upgradation for GP router	No. of NE	J	2,951						X12		
6d	EMS additional license including H/W and S/W upgradation for	No. of per NE	K	129						X13		

Sr. No.	Item Description	Unit	Unit cost (INR) (excl. tax)	Quantity	Total Cost (INR) (Excl. tax)	Rate of CGST	Rate of SGST	Rate of IGST	Total GST (in INR)	Total cost (Inclusive Of GST) (in INR)		HSN/ SAC Code
			A	B	C=A*B	D	E	F	G=C*[(D+E) or F]		H=C+G	
	Block router											
7a	Rack at GP locations (as per Section (IV C), Annexure-B, VI)	Nos	L	5,902						X14		
7b	Rack at Block locations (as per Section (IV C), Annexure-B, VI)	Nos	M	258						X15		
8	Remote Fibre Monitoring System (RFMS) system including necessary hardware and software with accessories including installation, integration, testing and commissioning (as per Section (IV C), Annexure-B, V)	Nos	N	258						X16		
9a	EMS for RFMS (including H/W, S/W & licenses)	No. of RTU	O	129						X17		
9b	EMS additional license including H/W and S/W upgradation for RFMS	No. of RTUs	P	129						X18		
10	State NOC as per details and specification given at Section (IV C), Annexure-B, IV)	Nos	Q	1						X19		
11a	Power System with backup provisions at GP locations with accessories including installation, integration, testing and commissioning with provision of MPPT Card including solar panels (as per Section (IV C), Annexure-B, VIII)	Nos	R	2,951						X20		
11b	Power System with backup provisions at GP locations with accessories including installation, integration, testing	Nos	S	2,951						X21		

Sr. No.	Item Description	Unit	Unit cost (INR) (excl. tax)	Quantity	Total Cost (INR) (Excl. tax)	Rate of CGST	Rate of SGST	Rate of IGST	Total GST (in INR)	Total cost (Inclusive Of GST) (in INR)		HSN/ SAC Code
			A	B	C=A*B	D	E	F	G=C*[(D+E) or F]		H=C+G	
	and commissioning with provision of slot for MPPT Card BUT excluding MPPT Card & solar panels (as per Section (IV C), Annexure-B, VIII)											
11c	MPPT solar module of 1 KW (as per sub section VIII of Annexure B of Section IV C - Amendment no. 12)	Nos	T	1,181						X22		
12	Supply of 6F Aerial drop OFC including services for last mile connectivity as per TEC GR as described at Serial No. 5 at Table : VII (17)	Km	U	23,932						X23		
13	Supply, installation including services of RCC Poles – 7/8 meter working load of 115 Kgs for last mile connectivity	Nos	V	47,864						X24		
14	Supply and installation of Joint Chamber as per E.I. for restoration of existing network (As per Clause 3.2.9 k) of Section – IV B)	Nos	W	733						X25		
15	Supply, installation of Joint Closure, testing and splicing 24 F for Dark Fibre Provisioning and/or attending OFC fault for the first time in a joint as per TEC GR/ E.I. for restoration of existing network (As per Clause 3.2.9 k) of Section – IV B)	Per splicing location	X	733						X26		
16	Unlicensed Band Radio (UBR)	Nos		1								

Sr. No.	Item Description	Unit	Unit cost (INR) (excl. tax)	Quantity	Total Cost (INR) (Excl. tax)	Rate of CGST	Rate of SGST	Rate of IGST	Total GST (in INR)	Total cost (Inclusive Of GST) (in INR)		HSN/ SAC Code
			A	B	C=A*B	D	E	F	G=C*[(D+E) or F]		H=C+G	
	5.X with 27dbi Antenna, mounting fixture including all installation material and services without mast on either end (equipment to be supplied in pair to be installed at both ends of a link)											
17	Digital Microwave -15GHz 2+0 XPIC 2KQAM with 0.6m Antenna, mounting fixture including all installation material and services without mast on either end (equipment to be supplied in pair to be installed at both ends of a link)	Nos		1								
18	MARR type mast (15 Mtr height) for UBR/DMW	Nos		1								
19	Total cost in INR (X1+X2+X3...+X26)											
	Total cost in word											

TABLE: VII. (16): Price Schedule of Package - 16 (Kerala)

Sr. No.	Item Description	Unit	Unit cost (INR) (excl. tax)	Quantity	Total Cost (INR) (Excl. tax)	Rate of CGST	Rate of SGST	Rate of IGST	Total GST (in INR)	Total cost (Inclusive Of GST) (in INR)		HSN/ SAC Code
			A	B	C=A*B	D	E	F	G=C*[(D+E) or F]		H=C+G	
1a	Supply of 24F OFC, Duct and Accessories including all the services, as described at Serial No.-1 in the Table: VII. (17).	RKM	A	8,492						X1		
1b	Supply of 48F OFC, Duct and Accessories including all the services, as described at Serial No.-2 in the Table: VII. (17).	RKM	1.1 A	-						X2		
1c	Supply of 24F ADSS OFC and Accessories including all the services (using existing power Poles), as described at Serial No.-3 in the Table: VII. (17).	RKM	B	4						X3		
1d	Supply of 24F ADSS OFC and Accessories including all the services (including supply of Poles), as described at Serial No.-4 in the Table: VII. (17).	RKM	2.5 B	4						X4		
2	Fibre Distribution Management System Type1 at Block location	Nos	C	152						X5		
3a	IP-MPLS Router at GP location	Nos	D	978						X6		

Sr. No.	Item Description	Unit	Unit cost (INR) (excl. tax)	Quantity	Total Cost (INR) (Excl. tax)	Rate of CGST	Rate of SGST	Rate of IGST	Total GST (in INR)	Total cost (Inclusive Of GST) (in INR)		HSN/ SAC Code
			A	B	C=A*B	D	E	F	G=C*[(D+E) or F]		H=C+G	
	Supply of router at GP locations with accessories including installation, integration, testing and commissioning (as per Section (IV C), Annexure-B, II & III)											
3b	IP-MPLS Router at Block location Supply of router at Block locations with accessories including installation, integration, testing and commissioning (as per Section (IV C), Annexure-B, II & III)	Nos	E	152						X7		
4	SFP 10G with 40 km pluggable	Nos	F	14,538						X8		
5	SFP 100G with 40 km pluggable	Nos	G	304						X9		
6a	EMS for GP routers (including H/W, S/W & licenses)	No. of NE	H	489						X10		
6b	EMS for Block routers (including H/W, S/W & licenses)	No. of per NE	I	76						X11		
6c	EMS additional license including H/W and S/W upgradation for GP router	No. of NE	J	489						X12		
6d	EMS additional license	No. of	K	76						X13		

Sr. No.	Item Description	Unit	Unit cost (INR) (excl. tax)	Quantity	Total Cost (INR) (Excl. tax)	Rate of CGST	Rate of SGST	Rate of IGST	Total GST (in INR)	Total cost (Inclusive Of GST) (in INR)		HSN/ SAC Code
			A	B	C=A*B	D	E	F	G=C*[(D+E) or F]		H=C+G	
	including H/W and S/W upgradation for Block router	per NE										
7a	Rack at GP locations (as per Section (IV C), Annexure-B, VI)	Nos	L	978						X14		
7b	Rack at Block locations (as per Section (IV C), Annexure-B, VI)	Nos	M	152						X15		
8	Remote Fibre Monitoring System (RFMS) system including necessary hardware and software with accessories including installation, integration, testing and commissioning (as per Section (IV C), Annexure-B, V)	Nos	N	152						X16		
9a	EMS for RFMS (including H/W, S/W & licenses)	No. of RTU	O	76						X17		
9b	EMS additional license including H/W and S/W upgradation for RFMS	No. of RTUs	P	76						X18		
10	State NOC as per details and specification given at Section (IV C), Annexure-B, IV)	Nos	Q	1						X19		
11a	Power System with backup provisions at GP locations with	Nos	R	245						X20		

Sr. No.	Item Description	Unit	Unit cost (INR) (excl. tax)	Quantity	Total Cost (INR) (Excl. tax)	Rate of CGST	Rate of SGST	Rate of IGST	Total GST (in INR)	Total cost (Inclusive Of GST) (in INR)		HSN/ SAC Code
			A	B	C=A*B	D	E	F	G=C*[(D+E) or F]		H=C+G	
	accessories including installation, integration, testing and commissioning with provision of MPPT Card including solar panels (as per Section (IV C), Annexure-B, VIII)											
11b	Power System with backup provisions at GP locations with accessories including installation, integration, testing and commissioning with provision of slot for MPPT Card BUT excluding MPPT Card & solar panels (as per Section (IV C), Annexure-B, VIII)	Nos	S	733						X21		
11c	MPPT solar module of 1 KW (as per sub section VIII of Annexure B of Section IV C - Amendment no. 12)	Nos	T	196						X22		
12	Supply of 6F Aerial drop OFC including services for last mile connectivity as per TEC GR as described at Serial No. 5 at Table : VII (17)	Km	U	1,756						X23		

Sr. No.	Item Description	Unit	Unit cost (INR) (excl. tax)	Quantity	Total Cost (INR) (Excl. tax)	Rate of CGST	Rate of SGST	Rate of IGST	Total GST (in INR)	Total cost (Inclusive Of GST) (in INR)		HSN/ SAC Code
			A	B	C=A*B	D	E	F	G=C*[(D+E) or F]		H=C+G	
13	Supply, installation including services of RCC Poles – 7/8 meter working load of 115 Kgs for last mile connectivity	Nos	V	3,512						X24		
14	Supply and installation of Joint Chamber as per E.I. for restoration of existing network (As per Clause 3.2.9 k) of Section – IV B)	Nos	W	754						X25		
15	Supply, installation of Joint Closure, testing and splicing 24 F for Dark Fibre Provisioning and/or attending OFC fault for the first time in a joint as per TEC GR/ E.I. for restoration of existing network (As per Clause 3.2.9 k) of Section – IV B)	Per splicing location	X	754						X26		
16	Unlicensed Band Radio (UBR) 5.X with 27dbi Antenna, mounting fixture including all installation material and services without mast on either end (equipment to be	Nos		1								

Sr. No.	Item Description	Unit	Unit cost (INR) (excl. tax)	Quantity	Total Cost (INR) (Excl. tax)	Rate of CGST	Rate of SGST	Rate of IGST	Total GST (in INR)	Total cost (Inclusive Of GST) (in INR)		HSN/ SAC Code
			A	B	C=A*B	D	E	F	G=C*[(D+E) or F]		H=C+G	
	supplied in pair to be installed at both ends of a link)											
17	Digital Microwave - 15GHz 2+0 XPIC 2KQAM with 0.6m Antenna, mounting fixture including all installation material and services without mast on either end (equipment to be supplied in pair to be installed at both ends of a link)	Nos		1								
18	MARR type mast (15 Mtr height) for UBR/DMW	Nos		1								
19	Total cost in INR (X1+X2+X3...+X26)											
	Total cost in word											

TABLE: VII. (17)

Detailed description of the line items, referred in the Price Schedules of Packages- 1 to 16

S. No.	Price Schedule S. No.	Item Description
1	1a	Supply of 24F OFC, Duct and Accessories including all the services, as described below: 1. Physical survey of block to GP route, capturing the Latitude-Longitude of OF cable route, electronics infrastructure and power infrastructure, preparation of GIS survey report before execution of works. 2. Supply of 24F armoured optical fibre cable (OFC), duct (40/33 mm) along with accessories and joint chambers, RCC route/ joint indicators, SJC, BJC, FTB/ FDMS or any other accessories required as per TEC-GR including transportation, freight, insurance and warehousing etc. 3. Excavation of trench for PLB pipe laying, backfilling, reinstatement, and compaction after laying of PLB pipe, laying / blowing of optical Fibre Cable inside laid PLB pipe, splicing and jointing of Optical Fibre Cable including supply of As Built Diagram (ABD) of constructed OFC Route. This shall include fixing of joint chamber, manhole, splice closure, Fixing, painting and sign writing of Route /Joint Indicators, termination at FTB/FDMS and all the relevant accessories etc. The work also includes road / bridge crossing, providing protection as per EI wherever required and obtaining Right-of-Way (RoW) permissions. 4. Commissioning, Acceptance Testing and makeover of the routes, commissioning of armoured optical fibre connectivity from the Block PoP to GP room and termination at GP router and end to end testing of dark and lit fibre per GP (for Underground laying) (as per the Engineering Instruction given at Section (IV C), Annexure-C) 5. Capturing the Latitude-Longitude of OF route & joint location after execution of works from Block to GP and capturing coordinates of electronics infrastructure & power infrastructure along with integration of GIS data with As Built Diagram of OF routes, videography and photos as defined in scope of work section of this RFP.
2	1b	Supply of 48F OFC, Duct and Accessories including all the services, as described below: 1. Physical survey of block to GP route, capturing the Latitude-Longitude of OF cable route, electronics infrastructure and power infrastructure, preparation of GIS survey report before execution of works. 2. Supply of 48F Ribbon type armoured Optical Fibre Cable (OFC), duct (40/33 mm) along with accessories and joint chambers, RCC route/joint indicators, SJC, BJC, FTB/FDMS or any other accessories required as per TEC-GR including transportation, freight, insurance and warehousing etc. 3. Excavation of trench for PLB pipe laying, backfilling, reinstatement and compaction after laying of PLB pipe, laying / blowing of optical Fibre Cable inside laid PLB pipe, splicing and jointing of Optical Fibre Cable including supply of As Built Diagram (ABD) of constructed OFC Route.

S. No.	Price Schedule S. No.	Item Description
		This shall include fixing of joint chamber, manhole, splice closure, Fixing, painting and sign writing of Route /Joint Indicators, termination at FTB/FDMS and all the relevant accessories etc. The work also includes road / bridge crossing, providing protection as per EI wherever required and obtaining Right-of-Way (RoW) permissions. 4. Commissioning, Acceptance Testing and makeover of the routes, commissioning of armoured optical fibre connectivity from the Block PoP to GP room and termination at GP router and end to end testing of dark and lit fibre per GP (for Underground laying) (as per the Engineering Instruction at Section (IV C), Annexure-C). 5. Capturing the Latitude-Longitude of OF route & joint location after execution of works from Block to GP and capturing coordinates of electronics infrastructure & power infrastructure along with integration of GIS data with As Built Diagram of OF routes, videography and photos as defined in scope of work section of this RFP.
3	1c	Supply of 24F ADSS OFC and Accessories including all the services (using existing power Poles), as described below: 1. Physical Survey of block to GP route, capturing the Latitude-Longitude of OF cable route, electronics infrastructure and power infrastructure, preparation of GIS survey report before execution of works. 2. Supply of Self-supporting Metal Free Aerial Optical Fibre Cable (24F ADSS) along with required accessories, SJC, BJC, FTB/FDMS or any other accessories required as per TEC GR including transportation, freight, insurance and warehousing etc. 3. Slings / Laying and commissioning of 24 core optical fibre connectivity from Block PoP to GP room and termination at GP Router. The cost shall include laying, fittings, splicing, splitting, splice closure, Pole clamping installation, termination at FTB/FDMS & all the relevant accessories etc. and end to end testing of dark and lit fibre per GP (For Aerial laying) of Optical Fibre Cable. Supply of As Built Diagram (ABD) of constructed OFC Route and Acceptance Testing, commissioning and makeover of the routes. The work also includes road / bridge crossing, providing protection as per EI wherever required and obtaining Right-of-Way (RoW) permissions. (As per the Engineering Instruction at Section (IV C), Annexure-C) 4. Installation by utilizing existing power infrastructure of State Discoms upto extent maximum possible. 5. Capturing the Latitude-Longitude of OF route & joint location after execution of works from Block to GP and capturing coordinates of electronics infrastructure & power infrastructure along with integration of GIS data with As Built Diagram of OF routes, videography and photos as defined in scope of work section of this RFP
4	1d	Supply of 24F ADSS OFC and Accessories including all the services (including supply of Poles), as described below: 1. Physical Survey of block to GP route, capturing the Latitude-Longitude of OF cable route, electronics infrastructure and power infrastructure, preparation of GIS survey report before execution of works. 2. Supply of Self-supporting Metal Free Aerial Optical Fibre Cable (24F ADSS) along with required accessories including RCC poles and joint

S. No.	Price Schedule S. No.	Item Description
		chambers, SJC, BJC, FTB/FDMS or any other accessories required as per TEC GR including transportation, freight, insurance and warehousing etc. 3. Slinging / Laying and commissioning of 24 core optical fibre connectivity from Block PoP to GP room and termination at GP Router. The cost shall include laying, fittings, splicing, splitting, splice closure, Pole clamping installation, termination at FTB/FDMS & all the relevant accessories etc. and end to end testing of dark and lit fibre per GP (For Aerial laying) of Optical Fibre Cable. Supply of As Built Diagram (ABD) of constructed OFC Route and Acceptance Testing, commissioning and makeover of the routes. The work also includes road / bridge crossing, providing protection as per EI wherever required and obtaining Right-of-Way (RoW) permissions. (As per the Engineering Instruction at Section (IV C), Annexure-C). 4. RCC Poles swaged of the length 7/8 meters (includes installation) not utilizing existing power infrastructure of State Discoms. 5. Capturing the Latitude-Longitude of OF route & joint location after execution of works from Block to GP and capturing coordinates of electronics infrastructure & power infrastructure along with integration of GIS data with As Built Diagram of OF routes, videography and photos as defined in scope of work section of this RFP
5	12	Supply of 6F Aerial Drop OFC and Accessories including all the services as per clause 3.10 Last mile connectivity of Section IV-B

Note for All Packages

Note-1 - RKM is the Route Kilometres. The RKM shall be measured through GIS system as mentioned in the Amendment#2. However, RKM shall be measured by Rodo Meter till the implementation of GIS system.

Note -2 – Normally, the length of Duct used is almost 6% higher than the RKM and OFC Kms is higher by around 10%. The bidders, while quoting the rates must account for the same.

Note-3 - In Case of any other type of SFP required (SFP 10G with 40 Km pluggable shall be Rs F as per the bidder's quote and SFP 100G with 40 Km pluggable shall be Rs G as per the bidder's quote), the rates shall be paid to the bidder as mentioned below:

- SFP 10G with 80 km pluggable shall be 2 TIMES of F,
- SFP 10G with 10 km pluggable shall be 0.25 TIMES of F,
- SFP 1G with 10km pluggable shall be 0.13 TIMES of F,
- Similarly, SFP 100G with 80 km pluggable shall be 1.2 TIMES of G.

Note-4 - In Case of Block Router (Item#3 of Price Schedule), the bidder has to supply the type A router in place of type B as per requirement for which the rates shall be 1.2 times the price quoted for Block Router type B at Serial No. #3 of the Price Schedule. The quantity of the type A router will be around 10% of the total quantity. Every block will have only one type of router, either type A or Type B.

Note-5 - In Case of GP Router (Item#3 of Price Schedule), the bidder has to supply the type C router in place of type D as per requirement for which the rates shall be 1.2 times the price quoted for GP Router type D at Serial No.#3 of the Price Schedule. The quantity of the type C router will be around 10% of the total quantity. Every GP will have only one type of router, either type C or Type D.

Note - 6 - Regarding items at Sl. No. 6 & 9 of the Price Sheets of all packages, BSNL may or may not procure the EMS for active equipment (as per SOR items at Sr. Nos. 7.5, 7.6, 8.4, 8.5, 9.2 and 9.3). However, quoted rates of these items shall be part of package price for bid evaluation. BSNL may decide to order one EMS of an OEM in any one package to cater more than one packages, based on actual requirement, along with additional licenses for integrating the network elements of other packages. PIA of the package where the EMS has been procured shall be obliged to integrate the network elements of other packages as decided by BSNL and also to facilitate the integration of the EMS with the S-NOC of such other packages for enabling the O&M by the PIA of such other packages. BSNL may procure any number of additional licenses in multiple of 100 licenses. Similarly, the PIA of the package from whom the EMS

has not been procured, shall integrate all its network elements and S-NOC with the EMS of the package where the same has been procured by BSNL. In such case, BSNL shall provide the DCN connectivity required to establish this integration for smooth functioning of network.

Note-7 - Any other item required for completion of the project as per scope of work including but not limited to patch cords, connectors, installation material, adapters, attenuators, software, hardware etc. shall be supplied by the PIA without any additional cost to BSNL.

Note-8 - Regarding ADSS OFC implementation (as per items# 1c & 1d of Price Schedules of all packages), the PIA may use GI poles also as per BIS standard No. BIS-2713 in place of RCC poles within the order price only. BSNL shall not pay any extra amount for the GI Poles.

Note-9 - Regarding ADSS OFC implementation (as per item# 1c of Price Schedules of all packages), if the PIA needs to install some additional poles, such requirement shall be submitted to the Independent Engineer. BSNL shall consider such requirement on the case-to-case basis, based on recommendations of IE and the cost of such additional poles shall be paid as per Amendment No.- 10.4.3 (regarding cost of Pole to be used in Last Mile Connectivity).

Note-10 – In case of areas which are prone to heavy snow fall in the States of Himachal Pradesh, Uttarakhand, NE-I circle & NE-II circle, the PIA can use OFC with Ice Loading (in place of OFC without ice loading) for which BSNL shall pay additional amount of Rs. 10/- per Meter, however quantity of such OFC (with Ice Loading) shall not exceed 5% of the total quantity in the State. There shall be no such limit in the UTs of J&K and Ladakh.

Note-11 – Since the OFC, to be used, is armoured; in order to trace the faults, suitable Cable Locator with each FRT is to be provided by the PIA.

Note-12 – A Bidder / Lead Bidder shall quote the amount for last mile connectivity as mentioned in serial no. 12 & 13 of price schedule. The total amount shall be equally divided @ 10% per year for entire Contract Period (10 years). For evaluation purpose, the NPV shall be calculated at a discount rate of 10%.

Note – 13 – The items at S. No. 16, 17 and 18 of price schedule are optional and shall not be part of evaluation. Further, BSNL reserves the right to place the purchase order at a negotiated price that can be upto average price of all technical valid bids for the items or the bid of the successful bidder, whichever is lower.

Pre-defined rates applicable for all packages:

The Successful bidder shall also be bound to provide following services for attending the faults of the made over existing network only after receiving the work order for the same by BSNL at the pre-defined rates as mentioned against each item. The quantities shall be as per site requirement. The bidder is supposed to absorb the gain/loss on account of the predefined rates in the quoted price of other line items for the concerned package. These charges shall be applicable only as one time activity.

TABLE-1

(whole table as per Amendment No. 15.1)

The table contains pre-defined rates for the permanent restoration works of existing network comprising of 48F, 96F, 288F for Packages No.-1,3,6,7 & 12

S. N.		Unit	Unit cost in Rs. (Excl. GST)
1	Supply of 48F metal free optical fibre cable with double HDPE sheath (G.652D Fibre) Ribbon type along with required accessories as per TEC GR, Supply of PLB HDPE Telecom Duct (40/33mm) along with required accessories as per TEC GR, Trenching and Laying (T&L): Replacement of damaged OFC and/or Project Work and/or Repair of one time OFC faults by Excavation of trench for PLB pipe laying, PLB pipe laying, Backfilling, Reinstatement and Compaction after laying of PLB pipe, laying / blowing of optical Fibre Cable inside laid PLB pipe, splicing and jointing of Optical Fibre Cable including supply of As Built Diagram (ABD) of constructed OFC Route with GIS Mapping and Acceptance Testing, commissioning. The work also includes road / bridge crossing, laying of PLB inside DWC pipe, wherever required and obtaining Right-of-Way (RoW) permissions. straight splice closure, Fixing, painting and sign writing of Route /Joint Indicators, termination at FTB/FDMS and all the relevant accessories etc. and end to end testing of dark and lit fibre for required optical power at ONT.	Per Mtr	<i>The Per meter replacement rate of damaged OFC- Rs. 285 per meter in the circles of UPW, UPE Every additional 48F OFC laid in separate 40/33mm PLB duct in the same trench @ Rs. 183 per meter</i>
2	Supply of 96F metal free optical fibre cable with double HDPE sheath (G.652D Fibre) Ribbon type along with required accessories as per TEC GR, Supply of PLB HDPE Telecom Duct (40/33mm) along with required accessories as per TEC GR, Trenching and Laying (T&L): Replacement of damaged OFC and/or Project Work and/or Repair of one time OFC faults by Excavation of trench for PLB pipe laying, PLB pipe laying, Backfilling, Reinstatement and Compaction after laying of PLB pipe, laying / blowing of optical Fibre Cable inside laid PLB pipe, splicing and jointing of Optical Fibre Cable including supply of As Built Diagram (ABD) of constructed OFC Route with GIS	Per Mtr	<i>The Per meter replacement rate of damaged OFC- Rs. 335 per meter in the circles of UPW, UPE Every additional 48F OFC laid in separate 40/33mm PLB duct in the same trench @ Rs. 233 per meter</i>

S. N.		Unit	Unit cost in Rs. (Excl. GST)
	Mapping and Acceptance Testing, commissioning. The work also includes road / bridge crossing, laying of PLB inside DWC pipe, wherever required and obtaining Right-of-Way (RoW) permissions. straight splice closure, Fixing, painting and sign writing of Route /Joint Indicators, termination at FTB/FDMS and all the relevant accessories etc. and end to end testing of dark and lit fibre for required optical power at ONT.		
3	Supply of 288F metal free optical fibre cable with double HDPE sheath (G.652D Fibre) Ribbon type along with required accessories as per TEC GR, Supply of PLB HDPE Telecom Duct (50/42mm) along with required accessories as per TEC GR, Trenching and Laying (T&L): Replacement of damaged OFC and/or Project Work and/or Repair of one time OFC faults by Excavation of trench for PLB pipe laying, PLB pipe laying, Backfilling, Reinstatement and Compaction after laying of PLB pipe, laying / blowing of optical Fibre Cable inside laid PLB pipe, splicing and jointing of Optical Fibre Cable including supply of As Built Diagram (ABD) of constructed OFC Route with GIS Mapping and Acceptance Testing, commissioning. The work also includes road / bridge crossing, laying of PLB inside DWC pipe, wherever required and obtaining Right-of-Way (RoW) permissions. straight splice closure, Fixing, painting and sign writing of Route /Joint Indicators, termination at FTB/FDMS and all the relevant accessories etc. and end to end testing of dark and lit fibre for required optical power at ONT.	Per Mtr	<i>The Per meter replacement rate of damaged OFC- Rs. 423 per meter in the circles of UPW, UPE Every additional 48F OFC laid in separate 40/33mm PLB duct in the same trench @ Rs. 331 per meter</i>
4	Supply and Installation of Route Indicator	Per No.	1,000
5	Solar Cable (3x 2.5 Sq.mm copper)	Per Site	1,000
6	SPV Mounting Structure	Per Site	2,000
7	Earthing including supply of material, installation and cabling till Enclosure//CCU as per the defined specifications in the scope	Per Site	2,200
8	Power Point Extension at the GP site	Per no	1,200
9	Complete Shifting of Equipment (including dismantling, transportation and supply of installation material not covered at Sl No 2,3,4 above)	Per Site	3,950
10	~~Supply, installation of Joint Closure, testing and splicing 24 F for Dark Fibre Provisioning and/or attending OFC fault for the first time in a joint as per~~	~~Per No~~	~~3,500~~

S. N.		Unit	Unit cost in Rs. (Excl. GST)
	TEC GR/ E.I.		
11	Supply and installation of Joint Chamber as per E.I.	Per No	4,000
12	Supply of 24F FTB/FDMS as per TEC GR and termination of all the fibres	Per No	3,000
13	Supply, installation and splicing/ jointing 1:4 Splitter as per TEC GR	Per No	751
14	Restoration charges using OH OFC on temporary basis.	Per mtr	@ Rs. 10 per meter if restoration is done within 24 Hrs from the time, the GP ONT goes faulty, @ Rs. 8 Per meter, if restoration is done within 72 Hrs from the time, the GP goes faulty and at no cost if the restoration is done after 72 Hrs.
15	Unlicensed Band Radio (UBR) 5.X with 27dbi Antenna, mounting fixture including all installation material and services without mast on either end	Per Unit	56,362
16	Unlicensed Band Radio (UBR) 5.X with 27dbi Antenna, mounting fixture including all installation material and services with appropriate MARR type mast (15 Mtr height) at one end to facilitate connectivity	Per Unit	1,26,362
17	Unlicensed Band Radio (UBR) 5.X with 27dbi Antenna, mounting fixture including all installation material and services with appropriate MARR type mast (15 Mtr height) at both ends to facilitate connectivity	Per Unit	1,96,362
18	Digital Microwave -15GHz 2+0 XPIC 2KQAM with 0.6m Antenna, mounting fixture including all installation material and services without mast on either end	Per Unit	2,57,580
19	Digital Microwave -15GHz 2+0 XPIC 2KQAM with 0.6m Antenna, mounting fixture including all installation material and services with appropriate MARR type mast (15 Mtr height) at one end to facilitate connectivity	Per Unit	3,27,580
20	Digital Microwave -15GHz 2+0 XPIC 2KQAM with 0.6m Antenna, mounting fixture including all installation material and services with appropriate	Per Unit	3,97,580

S. N.		Unit	Unit cost in Rs. (Excl. GST)
	MARR type mast (15 Mtr height) at both ends to facilitate connectivity		

Note: Brief Specifications of MARR type mast are as under-

The mast to be used for UBR and Point to Point M/W shall be made of HT Steel angles of E350 grade and MS angles of E250(A) grade confirming to IS:2062/Equivalent ASTM. All steel used shall be hot-dip galvanized conforming to IS:4759. The mast shall be designed for operational wind speed of 140Kmph. Design standard shall be as per IS 800-2007. The mast to be installed with appropriate plinth and 15 Mtr height above ground level to ensure sustained LOS.

TABLE-2**Predefined rates discovered in the existing PMA contract of BSNL***(whole table as per Amendment No. 15.2)*

The table contains the pre-defined rates for the permanent restoration works related to 24F OFC (mostly Phase-1 network) *(Clarification No. 11 dated 17.05.2024)*

S.N.	Circle	T&L (Rs. per Km)	24F OFC (Rs. per Km)	Duct (Rs. per Km)
1.	Assam	2,15,511	36,282	49,951
2.	Bihar	2,03,111	36,282	49,951
3.	Haryana	1,57,000	48,000	54,600
4.	Himachal Pradesh	2,71,111	36,282	49,951
5.	J & K	2,71,111	36,282	49,951
6.	Karnataka (Hard soil)	2,90,000	43,000	60,000
7.	Karnataka (Soft soil)	2,52,000	43,000	60,000
8.	MP	1,27,650	49,500	47,500
9.	NE-I	2,15,511	36,282	49,951
10.	NE-II	2,15,511	36,282	49,951
11.	Punjab	1,57,000	48,000	54,600
12.	Rajasthan	1,62,000	50,000	54,000
13.	UP East	1,28,500	49,500	47,500
14.	UP West	1,28,500	49,500	47,500
15.	Uttarakhand	2,71,111	36,282	49,951
16.	WB&CTD	2,03,111	36,282	49,951

NOTE:

Regarding the works to be executed on above rates, following conditions shall be applicable:

1. In case of rocky/hilly soil, full payment is to be made for depth equal to or more than 1.2 m. In case of depth below 1.65 m in case of normal soil and 1.2m in case of rocky/hilly soil, if instructions for protection are followed as detailed above, then no penalty will be levied.
2. **Duct:** Extra 2% of trench length to account for actual PLB length in trenches. The payment shall be made with above factor included.
3. In compliance to para 11, joint chambers are to be provided at every joint to keep the O.F.C. joint well protected and also to keep extra length of cable, which may be, required to attend the faults at a later date. Separate payment shall be made for construction of Joint Chambers.
4. Extra OFC length shall normally be kept @ 20 meter per joint. However, to avoid wastage of OFC, extra length beyond 20 meters and upto 100 meters may be allowed.
5. The payment of OFC shall be made as per the end to end OTDR length.

6. The length of OFC to be replaced on branch side may also be included during survey and estimation so that the contractor replaces the damaged branching side OFC also and splices the replaced section with the undamaged OFC end.
7. The cost of Straight Joints is included in the per Km Cost of Services. However, payment for Branch Joints and Splitters shall be made separately, wherever, installed as per site requirement.
8. **Illustration in case of less depth without protection:** Assuming that the standard depth required is 165 cm and the rate approved is Rs.100/- for the standard depth, then as per the above formula, for a depth of 100 cm the rate worked out is

$$\text{Rate Applicable} = 100 \times 0.75 = \text{Rs.75/- per running meter}$$

$$\text{Actual amount to be paid} = (100/165) \times 75 = \text{Rs.45.455/-}$$

$$= \text{Rs.45.5/- per running meter}$$

SECTION-VIII.A

BID SECURITY/ EMD Guarantee

(To be typed on Rs.100/- non-judicial stamp paper)

Sub: Bid Security/EMD guarantee.

Whereas M/s.....R/o.....
..... (Hereafter referred to as Bidder) has approached us for giving
Bank Guarantee of Rs /- (hereafter known as the "B.G. Amount") valid up to/...../ 20....
(hereafter known as the "Validity date") in favour of DGM (MMT) BSNL CO, Delhi (Hereafter
referred to as BSNL) for participation in the tender of work of vide tender no.
.....

Now at the request of the Bidder, We.....Bank
.....Branch having
..... (Address) and Regd. office address as

..... (Hereinafter called 'the Bank') agrees to give this guarantee as hereinafter
contained:

2. We the Bank do hereby undertake to pay the amounts due and payable under this guarantee without any demur, merely on a demand from BSNL stating that the amount claimed is due by way of loss or damage caused to or would be caused to or suffered by BSNL by reason of breach by the said bidder(s) of any of terms or conditions contained in the said Agreement or by reason of the bidder (s) failure to perform the said Agreement. Any such demand made on the bank shall be conclusive as regards the amount due and payable by the Bank under this guarantee where the decision of BSNL in these counts shall be final and binding on the bank. However, our liability under this guarantee shall be restricted to an amount not exceeding the "B. G. Amount".
3. We undertake to pay to BSNL any money so demanded notwithstanding any dispute or disputes raised by the bidder(s) in any suit or proceeding before any court or tribunal relating thereto our liability under this present being absolute and unequivocal. The Payment so made by us under this bond shall be valid discharge of our liability for payment there under and the bidder(s) shall have no claim against us for making such payment.
4. We the Bank further agree that the guarantee herein contained shall remain in full force and effect during the period that would be taken for the performance of the said agreement and that it shall continue to be enforceable till all the dues of BSNL under or by virtue of the said Agreement have been fully paid and its claims satisfied or discharged or till BSNL Certifies that the terms and conditions of the said Agreement have been fully and properly carried out by the said bidder(s) and accordingly discharge this guarantee. Unless a demand or claim under this guarantee is made on us in writing or before the expiry of Validity date from the date hereof, we shall be discharged from all liability under this guarantee thereafter.

5. We the Bank further agree with BSNL that BSNL shall have the fullest liberty without our consent and without affecting in any manner our obligations hereunder to vary any of the terms and conditions of the said Agreement or to extend time of performance by the said bidder(s) from time to time or to postpone for any time or from time to time any of the powers exercisable by BSNL against the said bidder(s) and to forbear or enforce any of the terms and conditions relating to the said agreement and we shall not be relieved from our liability by reason of any such variation, or extension being granted to the said Bidder(s) or for any forbearance, act or omission on the part of BSNL or any indulgence by BSNL to the said bidder(s) or by any such matter or thing whatsoever which under the law relating to sureties would, but for this provision, have effect of so relieving us.
6. Notwithstanding anything herein contained ;
 - (a) The liability of the Bank under this guarantee is restricted to the "B. G. Amount" and it will remain in force up to its Validity date specified above.
 - (b) The guarantee shall stand completely discharged and all rights of BSNL under this Guarantee shall be extinguished if no claim or demand is made on us in writing on or before its validity date.
7. In case BSNL demands for any money under this bank guarantee, the same shall be paid through banker's Cheque in favour of "AO (Cash) BSNL CO" payable at New Delhi.
8. The Bank guarantees that the below mentioned officer who have signed it on behalf of the Bank have authority to give this guarantee under its delegated power.

Place:

Date:(Signature of the Bank Officer) Rubber stamp of the bank)

Authorized Power of Attorney Number:

Name of the Bank officer:

Designation:

Complete Postal address of Bank:

Telephone Numbers

Fax numbers.....

SECTION-VIII.B

BID SECURITY IN FORM OF INSURANCE SURETY BOND

(To be submitted on non-judicial stamp paper of appropriate value)

Insurance Surety Bond for Bid Security

Whereas M/s R/o (Hereafter referred to as **Principal**) has approached us for giving a Surety of Rs./- (hereafter known as the "**Surety Amount**") valid up to / / 20.... (hereafter known as the "**Validity date**") in favour of(e.g. DGM (MMT) BSNL CO, Delhi)(Hereafter referred to as **BSNL**) for participation in the tender of work of..... vide tender no.

Now at the request of the Principal, We Insurance Company Limited, registered under the Insurance Act, 1938, with its Corporate office, ...and Registered/Head Office (the "**Surety**") to transact the business of Surety Insurance under the powers conferred under Section 14 (2) (i) of IRDA Act, 1999 & IRDA Guidelines issued vide IRDAI/NL/GDL/SIC/01/01/2022 3rd January, 2022, agreed to give this Surety Bond by way of performance guarantee as hereinafter contained:

2. We, the Surety, do hereby undertake to pay the amounts due and payable under this Surety without any demur, merely on a demand from the BSNL stating that the amount claimed is due by way of loss or damage caused to or would be caused to or suffered by the BSNL by reason of breach by the said **Principal** of any of terms or conditions contained in the said tender Agreement or by reason of the **Principal's** failure to honour its bid submitted to perform the said works. Any such demand made on the Surety shall be conclusive as regards the amount due and payable by the Surety under this Surety where the decision of the BSNL in these counts shall be final and binding on the Surety. However, our liability under this Surety shall be restricted to an amount not exceeding the "Surety Amount".
3. We, the Surety, undertake to pay to the BSNL any money so demanded notwithstanding any dispute or disputes raised by the **Principal** in any suit or proceeding before any court or tribunal relating thereto our liability under this present being absolute and unequivocal. The Payment so made by us under this bond shall be valid discharge of our liability for payment there under and the **Principal** shall have no claim against us for making such payment.
4. We the Surety, further agree that the Surety herein contained shall remain in full force and effect during the period that would be taken for the performance of the said tender agreement and that it shall continue to be enforceable till all the dues of the BSNL under or by virtue of the said tender Agreement have been fully paid and its claims satisfied or

discharged or till BSNL Certifies that the terms and conditions of the said tender Agreement have been fully and properly carried out by the said **Principal** and accordingly discharge this Surety. Unless a demand or claim under this Surety is made on us in writing or before the expiry of Validity date from the date hereof, we shall be discharged from all liability under this Surety thereafter.

5. We the Surety further agree with the BSNL that the BSNL shall have the fullest liberty, without our consent and without affecting in any manner our obligations hereunder, to vary any of the terms and conditions of the said tender Agreement or to extend time of performance by the said **Principal** from time to time or to postpone for any time or from time to time, any of the powers exercisable by the BSNL against the said **Principal** and to forbear or enforce any of the terms and conditions relating to the said tender agreement and we shall not be relieved from our liability by reason of any such variation, or extension being granted to the said **Principal** or for any forbearance, act or omission on the part of the BSNL or any indulgence by the BSNL to the said **Principal** or by any such matter or thing whatsoever which under the law relating to sureties would, but for this provision, have effect of so relieving us.
6. Notwithstanding anything herein contained:
 - (a) The liability of the Surety under this Surety bond is restricted to the “**Surety Amount**” and it will remain in force up to its Validity date specified above.
 - (b) The Surety shall stand completely discharged and all rights of the BSNL under this Surety shall be extinguished if no claim or demand is made on us in writing on or before its validity date.
7. In case BSNL demands for any money under this Surety Bond, the same shall be paid through Banker’s Cheque in favour of “**AO (Cash) BSNL C.O. New Delhi**” payable at New Delhi or by any other mode such as NEFT/RTGS, etc., as indicated by BSNL in its demand letter.
8. The Surety declares that the below mentioned officer who have signed it on behalf of the Surety, have authority to give this Surety under its delegated power.

Place:

Date:(Signature of the Insurance Company Officer)
Rubber stamp of the Insurance Company

Authorized Power of Attorney Number:

Name of the officer:

Designation:

Official Email ID:.....

Complete Postal address of Insurance Company:

Telephone Numbers

Fax numbers

Name, Address, Contact number and official Email ID of the Controlling Office of the Surety Issuing Branch or any web portal link, from whom / where the Surety Bond can be got confirmed by BSNL.

.....
.....
.....
.....

SECTION-IX-A.1 (1)

PERFORMANCE SECURITY GUARANTEE BOND

Format for Power of Attorney, available at Annexure-IX of the RFP may be read as “ANNEXURE-IX.A” and the same shall be applicable for the bidders, submitting its bid as a SOLE BIDDER.

Wherever in the RFP, reference is given to Annexure-IX, may be read as Annexure-IX.A. (Amendment No. 11)

In consideration of the CMD, Bharat Sanchar Nigam Limited (hereinafter called 'BSNL') having agreed to exempt _____ (hereinafter called 'the said contractor(s)') from the demand

under the terms and conditions of an agreement/Advance Purchase Order No.....

dated..... made between and for the supply of (hereinafter called "the said agreement"), of security deposit for the due fulfilment by the said contractor (s) of the terms and conditions contained in the said Agreement, on production of the bank guarantee for we, (name of the bank) (hereinafter refer to as "the bank") at the request of (contractor (s)) do hereby undertake to pay to BSNL an amount not exceeding against any loss or damage caused to or suffered or would be caused to or suffered by BSNL by reason of any breach by the said Contractor(s) of any of the terms or conditions contained in the said Agreement.

2. We (name of the bank) do hereby undertake to pay the amounts due and payable under this guarantee without any demure, merely on a demand from BSNL by reason of breach by the said contractor(s)' of any of the terms or conditions contained in the said Agreement or by reason of the contractors(s)' failure to perform the said Agreement. Any such demand made on the bank shall be conclusive as regards the amount due and payable by the Bank under this guarantee where the decision of BSNL in these counts shall be final and binding on the bank. However, our liability under this guarantee shall be restricted to an amount not exceeding__.

3. We undertake to pay to BSNL any money so demanded notwithstanding any dispute or disputes raised by the contractor(s)/supplier(s) in any suit or proceeding pending before any court or tribunal relating thereto our liability under this present being absolute and unequivocal. The payment so made by us under this bond shall be valid discharge of our liability for payment there under and the contractor(s)/supplier(s) shall have no claim against us for making such payment.

4. We (name of the bank) further agree that the guarantee herein contained shall remain in full force and effect during the period that would be taken for the performance of the said agreement and that it shall continue to be enforceable till all the dues of BSNL under or by virtue of the said Agreement have been fully paid and its claims satisfied or discharged or till (office/ Department)

BSNL certifies that the terms and conditions of the said Agreement have been fully or properly carried out by the said contractor(s) and accordingly discharges this guarantee. Unless a demand or claim under this guarantee is made on us in writing on or before the expiry of Two YEARS (as specified in P.O) from the date hereof, we shall be discharged from all liabilities under this guarantee thereafter.

5. We (name of the bank) further agree with BSNL that BSNL shall have the fullest liberty without our consent and without affecting in any manner our obligations hereunder to vary any of the terms and conditions of the said Agreement or to extend time of performance by the said contractor(s) from time to time or to postpone for any time or from time to time any of the powers exercisable by BSNL against the said Contractor(s) and to forbear or enforce any of the terms and conditions relating to the said agreement and we shall not be relieved from our liability by reason of any such variation, or extension being granted to the said Contractor(s) or for any forbearance, act or omission on the part of BSNL or any indulgence by BSNL to the said Contractor(s) or by any such matter or thing whatsoever which under the law relating to sureties would, but for this provision, have effect of so relieving us.
6. This guarantee will not be discharged due to the change in the constitution of the Bank or the Contractor(s)/ supplier(s).
7. We (name of the bank) lastly undertake not to revoke this guarantee during its currency except with the previous consent of BSNL in writing.

Place
Date

(Signature of the Bank Officer)
Rubber stamp of the bank:.....
Authorized Power of Attorney Number:.....
Name of the Bank officer:.....
Designation:.....
Complete Postal address of Bank:.....
Telephone Numbers.....
Fax numbers.....

For the consortium bidders, the Format for Power of Attorney is given in ANNEXURE-IX.B, which is being added through this amendment, as given below: (Amendment no. 11.2)

Annexure IX. B

Power of Attorney for Lead Member of Consortium\$ (Amendment No. 11)

(To be executed on Stamp paper of appropriate value)

Whereas On behalf of Universal Service Obligation Fund (USOF), Department of Telecommunication, Government of India, the Chairman and Managing Director, BSNL, New Delhi invites online sealed tenders, on rupee payment basis, in two bid (Technical & Financial) system, for Design, Supply, Construction, Installation, Upgradation, Operation and Maintenance of middle mile network of BharatNet.

Whereas, ..., ..., ... and (collectively the "Consortium") being members of the consortium are interested in bidding for the project in accordance with the terms and conditions of the request for proposal (RFP) and other connected documents in respect of the project, and

Whereas, it is necessary for the members of the consortium to designate one of them as the lead member with all necessary power and authority to do for and on behalf of the consortium, all acts, deeds and things as may be necessary in connection with the consortium's bid for the project and its execution.

NOW THEREFORE KNOW ALL MEN BY THESE PRESENTS

I, ... having our registered office at, (hereinafter collectively referred to as the "Principal") do hereby irrevocably designate, nominate, constitute, appoint and authorise M/S having its registered office at, being one of the Members of the Consortium, as the Lead Member and true and lawful attorney of the Consortium (hereinafter referred to as the "Attorney"). I hereby irrevocably authorise the Attorney (with power to sub-delegate) to conduct all business for and on behalf of the Consortium during the bidding process and, in the event the Consortium is awarded the contract, during the execution of the Project and in this regard, to do on our behalf and on behalf of the Consortium, all or any of such acts, deeds or things as are necessary or required or incidental to the qualification of the Consortium and submission of its bid for the Project, including but not limited to signing and submission of all applications, bids and other documents and writings, accept the Letter of Award, participate in bidders' and other conferences, respond to queries, submit information/ documents, sign and execute contracts and undertakings consequent to acceptance of the bid of the Consortium and generally to represent the Consortium in all its dealings with the Authority, and/ or any other Government Agency or any person, in all matters in connection with or relating to or arising out of the Consortium's bid for the Project and/ or upon award thereof till the Master Service Agreement is entered into with the Authority.

^{\$} To be submitted in original by the Bidders within 7 days of Bid Date.

AND hereby agree to ratify and confirm and do hereby ratify and confirm all acts, deeds and things done or caused to be done by our said attorney pursuant to and in exercise of the powers conferred by this power of attorney and that all acts, deeds and things done by our said attorney in exercise of the powers hereby conferred shall and shall always be deemed to have been done by us/ consortium.

IN WITNESS WHEREOF WE THE PRINCIPALABOVE NAMED HAVE EXECUTED THIS POWER OF ATTORNEY ON THIS DAY OF 2....

For
(Signature)

.....
(Name & Title)

For
(Signature)

.....
(Name & Title)

For
(Signature)

.....
(Name & Title)

Witnesses:

1.

2.

.....

(Executants)

(To be executed by all the Members of the Consortium)

Notes:

- *The mode of execution of the power of attorney should be in accordance with the procedure, if any, laid down by the applicable law and the charter documents of the executant(s) and when it is so required, the same should be under common seal affixed in accordance with the required procedure.*

- Also, wherever required, the bidder should submit for verification the extract of the charter documents and documents such as a board or shareholders' resolution/ power of attorney in favour of the person executing this power of attorney for the delegation of power hereunder on behalf of the bidder.
- For a power of attorney executed and issued overseas, the document will also have to be legalised by the Indian embassy and notarised in the jurisdiction where the power of attorney is being issued. However, the power of attorney provided by bidders from countries that have signed the Hague legislation convention 1961 are not required to be legalised by the Indian embassy if it carries a conforming apostille certificate

SECTION-IX-A.2

Performance Guarantee Surety Bond

(To be submitted on non-judicial stamp paper of appropriate value)

To , DGM (MMP) BSNL CO, Delhi R/o Bharat Sanchar Bhawan, Harish Chandra Mathura Lane, Janpath, New Delhi-110001	Surety Bond No : Surety Bond Issue dt : Surety Bond Amt. : INR..... Bond Valid upto : Bond Claim Period :

Dear Sir / Madam,

Whereas(e.g. **AGM (MM)** BSNL CO, Delhi R/o MM cell, Bharat Sanchar Bhawan, Harish Chandra Mathura Lane, Janpath, New Delhi-110001)(hereafter referred to as **BSNL**) has issued an APO/AWO no. Dated.....awarding the work of (the "Agreement")to M/s....., R/o..... (hereafter referred to as "**Principal**") and BSNL has asked Principal to submit a performance guarantee in favour of (e.g. **DGM (MMP)** BSNL CO, Delhi) of INR (hereafter referred to as "Bond Amount") valid up to dd.mm.yyyy(hereafter referred to as "Validity Date")

Now at the request of the Principal, We..... Insurance Company Limited,registered under the Insurance Act, 1938, with its Corporate office,.....and Registered/Head Office (the "**Surety**")to transact the business of Surety Insurance under the powers conferred under Section 14 (2) (i) of IRDA Act, 1999 & IRDA Guidelines issued vide IRDAI/NL/GDL/SIC/01/01/2022 3rd January, 2022, agreed to give this Surety Bond by way of performance guarantee as hereinafter contained:

2. The Surety do hereby undertake and assure to the BSNL that, if in opinion of BSNL the Principal in any way fails to observe or perform the terms and conditions of the Agreement or commits any breach of its obligations there-under, the Surety shall on demand and without any objection or demur pay to the BSNL such sum or sums up to an aggregate sum of the Bond Amount or such lesser amount as BSNL may demand without requiring BSNL to have recourse to any legal remedy that may be available to it to compel the Surety to pay the same.

3. Any such demand from the BSNL shall be conclusive as regards the liability of Principal to pay

o BSNL or as regards the amount payable by the Surety under this Surety Bond. The Surety shall not be entitled to withhold payment on the ground that the Principal had disputed its liability to pay or has disputed the quantum of the amount or that any arbitration proceeding or legal proceeding is pending between Principal and BSNL regarding the claim.

4. The liability of the Surety under this Surety Bond is restricted to the Bond Amount and this Surety Bond shall come into force from the date of its issue and shall remain in full force and effect up to its Validity date.

5. The Surety further agrees that the BSNL shall have the fullest liberty without the consent of the Surety and without affecting in any way the liability of the Surety under this Surety Bond to vary any of the terms and conditions of the Agreement or to extend the time for the performance contained in the Agreement from any of the powers exercisable by BSNL against the Principal and to forebear from enforcing any of the terms and conditions relating to the Agreement and the Surety shall not be relieved from its liability by reason of such failure or extension being granted to Principal or through any forbearance, act or omission on the part of BSNL or any indulgence by BSNL to Principal or any other matter or thing whatsoever which under the law relating to sureties would but for this provision have the effect of relieving or discharging the Surety.

6. In case BSNL demands for any money under this Surety Bond, the same shall be paid through banker's Cheque in favour of "AO (Cash) BSNL CO" payable at New Delhi or by any other mode such as NEFT/RTGS, etc., as indicated by BSNL in its demand letter.

7. The Surety guarantees that the below mentioned officers who have signed it on behalf of the Surety have authority to give this Surety Bond under its delegated power.

Notwithstanding anything contained herein above:

1. Our Liability under this Surety Bond shall not exceed
INR**(Rupees: Only).**
2. This Surety Bond shall be valid upto.....(Validity date)
3. Further a claim period of **3(three)months** from the Validity date of the Surety Bond is available to make a demand under this Surety Bond. We are liable to pay the Bond Amount or any part thereof under this Surety Bond only and only if you serve upon us a written claim or demand on or before (Date of claim period if any).
4. At the end of expiry of the Validity Date (including claim period), unless an action to enforce the claim under this Surety Bond is initiated before the Court or Tribunal on or before 12 months after the expiry of the Validity Date (including claim period), all your rights under this Surety Bond shall stand extinguished and we shall be relieved and discharged from all our liabilities and obligations under this Surety Bond irrespective of return of original Surety Bond

Place:

Date:

(Signature of the Surety)

Rubber stamp of the Surety

Authorized Power of Attorney Number:

Name of the Surety officer:

Designation:

Complete Postal address of Surety:

.....

Telephone Numbers

Fax numbers

Email ID (only official Email ID)

Name, Address, Contact number and official Email ID of the Controlling Office of the Surety Issuing Branch or any web portal link, from whom/ where the Surety Bond can be got confirmed by BSNL.

.....

.....

.....

SECTION-IX-B
MOBILIZATION ADVANCE SECURITY GUARANTEE BOND
FORMAT OF “MOBILIZATION ADVANCE BANK
GUARANTEE”

Sub: Advance Bank Guarantee no. for value..... [Insert ABG value here]..... in respect.....of.....Purchase Order No.....(“PO”):.....Dated.....for value [Insert total PO value]

In consideration of BSNL, Corporate office, New Delhi (hereinafter called “BSNL”) agreeing to make advance payment of [Insert ABG value in figures and words] (“**Advance Payment**”) to [Insert the name of the Contractor with address, contact person’s telephone/mobile number and email address], having its registered office at {Insert the full address }“hereinafter called ‘the said contractor’) which has been unequivocally accepted by the contractor and the contractor having agreed to provide an irrevocable Advance Bank Guarantee [“**Advance Bank Guarantee**”] in accordance with the terms and conditions of the said PO, we, {Insert the Issuing Bank name and address} (“**the Bank**”) hereby unconditionally agree and undertake to hold at your disposal, [Insert ABG value] and agree with you as follows:

1. Under the terms of the said PO, BSNL has agreed to pay to the contractor an advance payment of [insert the ABG value in figures and words]..... being% of the basic value/total value of the said PO, against furnishing of an Irrevocable Advance Bank Guarantee of equivalent amount by the Supplier.
2. The Bank at the request of the contractor has agreed to give this unconditional and irrevocable Advance Bank Guarantee and agree and undertake not to revoke the same.
3. The Bank, hereby guarantee that the Supplier will duly comply and faithfully perform all their obligations and responsibilities under the said PO, failing which we, the Guarantor, do hereby unconditionally undertake to pay to the Purchaser ON MERE DEMAND AND WITHOUT ANY DEMUR AND WITHOUT RECOURSE TO THE SUPPLIER such amount or amounts as the Guarantor may be called upon to pay not exceeding in the aggregate a sum of [insert ABG value in figures and words].....
4. The Advance Bank Guarantee shall not be determined or affected by liquidation or winding up, dissolution or change of constitution or insolvency of the Supplier but shall in all respects and for all purposes be binding and operative until payment of all monies due to BSNL under the Advance Bank Guarantee are paid.
5. The decision of BSNL that any sum has become payable shall be final and binding on the Bank.
6. The Advance Bank Guarantee shall be governed by the laws of India.
7. We (Bank Name) , shall on simple demand from the Purchaser pay immediately to the Purchaser, the said amount of (Insert ABG value in figures and words)..... without any demur and without requiring the Purchaser to invoke any legal remedy that may be available to them, to compel the Guarantor to pay the Advance Payment amount, even if

the Supplier considers such demand of the Purchaser is unjustified.

8. Any notice by way of request, demand or otherwise hereunder may be sent by courier, fax or by post to the Bank on or before the expiry date of the Advance Bank Guarantee. BSNL may lodge request/demand in writing at our branch[Insert specific branch name and full address with telephone/fax numbers] at on or before the expiry of the Advance Bank Guarantee as stated under clause no.9.

9. We (Bank Name) undertake to pay to BSNL any money so demanded notwithstanding any dispute or disputes raised by the contractor(s)/supplier(s) in any suit or proceeding pending before any court or tribunal relating thereto our liability under this present being absolute and unequivocal. The payment so made by us under this bond shall be valid discharge of our liability for payment there under and the contractor(s)/supplier(s) shall have no claim against us for making such payment

10. Our liability under the Advance Bank Guarantee is restricted to a sum of [Insert ABG value in figures and words) and the Advance Bank Guarantee shall remain in force until (date) or such extended period as may be required by BSNL & Contractor

and unless a claim under the Advance Bank Guarantee is lodged with us within three months from the date of expiry of the Advance Bank Guarantee at our branch i.e. on or before(date) or such extended period as the case may be, all your rights under the Advance Bank Guarantee shall be forfeited and we shall be relieved and discharged from all liabilities under the Advance Bank Guarantee.

11. We (name of the bank) further agree that the guarantee herein contained shall remain in full force and effect during the period that would be taken for the performance of the said agreement and that it shall continue to be enforceable till all the dues of BSNL under or by virtue of the said Agreement have been fully paid and its claims satisfied or discharged or till (office/ Department)

12. This guarantee will not be discharged due to the change in the constitution of the Bank or the Contractor(s)/ supplier(s).

13. We (name of the bank)..... lastly undertake not to revoke this guarantee during its currency except with the previous consent of BSNL in writing.

Place
Date
Officer)

(Signature of the Bank

Rubberstamp of the bank:

Authorized Power of Attorney Number: Name of the Bank officer: Designation:

Complete Postal address of Bank:

SECTION-X

LETTER OF AUTHORISATION FOR ATTENDING BID OPENING

(To be typed preferably on letterhead of the company)

To,
General Manager (MM)
Bharat Sanchar Nigam Limited,
Corporate Office, MM Cell, 2nd floor, Bharat Sanchar Bhawan, Janpath, New
Delhi – 110001

Subject: Authorization for attending bid opening on _____(date) in the Tender of
_____.

I/ We Mr. /Ms. _____ have submitted our bid for the
tender
no. in
respect of (Item _____ of
work)
which is due to open on (date).

Following persons are hereby authorized to attend the bid opening for the tender
mentioned _____ above _____ on _____ behalf _____ of
.....(Bidder) in order of preference
given below.

Order of Preference	Name	Specimen Signatures

I.

II.

Alternate Representative

Signatures of bidder/ Officer authorized to sign the bid Documents on behalf of the

bidder. Note:

1. Maximum of two representatives will be permitted to attend bid opening. In cases where it is restricted to one, first preference will be allowed. Alternate representative will be permitted when regular representatives are not able to attend.
2. Permission for entry to the hall where bids are opened, may be refused in case authorization as prescribed above is not received.

Section XI
AUTHORIZATION CERTIFICATE FROM OEM
(whole revised format as per Amendment No. 23.12)

Details of Manufacturer Authorization Form (MAF)

The Bidder should submit valid letter (MAF) with undertaking from their OEM(s) whose product is being quoted by the bidder, as per format given below:

Manufacturer Authorization Form

To,

.....,
.....,
.....

Subject: Manufacturer Authorizations Letter for Tender Enquiry No.

Sir,

We, <OEM Name> having our registered office at <OEM address>, hereinafter referred to as OEM are an established manufacturer of the following items quoted by <Bidder Name> having their registered office at <Bidder address>, hereinafter referred to as Bidder:

<name of items>...

.....

We <OEM Name> authorize <Bidder's name> to quote our above-mentioned item(s) for above mentioned tender.

We confirm that we have understood the delivery & installation timelines defined in the tender. We confirm that we have worked out all necessary logistics and pricing agreement with <bidder>, and there won't be any delay in delivery, installation and support from our side. Our full support as per pre-purchased support contract is extended/ applicable in all respects for supply, warranty and maintenance of our products. We also ensure to provide the required spares and service support as pre-purchased for the supplied equipment for a period of 10 years (includes 3 years implementation) from date of supply of the equipment as per tender terms. In case, the PMA (BSNL on behalf USOF/ DoT) requires to extend the period of contract with PIA beyond 10 years, we, as OEM, also undertake to provide support for this extended period also, in case, the supplied product is supported anywhere globally.

In case of any difficulties in logging complaint at bidder end, user shall have option to log complaint at our call support centre.

In case PIA is unable to fulfil the obligations given under this tender, OEM shall be responsible to complete its obligations towards project with any other PIA appointed by the purchaser.

In case it is required to change authorized agent of OEM, the OEM shall ensure that the alternate Authorized Agent in this case shall abide by all the terms & conditions laid down under the tender/ Contract with the bidder for the quoted OEM products.

In case of PIA exits from the Project for any reason, including but not limited to default, insolvency, termination of its Agreement with the purchaser, or other circumstances resulting in the inability of PIA to fulfill its obligations under the Agreement, OEM shall be obligated to continue providing the services to purchaser in accordance with the terms and conditions outlined in the agreement, between OEM and the bidder including commercials.

We also agree that in case of any default by us in meeting out the obligations as mentioned above, purchaser may debar us for a period upto 3 years.

If any product is declared end of sale, we shall proactively ensure that a suitable equivalent or higher roll over product is offered through the PIA to BSNL for due approval, contract and order executions thereafter.

We understand that any false information/ commitment provided here may result in <OEM's Name> getting blacklisted/debarred from doing business with BSNL.

We <OEM Name>, hereby provide this undertaking with regard to the Agreement executed between <Name of bidder> and <OEM Name> during the submission of the Bid for <Project Name>

Thanking You

For <OEM/ Manufacturer name>

< (Authorized Signatory of OEM)>

Name:

Designation:

Contact Details:

Seal of the Company

NOTE:

1. The letter should be submitted on the letter head of the manufacturer / OEM and should be counter-signed by the authorized signatory of the bidder.
2. Any deviation would lead to summarily rejection of bids.

Section XII
FORMAT OF UNDERTAKING for Non-Blacklisting of the Bidder
(whole revised format as per Amendment No. 7)

(to be provided on Non – judicial stamp paper of INR 100/- or such equivalent amount and duly attested by notary public)

Place:
Date:

To,
General Manager (MM)
Bharat Sanchar Nigam Limited,
Corporate Office, MM Cell, 2nd floor,
Bharat Sanchar Bhawan, Janpath, New Delhi – 110001

Ref: Tender No. MM/BNO&M/BN-III/T-791/2024 issued on 15.02.2024.

Subject: Declaration Letter for Non-Blacklisting of the Bidder.

Sir/Madam,

We, the undersigned, hereby declare that we are not blacklisted/ debarred with Ministry of Communication or BSNL or debarring order issued by Department of Expenditure (DOE), Ministry of Finance (MOF) covering all central Ministries/ Departments as per provision of OM No.F.1/20/2018-PPD by Department of Expenditure (DoE), MoF dated on 2nd Nov 2021, as on Bid submission date.

For and on behalf of
Signature:
(Authorized Signatory)
Name of the person:
Designation:
Name of the Respondent:
Address of the Respondent:
Company seal:

Section XIII

Special Instructions to bidders for e-Tendering

The bidders are required to submit soft copies of their bids electronically on the Central Public Procurement (CPP) Portal, using valid Digital Signature Certificates. The instructions given below are meant to assist the bidders in registering on the CPP Portal, prepare their bids in accordance with the requirements and submitting their bids online on the CPP Portal. More information useful for submitting online bids on the CPP Portal may be obtained at: <https://etenders.gov.in/eprocure/app>.

1. Registration

- 1.1 Bidders are required to enrol on the e-Procurement module of the Central Public Procurement Portal (URL: <https://etenders.gov.in/eprocure/app>) by clicking on the link “Online bidder Enrolment” on the CPP Portal which is free of charge.
- 1.2 As part of the enrolment process, the bidders will be required to choose a unique username and assign a password for their accounts.
- 1.3 Bidders are advised to register their valid email address and mobile numbers as part of the registration process. These would be used for any communication from the CPP Portal.
- 1.4 Upon enrolment, the bidders will be required to register their valid Digital Signature Certificate (Class III Certificates with signing key usage) issued by any Certifying Authority recognized by CCA India (e.g. Sify / nCode / eMudhra etc.), with their profile.
- 1.5 Only one valid DSC should be registered by a bidder. Please note that the bidders are responsible to ensure that they do not lend their DSC’s to others which may lead to misuse.
- 1.6 Bidder then logs in to the site through the secured log-in by entering their user ID / password and the password of the DSC / e-Token.

2. Searching for Tender Documents

- 2.1 There are various search options built in the CPP Portal, to facilitate bidders to search active tenders by several parameters. These parameters could include Tender ID, Organization Name, Location, Date, Value, etc. There is also an option of advanced search for tenders, wherein the bidders may combine a number of search parameters such as Organization Name, Form of Contract, Location, Date, Other keywords etc. to search for a tender published on the CPP Portal.

- 2.2 Once the bidders have selected the tenders they are interested in, they may download the required documents / tender schedules. These tenders can be moved to the respective 'My Tenders' folder. This would enable the CPP Portal to intimate the bidders through SMS / email in case there is any corrigendum issued to the tender document.
- 2.3 The bidder should make a note of the unique Tender ID assigned to each tender, in case they want to obtain any clarification / help from the Helpdesk.

3. Preparation of Bids

- 3.1 Bidder should take into account any corrigendum published on the tender document before submitting their bids.
- 3.2 Please go through the tender advertisement and the tender document carefully to understand the documents required to be submitted as part of the bid. Please note the number of covers in which the bid documents have to be submitted, the number of documents - including the names and content of each of the document that need to be submitted. Any deviations from these may lead to rejection of the bid.
- 3.3 Bidder, in advance, should get ready the bid documents to be submitted as indicated in the tender document / schedule and generally, they can be in PDF/ XLS / RAR / DWF/JPG formats.
- 3.4 Bid documents may be scanned with 100 dpi with black and white option which helps in reducing size of the scanned document.
- 3.5 To avoid the time and effort required in uploading the same set of standard documents which are required to be submitted as a part of every bid, a provision of uploading such standard documents(e.g. PAN card copy, annual reports, auditor certificates etc.) has been provided to the bidders. Bidders can use "My Space" or "Other Important Documents" area available to them to upload such documents. These documents may be directly submitted from the "My Space" area while submitting a bid, and need not be uploaded again and again. This will lead to a reduction in the time required for bid submission process.

Note: My Documents space is only a repository given to the Bidders to ease the uploading process. If Bidder has uploaded his Documents in My Documents space, this does not automatically ensure these Documents being part of Technical Bid.

4. Submission of Bids

- 4.1 Bidder should log into the site well in advance for bid submission so that they can

upload the bid in time i.e. on or before the bid submission time. Bidder will be responsible for any delay due to other issues.

- 4.2 The bidder has to digitally sign and upload the required bid documents one by one as indicated in the tender document.
- 4.3 Bidder should make payment towards the cost of Bidding Documents as per the instructions specified in the tender document. The proof of payment of the cost of Bidding Documents should be submitted by the bidders along with the bid, failing which, the uploaded bid will be rejected.
- 4.4 Bidders are requested to note that they should necessarily submit their financial bids in the format provided and no other format is acceptable.
- 4.5 The server time (which is displayed on the bidders' dashboard) will be considered as the standard time for referencing the deadlines for submission of the bids by the bidders, opening of bids etc. The bidders should follow this time during the bid submission.
- 4.6 All the documents being submitted by the bidders would be encrypted using PKI encryption techniques to ensure the secrecy of the data. The data entered cannot be viewed by unauthorized persons until the time of bid opening. The confidentiality of the bids is maintained using the secured Socket Layer 128 bit encryption technology. Data storage encryption of sensitive fields is done. Any bid document that is uploaded to the server is subjected to symmetric encryption using a system generated symmetric key. Further this key is subjected to asymmetric encryption using buyers/bid opener's public keys. Overall, the uploaded tender documents become readable only after the tender opening by the authorized bid openers.
- 4.7 The uploaded tender documents become readable only after the tender opening by the authorized bid openers.
- 4.8 Upon the successful and timely submission of bids (i.e. after Clicking "Freeze Bid Submission" in the portal), the portal will give a successful bid submission message & a bid summary will be displayed with the bid no. and the date & time of submission of the bid with all other relevant details.
- 4.9 The bid summary has to be printed and kept as an acknowledgement of the submission of the bid.

5. Offline Submissions:

In addition to online submission, the bidder shall also submit the following

documents offline in original to the Deputy Manager (MMT), Bharat Sanchar Nigam Limited, MM Cell, 2nd floor, Bharat Sanchar Bhawan, Janpath, New Delhi – 110001 in a Sealed Envelope, as per the instructions given in the tender document, otherwise the bid shall not be evaluated.

- 1.1 Power of Attorney for signing of Bid
- 1.2 Deleted
- 1.3 Bid Security as required under Clause 1 .of Section-I.
- 1.4 Tender Fee or supporting documents for claiming exemption of tender fee

6. Assistance to Bidders

Any queries relating to the tender document and the terms and conditions contained therein should be addressed to the Tender Inviting Authority for a tender or the relevant contact person indicated in the tender.

Any queries relating to the process of online bid submission or queries relating to CPP Portal in general may be directed to the 24x7 CPP Portal Helpdesk.

Section XIV
INTEGRITY PACT

(To be typed preferably on letterhead of the company)

FORMAT OF INTEGRITY PACT

(To be submitted on Plain Paper)

INTEGRITY PACT

Between

Bharat Sanchar Nigam Limited (BSNL) / hereinafter referred to as “The Principal”

and

.....hereinafter referred to as “The Bidder/Contractor”

Preamble

The Principal intends to award, under laid down organizational procedures, contract/s for ----- . The Principal values full compliance with all relevant laws, rules and regulations, and economic use of resources, and of fairness and transparency in its relations with its Bidder(s) and/ or Contractor(s).

In order to achieve these goals, the Principal will appoint an Independent External Monitors (IEMs) who will monitor the tender process and the execution of the contract for compliance with the principles mentioned above.

Section 1 – Commitments of the Principal

(1) The Principal commits itself to take all measures necessary to prevent corruption and to observe the following principles:-

- (a) No employee of the Principal, personally or through family members, will in connection with the tender for, or the execution of a contract, demand, take a promise for or accept, for self or third person, any material or immaterial benefit which he/she is not legally entitled to.
 - (b) The Principal will, during the tender process treat all Bidder(s) with equity and reason. The Principal will in particular, before and during the tender process, provide to all Bidder(s) the same information and will not provide to any Bidder(s) confidential/additional information through which the Bidder(s) could obtain an advantage in relation to the tender process or the contract execution.
 - (c) The Principal will exclude from the process all known prejudiced persons.
- (2) If the Principal obtains information on the conduct of any of its employees which is a criminal offence under the relevant Anti-Corruption Laws of India, or if there be a substantive suspicion in this regard, the Principal will inform its Vigilance Office and in addition can initiate disciplinary actions.

Section 2 – Commitments of the Bidder(s)/Contractor(s)

- (1) The Bidder(s)/Contractor(s) commit themselves to take all measures necessary to prevent corruption. The Bidder(s)/Contractor(s) commit themselves to observe the following principles during his participation in the tender process and during the contract execution.
 - (a) The Bidder(s)/Contractor(s) will not, directly or through any other person or firm, offer, promise or give to any of the Principal's employees involved in the tender process or the execution of the contract or to any third person any material or immaterial benefit which he/she is not legally entitled to, in order to obtain in exchange any advantage of any kind whatsoever during the tender process or during the execution of the contract.
 - (b) The Bidder(s)/Contractor(s) will not enter with other Bidder(s) into any undisclosed agreement or understanding, whether formal or informal. This applies in particular to prices, specifications, certifications, subsidiary contracts, submission or non- submission of bids or any other actions to restrict competitiveness or to introduce cartelization in the bidding process.
 - (c) The Bidder(s)/Contractor(s) will not commit any offence under the relevant Anti- corruption Laws of India; further the Bidder(s)/Contractor(s) will not use improperly, for purposes of competition or personal gain, or pass on to others, any information or document provided by the Principal as part of the business

- relationship, regarding plans, technical proposals and business details, including information contained or transmitted electronically and commit any offence under Indian Penal code (IPC)/Prevention of Corruption (PC) Act.
- (d) The Bidder(s)/Contractor(s) of foreign origin shall disclose the name and address of the Agents/representatives in India, if any. Similarly the Bidders/Contractors(s) of Indian Nationality shall furnish the name and address of the foreign principals, if any.
 - (e) The Bidder(s)/Contractor(s) will, when presenting their bid, disclose any and all payments made, is committed to or intends to make to agents, brokers or any other in connection with the award of the contract.
 - (f) Bidder(s)/Contractor(s) who have signed the Integrity Pact shall not approach the Courts while representing the matter to **Independent External Monitors (IEMs)** and shall wait for their decision in the matter.
 - (g) To disclose and transgression with any other company that may impinge on the anti corruption principle.
- (2) The Bidder(s)/Contractor(s) will not instigate third persons to commit offences outlined above or be an accessory to such offences.

Section 3 – Disqualification from tender process and exclusion from future contracts

If the Bidder(s)/Contractor(s), before contract award or during execution has committed a transgression through a violation of Section 2, above or in any other form such as to put his reliability or credibility in question, the Principal is entitled to disqualify the Bidder(s)/Contractor(s) from the tender process or take action as per the defined procedure in BSNL Procurement Manual, **which is in-force on the date of Publication of tender.**

Section 4 – Compensation for Damages

- (i) If the Principal has disqualified the Bidder(s) from the tender process prior to the award according to Section 3, the Principal is entitled to demand and recover the damages equivalent to Earnest Money Deposit / Bid Security.
- (ii) If the Principal has terminated the contract according to Section 3, or if the Principal is entitled to terminate the contract according to section 3, the Principal shall be

entitled to demand and recover from the Contractor the amount equivalent to liquidated damages (LD) of the contract value or the amount equivalent to **Security Deposit/Performance Bank Guarantee (PBG)** in addition to any other penalties/ recoveries as per terms and conditions of the tender.

Section 5 – Previous transgression

- (i) The Bidder declares that no previous transgression occurred in the last 3 years with any other Company in any country conforming to the Anti-corruption approach or with any other Public Sector Enterprise in India that could justify his exclusion from the tender process.
- (ii) If the Bidder makes incorrect statement on this subject, he can be disqualified from the tender process or action can be taken as per the defined procedure.

Section 6 – Equal treatment of all Bidders/Contractors/Subcontractors

- (9) The principal will enter into agreements with identical conditions as this one with all Bidders/Contractors.
- (ii) The Bidder(s)/Contractor(s) undertake(s) to demand from all subcontractors, a commitment in conformity with this Integrity Pact.
- (iii) The Principal will disqualify from the tender process all bidders who do not sign this Pact or violate its provisions.

Section 7 – Criminal charges against violating Bidder(s)/Contractor(s)/Subcontractor(s)

If the Principal obtains knowledge of conduct of a Bidder, Contractor or Subcontractor, or of an employee or a representative or an associate of a Bidder, Contractor or Subcontractor, which constitutes corruption, or if the Principal has substantive suspicion in this regard, the Principal will inform the same to Chief

Vigilance Officer.

Section 8 – External Independent Monitor/Monitors

1. Principal appoints competent and credible Independent External Monitor for this Pact. The task of the Monitor is to review independently and objectively, whether and to what extent the parties comply with the obligations under this agreement.
2. The monitor is not subject to instructions by the representatives of the parties and performs his/her functions neutrally and independently. The Monitor would have access in all contract documents, whenever required. It will be obligatory for him/her to treat the information and documents of the Bidders/Contractors as confidential. He/she reports to the CMD BSNL.
3. The Bidder(s)/Contractor(s) accepts that the Monitor has the right to access without restriction to all Project documentation of the Principal including that provided by the Contractor. The Contractor will also grant the Monitor, upon his request and demonstration of a valid interest, unrestricted and unconditional access to his project documentation. The same is applicable to Subcontractors. The Monitor is under contractual obligation to treat the information and documents of the Bidder(s)/Contractor(s)/Subcontractor(s) with confidentiality.

Notwithstanding anything contained in this Section, the Bidder(s)/Contractor(s) shall have no obligation whatsoever to provide any internal costing mechanisms or any internal financial or commercial data pursuant to any audit or review conducted by or on behalf of the Principal. Further, the Bidder(s)/Contractor(s) shall not be required to provide any data relating to its other customers, or any personnel or employee related data.

4. The Monitor is under contractual obligation to treat the information and documents of the Bidders/Contractor(s) /Sub-contractor(s) with confidentiality. The Monitor has also signed declarations on “Non-Disclosures of Confidential Information” and of “Absence of Conflict of Interest”. In case of any conflict of interest arising at a later date, the Independent External Monitor (IEM) shall inform CMD BSNL and recuse himself/herself from that case.
5. The Principal will provide to the Monitor sufficient information about all meetings among the parties related to the Project provided such meetings could have an impact on the contractual relations between the Principal and the Contractor. The

parties offer to the Monitor the option to participate in such meetings.

6. As soon as the Monitor notices, or believes to notice, a violation of this agreement, he will so inform the Management of the Principal and request the Management to discontinue or take corrective action, or to take other relevant action. The monitor can in this regard submit non- binding recommendations. Beyond this, the Monitor has no right to demand from the parties that they act in a specific manner, refrain from action or tolerate action.

7. The Monitor will submit a written report to the Chairperson of the Board of the Principal within 4 to 6 weeks from the date of reference or intimation to him by the 'Principal' and, should the occasion arise, submit proposals for correcting problematic situations.

8. If the Monitor has reported to the CMD of BSNL, a substantiated suspicion of an offence under relevant Anti-Corruption Laws of India, and BSNL has not, within reasonable time, taken visible action to proceed against such offence or reported it to the Corporate Vigilance Office, the Monitor may also transmit this information directly to the Central Vigilance Commissioner, Government of India.

9. The word 'Monitor' would include both singular and plural.

Section 9 – Pact Duration

This Pact begins when both parties have legally signed it. It expires for the Contractor 12 months after the last payment under the contract, and for all other Bidders 6 months after the contract has been awarded. Any violation of the same would entail disqualification of the bidders and exclusion from future business dealings.

If any claim is made/ lodged during this time, the same shall be binding and continue to be valid despite the lapse of this pact as specified above, unless it is discharged/determined by CMD, BSNL.

Section 10 – Other provisions

(1) This agreement is subject to Indian Law. Place of performance and jurisdiction is the Registered Office of the Principal, i.e. New Delhi. The arbitration clause provided in the tender document / contract shall not be applicable for any issue /dispute arising under Integrity Pact.

- (2) Changes and supplements as well as termination notices need to be made in writing. Side agreements have not been made.
- (3) If the Contractor is a partnership, this agreement must be, signed by all partners.
- (4) Should one or several provisions of this agreement turn out to be invalid, the remainder of this agreement remains valid. In this case, the parties will strive to come to an agreement to their original intentions.
- (5) Issues like Warranty/Guarantee etc. shall be outside the purview of IEMs.

For the Principal ~~For the Bidder~~/Contractor

Place..... Witness 1 :

Date Witness 2 :

Annexure I
Bidder's / SUPPLIER Profile
SUPPLIER Particulars for <NIT NUMBER>dated
<DD/MM/YYYY>

S. No.	Area of the details to be provided		Responding Firm's/Company Details to be provided
1.	Name of the SUPPLIER		
2.	Address of the SUPPLIER		
3.	Telephone number of the Firm/company		
4.	SUPPLIER's RFP number and date		
5.	Name of the contact person to whom all references shall be made regarding this RFP		
6.	Designation of the person to whom all references shall be made regarding this RFP		
7.	Address of the person to whom all references shall be made regarding this RFP		
8.	E-mail address of the Firm/company		
9.	Fax number of the Firm/company		
10.	Website address of the Firm/company		
11.	Details of Registration	1.Registratio Number of the Firm/company 2.Name of the place where the firm/company was registered 3.Date when the company was registered 4.Product /Service for which registered 5. Validity Period, if applicable	
12.	Goods and Service Tax Registration No. (GST No.)		
13.	PAN No.		
14.	Average Annual Turnover for the last three (3) audited financial Years (2020-21, 2021-22 & 2022-23 or 2021-22, 2022-23 & 2023-24) (Amendment No. 6.38)		
15.	Details of ownership of the firm (Name and Address of the Board of Directors, Partners etc.)		
16.	Name of the authorized signatory who is authorized to quote in the RFP and enter into the Contract (Power of Attorney to be submitted)		
17.	Name of the Bankers along with the branch (as appearing in MICR cheque) & Account #		

18.	Status of Firm/company like Pvt. Ltd. etc.		
19.	Locations and addresses of the offices.	1. Delhi or NCR region 2. The corporate address 3. The official address of the service delivery centre.	
20.	Name and contact details of the Project Manager	1. Name of the Project Manager assigned for 2. Contact details viz; telephone number, official address of the Project Manager assigned.	

Witness:

Signature -----

Name -----

Address -----

Date -----

SUPPLIER:

Signature -----

Name -----

Designation -----

Company Seal -----

--

Date -----

Annexure II (Amendment No. 6.39)

Declaration Proforma-2

UNDERTAKING & DECLARATION

For understanding the terms & condition of Tender & Specifications of work

a) Certified that:

1. I/ We have read, understood, and agreed with all the terms and conditions, specifications included in the tender documents & offer to execute the work at the rates quoted by us in the tender form.
2. if I/ We fail to enter into the agreement & commence the work in time, the EMD/ SD deposited by us will stand forfeited to BSNL.
3. no addition/ deletion/ corrections have been made in the terms & conditions of downloaded tender enquiry document and bid is being submitted against tender enquiry document which is identical to the tender document appearing on E-tender Portal (<https://www.etenders.gov.in>).

b) The tenderer hereby covenants and declares that:

1. All the information, documents, photo copies of the documents/ certificates enclosed along with the tender offer are correct.
2. If anything is found false and/or incorrect and/or reveals any suppression of fact at any time, BSNL reserves the right to debar our tender offer/ cancel the LOA/ Purchase/ work order if issued and forfeit the EMD/ SD/ Bill amount pending with BSNL. In addition, BSNL may debar the contractor from participation in its future tenders.

c) In addition to above, it is certified that I/ We have also understood the following from perspective of network design:

1. That the existing made over GPs working on satellite (as mentioned in SoR item sr. no. 2.2) are covered under new GP creation (as mentioned in SoR item sr. no. 1.2a).
2. That the existing BSNL fibre taken on lease under BharatNet Phase- I from Block to FPOIs shall no more be part of BharatNet network once the network is upgraded to ring architecture in that Block.
3. That the planning of OFC in ring architecture shall be based on optimal feasible path.
4. That, there will be an option to utilize the existing optical fibre cable of any TSP/ISP/IP-1 license holders for the construction of the uncovered GPs (as mentioned in SoR item sr. no.1.2a) as per Section IVB, clause no. 3.6.

5. That the conditions of field trial for the Class I/ Class II local suppliers of routers shall be applicable as per section IVA, clause no. 2.11.
6. That the S-NOC shall be installed in suitable BSNL exchange building in the respective circle as per section IV B, clause no. 3.8 (h).

Date:

Signature of Authorized signatory

Place:

Name of bidder Along with date & Seal

Annexure III

Check list of documents to be submitted by the bidder in excel format (Amendment No. 16)

S. No.	Section	Clause No.	Particulars of documents to be submitted	Page No and Documents Name in Bid	Comment
Off Line Bid Documents					
1	Section I	3	Demand Draft/ Bankers cheque in favour of AO Cash, BSNL CO , drawn on any nationalized / scheduled bank and payable at New Delhi, submitted towards tender fee/ cost of the tender documents.		
2	Section II	10	A proof regarding registration of MSE (Micro & Small Enterprises) with Appropriate Authority, if claiming exemption in tender fee or Bid Security		
3	Section II	12	Original copy of the Bid Security (as per Section-VIII A or B)		
Techno Commercial Bid Documents					
1.	Section I	3	Scanned copy of "Demand Draft/ Bankers cheque in favour of AO Cash, BSNL CO , drawn on any nationalized/ scheduled bank and payable at New Delhi, towards tender fee/ cost of the tender documents"		
2.	Section II	10	Scanned copy of proof regarding registration of MSE (Micro & Small Enterprises) with Appropriate Authority, if claiming exemption in tender fee or Bid Security		
3.	Section II	12	Scanned copy of the Bid Security (as per Section-VIII A or B)		
4.	Section I	12	Declaration that no addition/deletion/ corrections have been made in the downloaded tender document being submitted and it is identical to the tender document appearing on E-tender Portal (https://www.etenders.gov.in) and all amendments /corrigendum/ clarifications issued by BSNL have been taken into account.		
5.	Section II	10	Non-Relation Certificate duly signed by all Directors of Company (as per format in clause 34.4 Section II)		
6.	Section II	8	Bid form duly filled & signed as per Section VI		
7.	Section II	10.1	List of all Directors including their name(s), Director Identification Number(s) (DIN) and address (es) along with contact telephone numbers of office and residence.		
8.	Section II	10.1	Undertaking duly signed by the bidder stating that it shall be liable for due performance of the contract as per clause 12.4(d) (if applicable)		
9.	Section II	10.5	A signed undertaking from Authorized Signatory of the bidder certifying that all components/ parts/ assembly/ software used in the Desktops and Servers like Hard disk, Monitors, Memory etc. shall be original, new components/ parts/ assembly/		

S. No.	Section	Clause No.	Particulars of documents to be submitted	Page No and Documents Name in Bid	Comment
			software and that no refurbished/ duplicate/ second hand components/ parts/ assembly/ software are being used or shall be used		
10.	Section II	10.6	For supply of any software i.e. operating system or any applications software the bidder should submit a Certificate Of Authenticity (COA), issued by the respective OEM and duly signed by Authorized Signatory of the bidder stating that all Software supplied are authentic and legal copy is/are being supplied.		
11.	Section II	11.2	Clause-by-clause compliance. In case of deviations, a statement of the deviations and exception to the provision of the Technical Specifications and Commercial Conditions shall be given by the bidder		
12.	Section II	14	Scanned copy of notarized Power of Attorney for signing the bid document and authorization for executing the power of attorney as per clause 14.4 of Section II along with Attestation of the specimen signatures of such authorized signatory of the bid by the Company's/ firm's bankers		
13.	Section XIV	-	Integrity Pact as per Section XIV		
14.	Section IV-Part-A	2.1 (Table A)	Certificate of Incorporation and Memorandum & Article of Association		
15.	Section IV-Part-A	2.1 (Table A)	Self-attested Copy of PAN & GSTIN registration		
16.	Section IV-Part-A	2.1 (Table A)	Completion Certificate issued & signed by the competent authority of the client entity along with the supporting documents such as Work order/ Purchase order OR Contract clearly highlighting the scope of work Bill of Material and value of the contract/ order.		
17.	Section IV-Part-A	2.1 (Table A)	Undertaking from the bidder as per format given in Section XII that bidder is not blacklisted/ debarred with Ministry of Communication or BSNL or debarring order issued by Department of Expenditure (DOE), Ministry of Finance (MOF) covering all central Ministries/ Departments as per provision of OM No.F.1/20/2018-PPD by Department of Expenditure (DoE), MoF dated on 2nd Nov 2021		
18.	Section IV-Part-A	2.1 (Table A)	Audited/ Unaudited financial statements for net worth and average annual turnover as per eligibility criteria		
19.	Section IV-Part-A	2.1 (Table A)	Certificate from the Statutory Auditor for net worth and average annual turnover for the financial year preceding the Bid Date (i.e. 2022-23) as per eligibility criteria		

S. No.	Section	Clause No.	Particulars of documents to be submitted	Page No and Documents Name in Bid	Comment
20.	Section IV-Part-A	2.1 (Table A)	Copies of valid TSEC/ TAC or proof of having applied for TSEC/ TAC (BSNL registered QF-103 or TEC Form-B) for active & Passive components		
21.	Section IV-Part-A	2.1 (Table A)	A Self-declaration for not being declared as non-performer in any USOF project(s), as per the Sr. No.-7 of Table A of eligibility criteria.		
22.	Section IV A-Part-A	2.4 (vi)	Joint bidding agreement as per Annexure XII, if Bidder is a consortium member		
23.	Section IV A-Part-A	2.10	Self-declaration certificate by the Bidder that the items (excluding Services (I&C) and AMC value) offered as package in this tender meets the minimum local content as per Annexure VI		
24.	Section IV-Part-A	2.14	Land border sharing as per Annexure VII if bidder is from a country which shares land border with India		
25.	Section IV-Part-A	2.17	In case of imported products, certificate from OEM that it has a registered office and Service Support Centre in India to provide after sales service support in India.		
26.	Section-V	-	Unpriced detailed BOM		
27.	Section-X	-	Letter of Authorization for attending bid opening		
28.	Section-XI	-	Manufacturer Authorization Form (MAF) as per Section XI		
29.	Annexure-I	-	Bidders /Supplier profile & questionnaire duly filled & signed as per format in Annexure-I		
30.	Annexure-II	-	Undertaking & declaration duly filled & signed (Certificate for having understood the terms & conditions of tender and specification of work)		
31.	Annexure-IV	-	Detailed summary of experience certificate (EPC work and O&M of IFC network) in excel format as per Annexure -IV		
32.	Annexure -V	-	Detailed summary of turnover/ net worth details in excel format as per Annexure -V		
Financial Bid Documents					
1	Section VII	-	Scanned copy of signed & stamped Financial Bid as per format in Section-VII for the respective package		
2	Section-IA		Price Bid in BoQ as per CPP Portal		

Notes :

1. All the pages of bid documents should be numbered and arranged accordingly. The Bidder shall combine all the bid documents in the order, before uploading, as mentioned in the table above.
2. All other documents which are not mentioned in the table above but are required against any of the clause of RFP are necessarily to be submitted to make the bid compliant. These other documents shall be placed after the documents mentioned in the table above, while numbering and arranging the documents.
3. The bid documents (to be uploaded on the e-tendering portal) should be numbered in order of Check list in Annexure-III. An index in first folder with file names should be submitted for easy location

Annexure IV
Summary of Experience Certificate in Excel Format

S. No.	EPC work (Supply, Laying, Installation, Testing and Commissioning) of OFC (UG of at least 24 F)	Organization Name, Place and Address	PO No and Date	Completion certificate No, Date & Name, Designation, email, mobile No of Issuing Authority	Quantity/RKM	Year (Period) of completion of work	Reference Page No in Bid documents (from - to)
1							
2							
3							

S. No.	O&M of OFC Network (UG of at least 24 F)	Organization Name, Place and Address	PO No and Date	Completion certificate No, Date & Name, Designation, email, mobile No of Issuing Authority	Quantity/RKM	Year (Period) of completion of work	Reference Page No in Bid documents (from - to)
1							
2							
3							

S.	Telecom.	Organization	PO No	Completion	No.	Year	Reference

No.	Equipment Installation & Commission ing	Name, Place and Address	and Date	certificate No, Date & Name, Designation, email, mobile No of Issuing Authority		(Period) of completion of work	Page No in Bid documents (from -to)
1							
2							
3							

Note: Similar format is to be used by the bidder for providing details of supply and/or installation/commissioning of quoted make/model wherever required as per the requirement in this document.

Signature of the Bidder
With date and seal

Annexure V
Summary of Turnover/ Networth of the Bidders
(in excel format)

Details of Turnover of bidders as per bid documents (Eligibility, section-IV A):

S. No.	Name of the Bidder / Consortium member	Package applied	Required Minimum Average Annual Turnover (Rs. Crore)	Turnover of bidder as per bid documents (Rs. Crore) (Strike whichever is not applicable)			Average Annual Turnover	Reference Page No in Bid documents (from - to)	Remarks
				2020-21 Or 2021-22	2021-22 Or 2022-23	2022-23 Or 2023-24			
1									

Details of Net Worth of bidders as per bid documents (Eligibility, section-IV A):

S. No.	Name of the Bidder / Consortium member	Package applied	Required Minimum Net Worth (Rs. Crore)	Net worth of bidder as per bid documents (Rs. Crore) (Strike whichever is not applicable)	Reference Page No in Bid documents (from -to)	Remarks
				2022-23 Or 2023-14		
1						

Annexure VI (Part-A)
Self-declaration regarding Local Content (LC) for Telecom Product

FORM-1

Format for Self-declaration regarding Local Content (LC) for Telecom Product, Services or Works (As per clause 9 (b) of DPIIT order No P-45021/2/2017-B.E-II dated 15.06.2017, certificate from statutory auditor / cost auditor of the company is mandatory for all bids of a value more than Rs 10 crore)

Date:

I, ... S/o, D/o, w/o

....., Resident of

..... do hereby solemnly affirm and declare as under.

That I agree to abide by the terms and conditions of Department of Telecommunications, Government of India issued vide Notification

No. dated.....

That the information furnished hereinafter is correct to best of my knowledge and belief and I undertake to produce relevant records before the procuring entity or any other authority so nominated by the department of Telecommunications, Government of India for the purpose of assessing the LC.

Percentage of LC claimed:.....%

That the LC for all inputs which constitute the said Telecom Product/Services/Works has been verified by me and I am responsible for correctness of the claims made therein.

That in the event of the LC of the Telecom Product/Services/Works mentioned herein is found to be incorrect and not meeting the prescribed LC norms, based on the assessment of an authority so nominated by the Department of Telecommunications, Government of India and I will be liable as under clause 9 (f) **of Public Procurement (Preference to Make in India) Order 2017.**

I agree to maintain all information regarding my claim for LC in the Company's record for a period of 2 years and shall make this available for verification to any statutory authorities.

- i. Name and details of the Local supplier (Registered Office, Manufacturing unit location, nature of legal entity)
- ii. Date on which this certificate is issued.
- iii. Telecom Product/Services/Works for which the certificate is produced.
- iv. Procuring agency to whom the certificate is furnished.
- v. Percentage of LC claimed.

- vi. Name and contact details of the unit of the manufacturer.
- vii. Sale price of the product.
- viii. Ex-Factory Price of the product.
- ix. Freight, insurance and handling
- x. Total Bill of Material.
- xi. List and total cost value of inputs used for manufacture of the Telecom Product/Services/Works.
- xii. List and total cost of inputs which are locally sourced. Please attach LC certificate from local suppliers, if the input is not in-house.
- xiii. List and cost of inputs which are imported, directly or indirectly.

For and on behalf of _____ (Name of Firm/Entity)

Authorized signatory (To be duly authorized by the Board of Directors) **<Insert Name, Designation and Contact No. and date>**

Annexure VI (Part-B)

Undertaking w.r.t. Local content declaration in view of allowing multiple OEMs
(only applicable if bidder is claiming Preference as Class-I Local category bid for award of work)
We have offered multiple OEMs for active & passive components in our bid for the Package No. of tender enquiry No.

We hereby claim Preference as Class-I Local category bid for award of work for the package and have worked out our bid's Local content (LC) in such a manner that our claim for Local content will always remain under Class-I category with the offered OEMs during bidding stage as well as during the supplies.

We have also taken cognizance of the DPIIT guidelines dated 16.09.2020 and the Gazette notification dated 29th Aug 2018 issued by DoT on PMI Policy is also complied for calculation of local content of products of our OEMs, whose product has been offered in our bid.

(Authorized signatory)

ANNEXURE-VII
Certificate to be submitted by Bidders
(On Company's Letter Head)

Reference 1: BSNL Tender Enquiry No.

Reference 2: Department of Expenditure Office Memorandums (OMs) No. 7/10/2021- PPD (1) dated 23rd February 2023 and its subsequent Clarification, if any.

I, in capacity of authorized signatory of M/s.....having Regd. office at.....being a participant bidder in BSNL T.E cited at reference 1 above, hereby declare that I have read and understood the clause regarding Restrictions under Rule 144(xi) of the General Financial Rules (GFRs) 2017 on grounds of Defence of India and National Security issued vide OM cited at reference 2 above, on procurement from a bidder of a country which shares a land border with India and on sub-contracting to contractors from such countries.

I, hereby, further certify that our Company is not from such a country which shares a land border with India and in light of conditions & restrictions imposed vide cited OMs, we fulfil all the requirements in this regard to become eligible to be considered in the subject Tender Enquiry by BSNL.

(Name of the authorized signatory)

Signature
Designation in Company Seal / Stamp of Company
Counter signed by Company Secretary of the Company with seal / stamp

ANNEXURE-VIII

The numbers are only indicative and may vary substantively at the time of handing over the network to PIA

States	Total No. of GPs	Total GPs down due to fiber faults
ANDAMAN AND NICOBAR ISLANDS	75	17
NICOBARS	4	
NORTH AND MIDDLE ANDAMAN	39	6
SOUTH ANDAMANS	32	11
ARUNACHAL PRADESH	27	25
EAST SIANG	18	18
PAPUM PARE	9	7
ASSAM	1558	951
BAKSA	13	9
BARPETA	34	17
BISWANATH	63	39
BONGAIGAON	64	16
CACHAR	167	42
CHARAIDEO	40	30
DARRANG	25	25
DHEMAJI	55	20
DHUBRI	33	27
DIBRUGARH	69	59
GOALPARA	33	22
GOLAGHAT	67	17
HAILAKANDI	56	12
HOJAI	45	30
JORHAT	75	51
KAMRUP	144	123
KAMRUP METRO	23	21
KARIMGANJ	46	6
LAKHIMPUR	5	4
MAJULI	18	14
MARIGAON	50	36
NAGAON	136	87
NALBARI	40	35
SIVASAGAR	66	50
SONITPUR	71	45
SOUTH SALMARA MANCACHAR	10	10
TINSUKIA	89	83
UDALGURI	21	21

States	Total No. of GPs	Total GPs down due to fiber faults
BIHAR	8810	5461
ARARIA	227	213
ARWAL	73	45
AURANGABAD	215	34
BANKA	196	54
BEGUSARAI	244	208
BHAGALPUR	249	183
BHOJPUR	241	138
BUXAR	151	137
DARBHANGA	337	171
GAYA	356	93
GOPALGANJ	248	67
JAMUI	161	64
JEHANABAD	100	75
KAIMUR (BHABUA)	156	120
KATIHAR	245	216
KHAGARIA	124	120
KISHANGANJ	133	121
LAKHISARAI	85	67
MADHEPURA	183	158
MADHUBANI	438	231
MUNGER	105	74
MUZAFFARPUR	399	288
NALANDA	269	196
NAWADA	200	54
PASHCHIM CHAMPARAN	315	270
PATNA	336	321
PURBI CHAMPARAN	432	224
PURNIA	259	121
ROHTAS	261	180
SAHARSA	156	98
SAMASTIPUR	399	260
SARAN	339	141
SHEIKHPURA	59	46
SHEOHAR	58	31
SITAMARHI	287	215
SIWAN	312	101
SUPAUL	163	56
VAISHALI	299	270
CHANDIGARH	13	6
CHANDIGARH	13	6
HARYANA	6107	4433
AMBALA	404	331

States	Total No. of GPs	Total GPs down due to fiber faults
BHIWANI	467	361
FARIDABAD	105	95
FATEHABAD	251	143
GURUGRAM	215	209
HISAR	307	208
JHAJJAR	253	226
JIND	305	184
KAITHAL	276	184
KARNAL	353	283
KURUKSHETRA	371	289
MAHENDRAGARH	347	208
NUH	319	272
PALWAL	238	197
PANCHKULA	125	67
PANIPAT	167	129
REWARI	356	222
ROHTAK	139	87
SIRSA	337	160
SONIPAT	331	212
YAMUNANAGAR	441	366
HIMACHAL PRADESH	258	34
HAMIRPUR	176	4
MANDI	26	14
SOLAN	56	16
JAMMU AND KASHMIR	427	16
ANANTNAG	34	
BADGAM	26	1
BANDIPORA	29	
BARAMULLA	40	5
GANDERBAL	21	
JAMMU	144	2
KATHUA	74	4
SAMBA	55	4
SRINAGAR	4	
KARNATAKA	6197	2654
BAGALKOTE	200	116
BALLARI	251	110
BELAGAVI	527	199
BENGALURU RURAL	108	100
BENGALURU URBAN	101	96
BIDAR	190	128
CHAMARAJANAGARA	134	18
CHIKKABALLAPURA	157	65

States	Total No. of GPs	Total GPs down due to fiber faults
CHIKKAMAGALURU	234	63
CHITRADURGA	190	98
DAKSHINA KANNADA	235	86
DAVANGERE	192	64
DHARWAD	149	52
GADAG	123	67
HASSAN	275	106
HAVERI	232	99
KALABURAGI	264	204
KODAGU	107	8
KOLAR	160	22
KOPPAL	161	129
MANDYA	241	42
MYSURU	272	23
RAICHUR	189	125
RAMANAGARA	132	89
SHIVAMOGGA	278	69
TUMAKURU	341	90
UDUPI	164	35
UTTARA KANNADA	240	59
VIJAYAPURA	225	181
YADGIR	125	111
KERALA	1129	215
ALAPPUZHA	85	25
ERNAKULAM	98	18
IDUKKI	60	21
KANNUR	92	13
KASARAGOD	44	12
KOLLAM	81	16
KOTTAYAM	84	15
KOZHIKODE	87	11
MALAPPURAM	115	35
PALAKKAD	104	12
PATHANAMTHITTA	62	5
THIRUVANANTHAPURAM	84	9
THRISSUR	104	19
WAYANAD	29	4
MADHYA PRADESH	17986	15195
AGAR	3	3
AGAR MALWA	173	154
ALIRAJPUR	293	290
ANUPPUR	286	275
ASHOKNAGAR	337	294

States	Total No. of GPs	Total GPs down due to fiber faults
BALAGHAT	698	233
BARWANI	420	339
BETUL	564	422
BHIND	41	18
BHOPAL	194	182
BURHANPUR	169	162
CHHATARPUR	227	197
CHHINDWARA	791	735
DAMOH	386	352
DATIA	281	272
DEWAS	500	490
DHAR	392	378
DINDORI	371	340
EAST NIMAR	429	402
GUNA	429	411
GWALIOR	267	253
HARDA	212	198
HOSHANGABAD	425	355
INDORE	319	293
JABALPUR	526	440
JHABUA	381	372
KATNI	117	74
KHARGONE	310	208
MANDLA	488	427
MANDSAUR	445	283
MORENA	122	101
NARSINGHPUR	447	258
NEEMUCH	239	178
NIWARI	134	97
PANNA	390	337
RAISEN	488	451
RAJGARH	421	393
RATLAM	423	374
REWA	351	312
SAGAR	346	281
SATNA	696	629
SEHORE	502	477
SEONI	649	595
SHAHDOL	78	13
SHAJAPUR	384	279
SHEOPUR	221	205
SHIVPURI	213	179
SIDHI	151	135

States	Total No. of GPs	Total GPs down due to fiber faults
SINGRAULI	208	140
TIKAMGARH	326	300
UJJAIN	253	216
UMARIA	234	199
VIDISHA	236	194
MANIPUR	323	295
BISHNUPUR	25	25
IMPHAL EAST	49	34
IMPHAL WEST	37	34
KAKCHING	17	14
KANGPOKPI	168	162
THOUBAL	27	26
MEGHALAYA	120	102
EAST JAINTIA HILLS	19	19
EAST KHASI HILLS	59	44
WEST JAINTIA HILLS	42	39
MIZORAM	40	25
HNAHTHIAL	1	1
KOLASIB	1	
LUNGLEI	15	6
SERCHHIP	23	18
NAGALAND	85	79
DIMAPUR	54	52
KOHIMA	18	17
MOKOKCHUNG	6	3
PEREN	7	7
PUDUCHERRY	101	2
KARAIKAL	28	1
PONDICHERRY	73	1
PUNJAB	12736	4466
AMRITSAR	851	339
BARNALA	155	113
BATHINDA	303	137
FARIDKOT	171	84
FATEHGARH SAHIB	431	228
FAZILKA	366	69
FIROZEPUR	750	111
GURDASPUR	1285	529
HOSHIARPUR	1390	426
JALANDHAR	891	295
KAPURTHALA	527	111
LUDHIANA	888	277
MANSA	246	161

States	Total No. of GPs	Total GPs down due to fiber faults
MOGA	330	7
MUKTSAR	265	90
NAWANSHAHR	460	200
PATHANKOT	405	55
PATIALA	970	202
RUPNAGAR	580	279
S.A.S NAGAR	338	156
SANGRUR	586	458
TARN TARAN	548	139
RAJASTHAN	8964	2464
AJMER	290	78
ALWAR	493	117
BANSWARA	117	45
BARAN	192	63
BARMER	244	105
BHARATPUR	381	178
BHILWARA	395	139
BIKANER	296	63
BUNDI	183	72
CHITTORGARH	274	85
CHURU	259	24
DAUSA	236	16
DHOLPUR	96	69
DUNGARPUR	123	69
GANGANAGAR	248	13
HANUMANGARH	257	23
JAIPUR	546	91
JAISALMER	88	25
JALORE	282	124
JHALAWAR	258	62
JHUNJHUNU	309	6
JODHPUR	440	142
KARAULI	233	87
KOTA	161	54
NAGAUER	477	46
PALI	327	101
PRATAPGARH	112	31
RAJSAMAND	214	60
SAWAI MADHOPUR	205	86
SIKAR	351	10
SIROHI	166	54
TONK	236	49
UDAIPUR	475	277

States	Total No. of GPs	Total GPs down due to fiber faults
TRIPURA	622	255
DHALAI	84	50
GOMATI	108	45
KHOWAI	80	28
NORTH TRIPURA	30	5
SEPAHIJALA	112	51
SOUTH TRIPURA	43	8
UNAKOTI	80	20
WEST TRIPURA	85	48
UTTAR PRADESH EAST	33659	31468
AMBEDKAR NAGAR	814	777
AMETHI	680	634
AYODHYA	796	740
AZAMGARH	593	534
BAHRAICH	335	316
BALLIA	423	394
BALRAMPUR	154	145
BANDA	445	389
BARABANKI	1076	977
BASTI	1178	1155
BHADOHI	553	508
CHANDAUJI	723	686
CHITRAKOOT	326	321
DEORIA	1062	1013
FARRUKHABAD	391	284
FATEHPUR	377	377
GHAZIPUR	1055	1008
GONDA	263	235
GORAKHPUR	1294	1248
HAMIRPUR	309	289
HARDOI	1121	1023
JALAUN	572	542
JAUNPUR	1482	1437
JHANSI	487	457
KANNAUJ	78	76
KANPUR DEHAT	625	579
KANPUR NAGAR	564	547
KAUSHAMBI	475	428
KHERI	1023	983
KUSHI NAGAR	993	935
LALITPUR	392	364
LUCKNOW	457	409
MAHARAJGANJ	888	788

States	Total No. of GPs	Total GPs down due to fiber faults
MAHOBA	217	215
MAU	602	430
MIRZAPUR	292	236
PRATAPGARH	1134	986
PRAYAGRAJ	1563	1436
RAE BARELI	905	884
SANT KABEER NAGAR	738	728
SHAHJAHANPUR	971	930
SHRAVASTI	140	140
SIDDHARTH NAGAR	1169	1143
SITAPUR	1337	1316
SONBHADRA	49	32
SULTANPUR	870	804
UNNAO	929	863
VARANASI	739	727
UTTAR PRADESH WEST	12170	11086
AGRA	647	582
ALIGARH	770	741
AMROHA	441	401
AURAIYA	157	135
BAGHPAT	253	250
BAREILLY	638	572
BIJNOR	962	678
BUDAUN	607	569
BULANDSHAHR	839	791
ETAH	374	366
ETAWAH	371	349
FIROZABAD	343	319
GAUTAM BUDDHA NAGAR	216	216
GHAZIABAD	152	144
HAPUR	253	249
HATHRAS	432	387
KASGANJ	230	224
MAINPURI	338	338
MATHURA	504	493
MEERUT	442	362
MORADABAD	621	600
MUZAFFARNAGAR	419	316
PILIBHIT	357	333
RAMPUR	586	545
SAHARANPUR	774	692
SAMBHAL	358	353
SHAMLI	86	81

States	Total No. of GPs	Total GPs down due to fiber faults
UTTARAKHAND	1848	665
ALMORA	213	65
BAGESHWAR	180	63
CHAMPAWAT	66	26
DEHRADUN	209	81
HARIDWAR	319	107
NAINITAL	186	112
PAURI GARHWAL	277	75
TEHRI GARHWAL	106	42
UDAM SINGH NAGAR	257	61
UTTAR KASHI	35	33
WEST BENGAL	2941	688
24 PARAGANAS NORTH	157	59
24 PARAGANAS SOUTH	130	51
BANKURA	212	33
BIRBHUM	186	23
COOCHBEHAR	140	33
DARJEELING	26	11
DINAJPUR DAKSHIN	48	9
DINAJPUR UTTAR	83	11
HOOGHLY	107	22
HOWRAH	127	25
JALPAIGURI	156	36
MALDAH	121	9
MEDINIPUR EAST	248	35
MEDINIPUR WEST	319	46
MURSHIDABAD	276	84
NADIA	202	53
PASCHIM BARDHAMAN	64	31
PURBA BARDHAMAN	149	40
PURULIA	190	77

Note: The O&M agencies i.e., PMA/FMA are working to make all the GPs up by attending the OFC faults. It is expected that by the time, PIAs takeover the work of this tender, most of these GPs will be up.

ANNEXURE-IX

Power of Attorney for signing of Bid¹\$

(Refer Clause 2.2.5)

(To be executed on Stamp paper of appropriate value)

Know all men by these presents, We (name of the firm and address of the registered office) do hereby irrevocably constitute, nominate, appoint and authorize Mr/Ms (name), ... son/daughter/ wife of and presently residing at, who is presently employed with us and holding the position of, as our true and lawful attorney (hereinafter referred to as the "Attorney") to do in our name and on our behalf, all such acts, deeds and things as are necessary or required in connection with or incidental to submission of our Bid for the Project proposed or being developed by BSNL including but not limited to signing and submission of all applications, bids and other documents and writings, participate in Pre-Bids and other conferences and providing information/ responses to BSNL, representing us in all matters before BSNL, signing and execution of all contracts, undertakings consequent to acceptance of our bid, and generally dealing with BSNL in all matters in connection with or relating to or arising out of our bid for the said Project and/ or upon award thereof to us and/or till the entering into of the contract with BSNL.

AND we hereby agree to ratify and confirm and do hereby ratify and confirm all acts, deeds and things done or caused to be done by our said Attorney pursuant to and in exercise of the powers conferred by this Power of Attorney and that all acts, deeds and things done by our said Attorney in exercise of the powers hereby conferred shall and shall always be deemed to have been done by us.

IN WITNESS WHEREOF WE, ..., THE ABOVE NAMED PRINCIPAL HAVE EXECUTED THIS POWER OF ATTORNEY ON THIS DAY OF 2.....

For

(Signature, name, designation and address)

\$ To be submitted in original by the Bidders before within 7 days of Bid Due Date.

Witnesses:

1.

2.

Accepted

..... (Signature)

(Name, Title and Address of the Attorney)

(Notarised)

Notes:

- The mode of execution of the Power of Attorney should be in accordance with the procedure, if any, laid down by the applicable law and the charter documents of the executant(s) and when it is so required, the same should be under common seal affixed in accordance with the required procedure.
- Wherever required, the Bidder should submit for verification the extract of the charter documents and documents such as a board or shareholders' resolution/ power of attorney in favour of the person executing this Power of Attorney for the delegation of power hereunder on behalf of the Bidder.

ANNEXURE-X

**Format of Survey Report
Table-A**

Format of Survey																
S.No.	Block Name with LGD Code	Total No of GP	Main Ring		Child Ring		Existing OFC(FPOI to GP) to be used in Ring (in Km)	Block to FPOI OFC length (to be replaced) in Km	OFC to be laid for Ring Formation (in Km)		Total OFC to be laid (in Km)		Count of SFP Required			Remarks
			Main Ring S.No.	Count of GP	Child Ring S.No.	Count of GP			24 F	48 F	24 F	48 F	10 Km	40 Km	80 Km	
1	2	3	4		5		6	7	8		9=7+8		10			11

Table-B

Infra Structure in GP								
S.No.	Block Name with LGD Code	Name of GP	GP LGD Code	Availability of space Yes/ No	Commercial Electric Supply availability Yes/No	Availability of Power Supply in Hrs.	OLT Available/Not available	Remarks

ANNEXURE-XI

Proof of Delivery/ Service Completion Certificate

Invoice No.:

Date:

Invoice Line-Item No.	BSNL's SAP PO No.	PO line- item No.	Delivery No. (MIGO/ SES No.), if available	Item Description	Quantity	Unit of Measure
1						
2						
3						

I hereby certify that the material/ services provided by me are in accordance with the terms & conditions of the Purchase Order, referred above.

I request you to sign and stamp on the Proof of Delivery/ Service Completion Certificate for the material/ service provided.

(Sign & Stamp)
Authorized Signatory
Company Name

To,
Consignee (Name & Address)
BSNL

(Sign & Stamp)
Authorized Signatory
BSNL

ANNEXURE-XII

Joint Bidding Agreement

(To be executed on Stamp paper of appropriate value)

THIS JOINT BIDDING AGREEMENT is entered into on this the day of 20...

AMONGST

1. Limited, a company incorporated under the Companies Act, 1956/2013 and having its registered office at (hereinafter referred to as the “**First Part**” which expression shall, unless repugnant to the context include its successors and permitted assigns)

AND

2. Limited, a company incorporated under the Companies Act, 1956/2013 and having its registered office at (hereinafter referred to as the “**Second Part**” which expression shall, unless repugnant to the context include its successors and permitted assigns)

AND

3. Limited, a company incorporated under the Companies Act, 1956/2013 and having its registered office at (hereinafter referred to as the “**Third Part**” which expression shall, unless repugnant to the context include its successors and permitted assigns)
(Amendment No. 6.40)

WHEREAS,

(A) Bharat Sanchar Nigam Limited having its corporate office at Janpath Road, HC Mathur Lane, New Delhi, Delhi 110001 represented by it's CMD (hereinafter referred to as the “**BSNL**” which expression shall, unless repugnant to the context or meaning thereof, include its administrators, successors and assigns) has invited applications (the **Bids**) by its Request for Proposal No. dated (the “**RFP**”) for selection of Bidder for Development (Creation, Upgradation and Operation & Maintenance) of BharatNet through Design, Build, Operate and Maintain (DBOM) Model in the Licensed Service Area of State/UT name on Design, Build, Operate and Maintain (DBOM) Model (Package XX) (the “**Package**”).

(B) The Parties are interested in jointly bidding for the package as members of a Consortium and in accordance with the terms and conditions of the RFP document and other Bidding Documents in respect of the package, and It is a necessary condition under the RFP document that the members of the Consortium shall enter into a Joint Bidding Agreement and furnish a copy thereof with the Bid.

NOW IT IS HEREBY AGREED as follows:

1. Definitions and Interpretations

In this Agreement, the capitalised terms shall, unless the context otherwise requires, have the meaning ascribed thereto under the RFP.

2. Consortium

- 2.1 The Parties do hereby irrevocably constitute a consortium (the “**Consortium**”) for the purposes of jointly participating in the Bidding Process for the package.
- 2.2 The Parties hereby undertake to participate in the Bidding Process only through this Consortium and not individually and/ or through any other consortium constituted for this package, either directly or indirectly or through any of their Associates.

3. Covenants

The Parties hereby undertake that in the event the Consortium is declared the selected Bidder and awarded the package, the Lead Member shall enter into a Contract Agreement with the BSNL and for performing all its obligations as the PIA in terms of the Contract Agreement for the package.

4. Role of the Parties

The Parties hereby undertake to perform the roles and responsibilities as described below:

- (a) Party of the First Part shall be the Lead member of the Consortium and shall have the power of attorney from all Parties for conducting all business for and on behalf of the Consortium during the Bidding Process and until the expiry of the Defects Liability Period under and in accordance with the Contract Agreement;
- (b) Party of the Second Part shall be {the Technical Member of the Consortium;
- (c) Party of the Third Part shall be {the Technical Member of the Consortium;

5. Joint and Several Liability

- 5.1 The Parties do hereby undertake to be jointly and severally responsible for all obligations and liabilities relating to the package and in accordance with the terms of the RFP and the Contract Agreement.
- 5.2 The Parties do hereby undertake and declare that the Lead Member shall represent all the members of the Consortium and shall at all times be liable and responsible for discharging the functions and obligations of the Consortium; and that each member of the Consortium shall be bound by any decision, communication, notice, action or inaction of the Lead Member on any matter related to this Agreement and the BSNL shall be entitled to rely upon any such action, decision or communication of the Lead Member. The BSNL shall have the right to release payments solely to the Lead Member and shall not in any manner be responsible or liable for the inter se allocation of payments among members of the Consortium.

6. Representation of the Parties

Each Party represents to the other Parties as of the date of this Agreement that:

- (a) Such Party is duly organised, validly existing and in good standing under the laws of its incorporation and has all requisite power and authority to enter into this Agreement;
- (b) The execution, delivery and performance by such Party of this Agreement has been authorised by all necessary and appropriate corporate or governmental action and a copy of the extract of the charter documents and board resolution/ power of attorney in favour of the person executing this Agreement for the delegation of power and authority to execute this Agreement on behalf of the Consortium Member is annexed to this Agreement, and will not, to the best of its knowledge:
 - i. require any consent or approval not already obtained;
 - ii. violate any Applicable Law presently in effect and having applicability to it;
 - iii. violate the memorandum and articles of association, by-laws or other applicable organisational documents thereof;
 - iv. violate any clearance, permit, concession, grant, license or other governmental authorisation, approval, judgement, order or decree or any mortgage agreement, indenture or any other instrument to which such Party is a party or by which such Party or any of its properties or assets are bound or that is otherwise applicable to such Party; or
 - v. create or impose any liens, mortgages, pledges, claims, security interests, charges or encumbrances or obligations to create a lien, charge, pledge, security interest, encumbrances or mortgage in or on the property of such Party, except for encumbrances that would not, individually or in the aggregate, have a material adverse effect on the financial condition or prospects or business of such Party so as to prevent such Party from fulfilling its obligations under this Agreement;
- (c) this Agreement is the legal and binding obligation of such Party, enforceable in accordance with its terms against it; and
- (d) there is no litigation pending or, to the best of such Party's knowledge, threatened to which it or any of its Associates is a party that presently affects or which would have a material adverse effect on the financial condition or prospects or business of such Party in the fulfilment of its obligations under this Agreement.

8. Termination

This Agreement shall be effective from the date hereof and shall continue in full force and effect until the expiry of the Defects Liability Period under the Contract Agreement, in case the package is awarded to the Consortium. However, in case the Consortium is either not qualified for the package or does not get selected for award of the package, the Agreement will stand terminated in case the Bidder is not qualified or upon return of the Bid Security by the BSNL to the Bidder, as the case may be.

9. Miscellaneous

9.1 This Joint Bidding Agreement shall be governed by laws of India.

9.2 The Parties acknowledge and accept that this Agreement shall not be amended by the Parties without the prior written consent of the BSNL

IN WITNESS WHEREOF THE PARTIES ABOVE NAMED HAVE EXECUTED AND DELIVERED THIS AGREEMENT AS OF THE DATE FIRST ABOVE WRITTEN.

SIGNED, SEALED AND
DELIVERED

SIGNED, SEALED AND
DELIVERED

SIGNED, SEALED AND
DELIVERED

For and on behalf

LEAD MEMBER

SECOND PART

THIRD PART

(Signature)

(Signature)

(Signature)

(Name)

(Name)

(Name)

(Designation)

(Designation)

(Designation)

(Address)

(Address)

(Address)

SIGNED, SEALED AND

Notes:

1. The mode of the execution of the Joint Bidding Agreement should be in accordance with the procedure, if any, laid down by the Applicable Law and the charter documents of the executant(s) and when it is so required, the same should be under common seal affixed in accordance with the required procedure.
2. Each Joint Bidding Agreement should attach a copy of the extract of the charter documents and documents such as resolution / power of attorney in favour of the person executing

this Agreement for the delegation of power and authority to execute this Agreement on behalf of the Consortium Member.

3. For a Joint Bidding Agreement executed and issued overseas, the document shall be legalised by the Indian Embassy and notarized in the jurisdiction where the Power of Attorney has been executed.

ANNEXURE-XIII

List of Abbreviations (Amendment No. 17)

Abbreviation Index

S. No.	Abbreviation	Definition
1	A&N	Andaman & Nicobar Islands
2	AAA	Authentication, Authorization, and Accounting
3	ABD	As Build Diagram
4	ABG	Advance Bank Guarantee
5	ABS/PU	Acrylonitrile Butadiene Styrene / Polyurethane
6	AC	Alternating Current
7	ACL	Access Control List
8	ADSS	All-Dielectric Self-Supporting
9	AES	Advanced Encryption Standard
10	AIO	All in One
11	AMC	Annual Maintenance Contract
12	AMF	Auto Mains Failure
13	AMR	Adaptive Modulation and Coding
14	Annex	Annexure
15	ANSI	American National Standards Institute
16	API	Application Programming Interface
17	APO / A.P.O	Advance Purchase Order
18	ASTM	American Society for Testing and Materials
19	AT	Acceptance Testing
20	ATM	Asynchronous Transfer Mode
21	ATPC	Automatic Transmit Power Control
22	AWO	Advance Work Order
23	BA	Business Area
24	BBU	Baseband Unit
25	BEG	Business Exchange Gateway
26	BG	Bank Guarantee
27	BHQ	Block Head Quarter
28	BIFMA	Business and Institutional Furniture Manufacturers Association
29	BIS	Bureau of Indian Standards
30	BITE	Built-In Test Equipment
31	BJC	Branched Type Joint Closure
32	BMS	Building Management System
33	BNG	Broadband Network Gateway
34	BNU	BharatNet Udyami
35	BoM / BOM	Bill of Materials
36	BoQ / BOQ	Bill of Quantities
37	BSC	Base Station Controller
38	BSNL	Bharat Sanchar Nigam Limited
39	BTS	Base Transceiver Station
40	CA / C.A.	Chartered Accountant
41	CAC	Comfort Air Conditioning

42	CAMC	Comprehensive Annual Maintenance Contract
43	CAN	Controller Area Network
44	CAPEX	Capital Expenditure
45	CC	Cable Chamber
46	CCA	Controller of Certifying Authorities
47	CCU	Communications Control Unit
48	CD-ROM	Compact Disc Read-Only Memory
49	CEO	Chief Executive Officer
50	CGST	Central Goods and Services Tax
51	CIR	Committed Information Rate
52	CISC Architecture	Complex Instruction Set Computer Architecture
53	CLI	Command Line Interface
54	CN	Credit Note
55	COA	Certificate of Authenticity
56	COS	Class of Service
57	CPAN	Converged Packet Access Network
58	CPPP / CPP Portal	Central Public Procurement Portal
59	CPSU	Central Public Sector Undertakings
60	CPU	Central Processing Unit
61	CRM	Customer Relationship Management
62	CTD	Calcutta Telephones District
63	Cu M / Cu Mtr	Cubic Meter
64	DAB	Dispute Adjudication Board
65	DB	Distribution Board or Database (Based on context)
66	dB	Decibel
67	dBi	Decibels Relative to Isotropic
68	DBOM	Design Build Operate and Maintain
69	DC	Direct Current
70	DC (in reference to NOC)	Data center
71	DCN	Data Communication Network
72	DD	Demand Draft
73	DDR4	Double Data Rate Fourth Generation
74	DDRS	Dynamic Data Rate Selection
75	Degree C	Degree Centigrade
76	DG	Diesel Generator
77	DHCP	Dynamic Host Configuration Protocol
78	DiffServ	Differentiated Services
79	DIN	Director Identification Number
80	DMW	Digital Microwave
81	DN	Debit Note
82	DNH & DD	Dadra and Nagar Haveli and Daman and Diu
83	DNS	Domain Name System
84	DOE	Department of Expenditure
85	DoT / DOT	Department of Telecommunications, Government of India
86	DP	Delivery Period
87	DPIIT	Department for Promotion of Industry and Internal Trade
88	DR	Disaster Recovery

89	DRC	Dispute Resolution Committee
90	DSC	Digital Signature Certificates
91	DSCP	Differentiated Services Code Point
92	DSR	Delhi Schedule of Rates
93	dt	Date
94	DTR	Detailed Technical Requirements
95	DVI	Digital Visual Interface
96	DWC	Double Walled Corrugated
97	DWDM	Dense Wavelength-Division Multiplexing
98	DWF	Design Web Format (CAD drawing file format)
99	E.I.	Engineering Instructions
100	E/A	Engine Alternator
101	EHS	Environment, Health and Safety
102	EIR	Excess Information Rate
103	EIRP	Effective Isotropic Radiated Power
104	EMBG	Earnest Money Bank Guarantee
105	EMD	Earnest Money Deposit
106	EMS / eMS	Element Management System
107	EoL	End of Life
108	EPC	Engineering, Procurement and Construction
109	EPF	Employees' Provident Fund
110	EPIC Architecture	Explicitly Parallel Instruction Computing
111	Eqpt.	Equipment
112	ERPS	Ethernet Ring Protection Switching
113	ESIC	Employees' State Insurance Corporation
114	ETA	Equipment Type Approval
115	FAT	Final Acceptance Test
116	FDMS	Fiber Distribution Management System
117	FER	Frame Error Ratio
118	Fig.	Figure
119	ODU	Outdoor Unit
120	FLM	First Line Maintenance
121	FMA	Fiber Maintenance Agency
122	FO	Full Outdoor
123	FOA	Field Operation Assistance
124	FPOI / FPIO	Fiber Point of Interconnect
125	FRAC	Fair Rent Assessment Committee
126	FSC	Forest Stewardship Council
127	Ft.	Feet
128	FTAM	File Transfer, Access, and Management
129	FTB	Fiber Termination Box
130	FTP	File Transfer Protocol
131	FTTH	Fiber to the Home
132	FTTx	Fiber to the X
133	GALV.	Galvanized
134	Gbps	Gigabits per Second
135	GDC	Gravity Die Casting
136	GE ports	Gigabit Ethernet Ports

137	GE SFP	Gigabit Ethernet Small Form-factor Pluggable
138	GFR	General Financial Rules
139	GHz	Giga Hertz
140	GI / G.I	Galvanized Iron
141	GIS	Geographic Information System
142	GOI	Government of India
143	Govt.	Government
144	GP	Gram Panchayat
145	GPON	Gigabit Passive Optical Network
146	GPS	Global Positioning System
147	GR	Generic Requirement
148	GSM (with reference to paper)	Grams per Square Metre
149	GST	Goods and Services Tax
150	GSTIN	Goods and Services Tax Identification Number
151	GSTN	Goods and Service Tax Network
152	GSTR	Goods and Services Tax Return
153	GUI	Graphic User Interface
154	H/W	Hardware
155	HDD	Horizontal Directional Drilling
156	HDD (in reference to IT)	Hard Disk Drive
157	HDMI	High-Definition Multimedia Interface
158	HDPE	High Density Polyethylene
159	HLD	High-level Diagram
160	HOTO	Hand Over Take Over
161	HP	Himachal Pradesh
162	HQ	Headquarters
163	HSL	High-Speed Link
164	HSN	Harmonized System of Nomenclature
165	HT	High Tension
166	HT Steel	High Tensile Steel
167	HTTP / HTTPS	Hypertext Transfer Protocol / (Secure)
168	Hz	Hertz
169	I&C	Installation & Commissioning
170	I.e.	Id est
171	I/O	Input/Output
172	IA	Infrastructure Assessment
173	IE	Independent Engineer
174	IEC	International Electrotechnical Commission
175	IEEE	Institution of Electrical and Electronics Engineers
176	IEM	Independent External Monitor
177	IFSC	Indian Financial System Code
178	IGST	Integrated Goods and Services Tax
179	INR	Indian Rupees
180	IP-1	Infrastructure Provider Category 1
181	IPAM	IP Address Management
182	IPC	Indian Penal code

183	IP-MPLS	Internet Protocol Multi-Protocol Label Switching
184	IPP /IP prec	IP Precedence
185	IPS	Intrusion Prevention System
186	IPSEC	IP Security
187	IPTV	Internet Protocol Television
188	IPv4	Internet Protocol version 4
189	IPv6	Internet Protocol version 6
190	IRDA	Insurance Regulatory and Development Authority
191	ISI	Indian Standards Institute
192	ISO	International Organization for Standardization
193	ISP	Internet Service Provider
194	IT	Information Technology
195	ITU	International Telecommunication Union
196	ITU-R	ITU - Radiocommunication Sector
197	ITU-T	ITU - Telecommunication Standardization Sector
198	J&K	Jammu & Kashmir
199	JPG	Joint Photographic Experts Group (Image file format)
200	Kg	Kilogram
201	Kms	Kilometers
202	KMZ/KML	Keyhole Markup Language Zipped / Keyhole Markup Language
203	KPI	Key Performance Indicator
204	KQAM	Kilo Quadrature Amplitude Modulation
205	KVA	Kilo-Volt-Amperes
206	KW	Kilowatt
207	L1 / L-1	Selected Bidder
208	L2 / L-2	Qualified Bidder who has submitted the 2nd lowest Financial Bid
209	L3 / L-3	Qualified Bidder who has submitted the 3rd lowest Financial Bid
210	LACP	Link Aggregation Control Protocol
211	LAG	Link Aggregation
212	LAN	Local Area Network
213	LC	Local Content
214	LC Type Connector	Lucent Connector
215	LCD	Liquid Crystal Display
216	LCT	Local Craft Terminal
217	LD	Liquidated Damages
218	LED	Light Emitting Diode
219	LGD	Local Government Directory
220	LLD	Low-level Diagram
221	LLDP	Link Layer Discovery Protocol
222	LMC	Last Mile Connectivity
223	LOA	Letter of Award
224	LOS	Line of Sight
225	LSA	License Service Areas
226	LSL	Local Switching Layer
227	LSP	Label Switched Paths

228	LT	Low Tension
229	Ltd.	Limited
230	LTE	Long Term Evolution
231	M/W	Microwave
232	MAB	MAC Authentication Bypass
233	MAC	Media Access Control
234	MAF	Manufacturers Authorizations Form
235	MARR	Microwave Antenna Radio Relay
236	MASS	Metal Free Aerial Self Supporting Cable
237	MB	Measurement Book
238	Mbps	Megabits Per Second
239	MCB	Miniature Circuit Breaker
240	MCLR	Marginal Cost of Funds based Lending Rate
241	MD	Managing Director
242	MDC	Mini Data Center
243	MDF	Medium-Density Fiberboard
244	MH	Man-holes
245	MHz / MHZ	Mega Hertz
246	MICR	Magnetic Ink Character Recognition
247	MIGO	Material Incoming Goods
248	MIS	Management Information System
249	mm	Millimetre
250	MOF	Ministry of Finance
251	MOU	Memorandum of Understanding
252	MP	Madhya Pradesh
253	MP4	MPEG-4 Advanced Video Coding
254	MPLS	Multi-Protocol Label Switching
255	MPLS EXP	Multi-Protocol Label Switching Experimental Bits
256	MPPT	Maximum Power Point Tracking
257	MS Pole	Mild Steel Pole
258	MS Weld Mesh	Mild Steel Weld Mesh
259	MSA	Master Service Agreement
260	MSC	Mobile Switching Center
261	MSE	Micro & Small Enterprise
262	MSME	Micro, Small, & Medium Enterprise
263	MSO	Multiple System Operator
264	MTCTE	Mandatory Testing and Certification of Telecom Equipment
265	MTTR	Mean Time to Repair
266	NABL	National Accreditation Board for Testing & Calibration Laboratories
267	NB / N.B.	Nota Bene (Important Point)
268	NDPP	Network Device Protection Profile
269	NE/FT	Network Engineer / Field Technician
270	NEFT	National Electronic Funds Transfer
271	NER / NE	North Eastern Region
272	NESC	National Electric Safety Code
273	NGFW	Next-Generation Firewall
274	NH	National Highway

275	NIC	National Informatics Centre
276	NIPS	Network intrusion prevention system
277	NIT	Notice Inviting Tender
278	NKN	National Knowledge Network
279	nm	Nanometre
280	NMS	Network Management Station
281	NNI	Network-to-Network Interface
282	Ns	Nanosecond
283	NSCS	National Security Council Secretariat
284	NTP	Network Time Protocol
285	NVR	Network Video Recorder
286	O&M	Operations and Maintenance
287	OAM	Operations, Administration, and Maintenance
288	OCV	Open Circuit Voltage
289	OEC	Outside Expert Committee
290	OEM	Original Equipment Manufacturer
291	OF / O.F.	Optical Fiber
292	OFB	OFC Blowing
293	OFC	Optical Fiber Cable
294	OH	Overhead
295	OLT	Optical Line Terminal
296	ONT	Optical Network Terminal
297	OPEX	Operating Expenses or Expenditure
298	OPGW	Optical Ground Wire
299	OPPC	Optical Phase Conductor
300	OS	Operating System
301	OSHA	Occupational Safety and Health Act
302	OSS	Operations Support Systems
303	OTD / OT Ducting	Open Trenching Ducting
304	OTDR	Optical Time Domain Reflectometer
305	OTN	Optical Transport Network
306	P2P tests	Peer-to-Peer
307	PAC	Precision Air Conditioning
308	PAN	Permanent Account Number
309	PAT	Preliminary Acceptance Testing
310	PBG	Performance Bank Guarantee
311	PBX	Private Branch Exchange
312	PC	Personal Computer
313	PC Act	Prevention of Corruption Act
314	PCC	Plain Cement Concrete
315	PDF	Portable Document Format
316	PG	Performance Guarantee
317	PGCIL	Power Grid Corporation of India Limited
318	PIA	Project Implementation Agency
319	PIC	Passive Integrated Circuit
320	PLB	Permanently Lubricated
321	PMA	Planned Maintenance Agency
322	PMI	Preference to Make in India

323	PMON	Performance Monitoring
324	PO / P.O.	Purchase Order
325	PO Value	Total Project Cost
326	PoA / POA	Power of Attorney
327	PoE	Power over Ethernet
328	POM	Point of Measurement
329	PON	Passive Optical Network
330	PoP	Point of Presence
331	PP Rope	Polypropylene Rope
332	PSU	Public Sector Undertaking
333	PTN	Packet Transport Network
334	PTP	Precision Time Protocol
335	Pvt.	Private
336	QA	Quality Assurance
337	QAM	Quadrature Amplitude Modulation
338	QoS	Quality of Service
339	QPSK	Quadrature Phase Shift Keying
340	R&A Act	Regulation and Abolition Act
341	RAID	Redundant Array of Independent Disks
342	RAM	Random Access Memory
343	RAR	Roshal Archive (Compressed file format)
344	RBI	Reserve Bank of India
345	RCC / R.C.C	Reinforced Cement Concrete
346	REST	Representational State Transfer
347	RFID	Radio-Frequency Identification
348	RFMS	Remote Fiber Monitoring System
349	RFP	Request for Proposal
350	RFTMS	Remote Fiber Testing & Monitoring System
351	RFTS	Remote Fiber Test System
352	RI	Route Indicator
353	RISC Architecture	Reduced Instruction Set Computer Architecture
354	RKM	Route Kilometre
355	RM	Route Markers
356	RMON	Remote Monitoring
357	ROHS	Restriction of Hazardous Substances
358	ROW	Right of Way
359	RPM	Rotation per minute
360	RTGS	Real-time gross settlement
361	RTU	Remote Test Units
362	RU	Rack Unit
363	S.No.	Serial Number
364	S/W	Software
365	SAC	Services Accounting Code
366	SAN	Storage Area Network
367	SAS	Serial-Attached SCSI (Small Computer System Interface)
368	SC Type Connector	Subscriber Connector
369	SCP	Secure Copy Protocol
370	SD	Security Deposit

371	SES	Service Entry Sheet
372	SFP	Small Form-factor Pluggable
373	SFTP	SSH File Transfer Protocol
374	SGST	State Goods and Services Tax
375	SHP	Shape file
376	SIA	Secretariat for Industrial Approval
377	SJC	Straight Through Joint Closure
378	SLA	Service Level Agreement
379	SMMP	May be referred as SNMP (Simple Network Management Protocol)
380	SMPP Port	Short Message Peer-to-Peer Protocol
381	SMPS	Switched-mode power supply
382	SMS	Short Message Service
383	SNMP	Simple Network Management Protocol
384	SNOC / State NoC	State Network Operations Center
385	SOP	Standard Operating Procedures
386	SOR / SoR	Schedule of Requirement
387	SP	Service Provider
388	SPV	Special Purpose Vehicle
389	SPV Mounting Structure	Solar Photovoltaic Mounting Structure
390	Sq.	Square
391	SRL	Structural Reinforcement Layer
392	SSD	Solid State Drive
393	SSH	Secure Shell
394	SSL	Secure Sockets Layer
395	SVD	Spiral Vibration Damper
396	SWAN	State-Wide Area Network
397	SWG	Standard Wire Gauge
398	Sync E	Synchronous Ethernet
399	T&L	Trenching & Laying
400	TAC	Type Approval Certificate
401	TAN	Tax Deduction and Collection Account Number
402	TCP	Transmission Control Protocol
403	TCS	Tax Collected at Source
404	TDD	Time Division Duplexing
405	TDS	Tax Deducted at Source
406	TE / T.E.	Tender Enquiry
407	TEC	Telecom Engineering Center
408	TFT Screen	Thin Film Transistor Screen
409	TFTP	Trivial File Transfer Protocol
410	TOE	Tender Opening Event
411	TOS	Type of Service
412	TPA	Third Party Auditor
413	TRAI	Telecom Regulatory Authority of India
414	TSEC	Technical Specification Evaluation Centre
415	TSP	Telecom Service Provider
416	Tx / Rx	Transmission / Reception

417	UBR	Unlicensed Band Radio
418	UG / U/G	Underground
419	UMTS	Universal Mobile Telecommunications System
420	UNMS	Unified Network Management System
421	UP(E) / UPE	Uttar Pradesh East
422	UP(W) /UPW	Uttar Pradesh West
423	UPS	Uninterruptible Power Supply
424	URC	Udyam Registration Certificate
425	URL	Uniform Resource Locator
426	USB	Universal Serial Bus
427	USOF	Universal Service Obligation Fund
428	UT	Union Territory
429	UTM	Unified Threat Management
430	UTR Number	Unique Transaction Reference Number
431	V	Volt
432	VGA	Video Graphics Array
433	VLAN	virtual local area network
434	VPLS	Virtual Private LAN Service
435	VPN	Virtual Private Network
436	VRF	Virtual Routing and Forwarding
437	W	Watt
438	w.r.t	with respect to
439	WDM	Wavelength division multiplexing
440	WGS	World Geodetic System
441	WO / W.O.	Work Order
442	WPC	Wireless Planning and Coordination Wing
443	XLS	Excel Spreadsheet
444	XPIC	Cross Polarization Interference Cancellation
445	μs	Microsecond
446	2G / 3G/ 4G/ 5G	Second / Third / Fourth / Fifth Generation of Wireless Network

ANNEXURE-XIV

Format for essential information for applying to NSCS (Trusted Telecom Portal) (Amendment No. 6, Appendix-3)

1	Project Name	:			
2	Type of Project	:	1. New Roll Out 2. Expansion 3. Upgrade		
3	Are your procurements from India registered vendor only for this project?	:	☐ Yes ☐ No		
4	Do you intend to procure from non-India registered vendor for this project?	:	☐ Yes ☐ No		
5	Remarks on the Project Criticality, if any,				
6	Details of Equipment:				
	Asset (one to be selected)	Equipment Name	Company Name/Vendor	Product Name	Model Name
	a) Support System b) Transport		Name of Contact person: E-mail ID: Mobile No.		