

**Agreement**

**For**

**Support from USO Fund**

**For**

**Creation, Operation and Maintenance of the National Optical  
Fibre Network (NOFN) for Provision of Broadband Connectivity  
to the Panchayats to be executed by  
Bharat Broadband Network Limited BBNL**

**Under**

**Universal Services Obligation Fund  
The Indian Telegraph (Amendment) Rules, 2012**

**No. 30-166/2014-BB-USOF Dated 25/02/2014**

**TOTAL PAGES – 45**

**GOVERNMENT OF INDIA  
MINISTRY OF COMMUNICATIONS & IT  
DEPARTMENT OF TELECOMMUNICATIONS  
OFFICE OF THE ADMINISTRATOR (USOF)  
20, ASHOKA ROAD, NEW DELHI-110001, INDIA**

*RJ*

*See page 5*

# SECTION-I AGREEMENT

No. 30-166/2014-BB-USOF  
Government of India  
Department of Telecommunications  
Office of the Administrator USO Fund  
20, Ashoka Road, Sanchar Bhawan, New Delhi – 110 001

## AGREEMENT

The Agreement is made and entered into on the 25<sup>th</sup> day of February, 2014.

### Between

The President of India, acting through the Administrator, Universal Service Obligation Fund (USOF) who for the purpose of this Agreement is being represented by Director (Broadband), USOF, Shri Rupendra Kumar, Department of Telecommunications under Government of India and having its office at 2nd Floor, Sanchar Bhawan, 20 Ashoka Road, New Delhi – 110001, (hereinafter referred to as the "Administrator", which expression, unless repugnant to the context or meaning thereof, shall include its successors, administrators or assignees;) of the First Part

### AND

M/s Bharat Broadband Network Limited, a Company registered under the Companies Act 1956, having its registered office at 3<sup>rd</sup> Floor, C-DOT Campus, Chhatarpur, New Delhi-110030, acting through Ms. Deepika Khosla, the authorized signatory, (hereinafter called "BBNL" which expression, unless repugnant to the context or meaning thereof, shall include its successors, administrators or permitted assignees) of the Second Part.

**Whereas**, the Government of India has approved on 25.10.2011 the setting up of National Optical Fibre Network (NOFN) for providing broadband connectivity to approximately 2,50,000 Gram Panchayats in India in two years' time

**Whereas**, the Government of India has decided that creation, operation and maintenance of NOFN shall be funded through the Universal Service Obligation Fund (USOF)

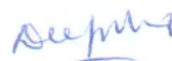
**Whereas**, M/s Bharat Broadband Network Limited has been set up as a Special Purpose Vehicle (SPV) for creation and implementation of NOFN, and incorporated under the Companies Act, 1956

### NOW THIS AGREEMENT WITNESSETH AS FOLLOWS:

In consideration of the mutual covenants set out in this Agreement, the parties hereby agree as follows:

1.1 This Agreement is divided into seven Sections. Apart from the present Section-I, other Sections are as under:

- II General Conditions
- III Operating Conditions



- IV Technical Conditions
- V Financial Conditions
- VI Commercial Conditions
- VII Definitions

All the Sections and Annexures together form the Agreement.

1.2. **No Partnership** – Nothing in this Agreement shall be construed to constitute a partnership or agency between the Parties and BBNL shall not make any assurance, promise or covenant nor shall hold itself out as competent to do so, on behalf of the Administrator nor shall pledge the credit of the Administrator for any transaction in relation to this Agreement.

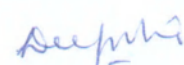
1.3. **No Employment** – Nothing in this Agreement shall constitute an offer or assurance of employment of any nature whatsoever to BBNL or any person employed by or under him for this Agreement.

1.4. **Indemnity**–BBNL shall indemnify and at all times keep the Administrator indemnified and harmless against any direct loss to it or any claims by any third person, for any personal injury to anybody or loss to property, movable or immovable, caused by or attributable to any act or omission of BBNL or any of his officer, employee, agent or professional etc. while performing or purporting to perform this Agreement.

1.5. **Waiver** – Neither the failure of either Party to insist on any occasion upon the performance of the provisions of this Agreement nor time or other indulgence granted by a Party to the other Party shall be treated or deemed as waiver of such breach or acceptance of any variation or the relinquishment of any such right thereunder. Waiver by either Party of any default by the other Party in the observance or performance of any provision of this Agreement shall not operate or be construed as a waiver of any other or subsequent default or of other provisions of or obligations under this Agreement nor shall affect the validity or enforceability of this Agreement in any manner.

1.6. **Severability of Terms** – If for any reason whatsoever, any provision of this Agreement is or becomes invalid, illegal or unenforceable or is declared by any court of competent jurisdiction or any other instrumentality to be invalid, illegal or unenforceable, the validity, legality or enforceability of the remaining provisions shall not be affected in any manner.

IN WITNESS WHEREOF, the parties hereto set their hand on the Agreement through their duly authorized representatives, at New Delhi on the day, month & year first above written.





Signed for and on behalf of President of India.

*R*  
25/2/14

By Shri Rupendra Kumar,  
Director (Broadband)  
Universal Service Obligation Fund,  
Department of Telecommunication

रुपेन्द्र कुमार/RUPENDRA  
निदेशक, सार्वभौमिक सेवा बाधित्व  
Director, Universal Service Obligation Fund  
दूरसंचार विभाग, भारत सरकार  
Deptt. of Telecom, Govt. of India  
नई दिल्ली/New Delhi

Signed on behalf of Bharat Broadband Network Limited by Ms. Deepika Khosla, authorized signatory executed in accordance with the decision taken in BBNL's 22<sup>nd</sup> board meeting dated 13.06.2013.

*Deepika*  
25.02.2014


By Ms. Deepika Khosla  
CGM (Planning)  
Bharat Broadband Network Limited

दीपिका खोसला/DEEPIKA  
मुख्य महाप्रबन्धक (योजना)/Chief  
भारत ब्रोडबैंड नेटवर्क लि./Bharat  
नई दिल्ली-११००३०/New Delhi

In the presence of:

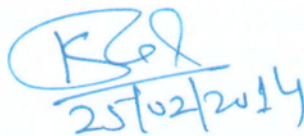
Witnesses:

(1)

Signature: 

Bharat Broadband Network Limited

(2)

Signature: 

Universal Service Obligation Fund,  
Department of Telecommunication  
Sanchar Bhawan, Ashoka Road, New Delhi – 110001

(कमल भगत)  
(KAMAL BHAGAT)  
निदेशक, सार्वभौमिक सेवा बाधित्व निधि-1  
Director, Universal Service Obligation Fund-1  
दूरसंचार विभाग, भारत सरकार  
Deptt. of Telecom, Govt. of India  
नई दिल्ली/New Delhi



# SECTION-II

## GENERAL CONDITIONS

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2.0 This Agreement, signed by BBNL with the Administrator USOF, shall be subject to the terms and conditions (including Transfer or Assignment or Franchising) of the Registration/Certificate/License conditions for Infrastructure Providers Category-II (IP-II)/Basic Services/Cellular Mobile Telephone Services (CMTS)/Unified Access Service License (UASL)/National Long Distance License (NLD) issued by DoT and any future evolution of licenses from time to time, as applicable.

### 2.1 Scope of the Agreement

2.1.1 BBNL shall set up, provide (i.e. procure, install, test, commission), operate, maintain and manage OFC transport network and associated infrastructure required for effective provision of at least 100 Mbps bandwidth on sharing basis in all the estimated 2,50,000 Gram Panchayats (GPs) of India. The network and associated infrastructure so created shall be called the National Optical Fibre Network (NOFN). The assets created under this project with funding from USOF shall be owned by USOF/ Government of India.

2.1.2 BBNL shall be solely responsible for creation, operation and maintenance of NOFN for provision of bandwidth to all the estimated 2,50,000 GPs, covering both existing routes/sections utilized and new sections. This responsibility shall be on a continuous basis and will extend to all aspects of the scheme viz., roll-out and commissioning, leasing, operation and maintenance, providing bandwidth on sharing basis as prescribed in this Agreement.

2.1.3 USOF shall provide subsidy as per Financial Conditions of the Agreement (Section-V)

### 2.2 Duration of Agreement

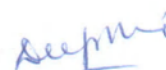
The Agreement shall be valid for a total period of **five years** from 25.02.2012 and thereafter BBNL becomes self-sustainable as enshrined in the Cabinet Note unless revoked earlier for reasons as specified elsewhere in the document.

### 2.3 Extension of Agreement

The Administrator may extend, if deemed expedient, the validity of Agreement for such period and on such terms as may be mutually agreed. The decision of the Administrator shall be final in this regard.

### 2.4 Modifications in the Terms and Conditions of Agreement

2.4.1 The Administrator reserves the right to modify at any time the terms and conditions of the Agreement, if in the opinion of the Administrator it is necessary or expedient to do so in public interest or in the interest of the security of the State or for the proper conduct of the service. The decision of the Administrator shall be final in this regard.



## 2.5 Requirement to furnish information

BBNL shall furnish to the Administrator, on demand, such documents, accounts, estimates, returns, reports or other information as may be called for by the Administrator.

## 2.6 Suspensions, Revocation or Termination of Agreement

2.6.1 The Administrator reserves the right to suspend the operation of the Agreement in whole or in part, at any time, if, in the opinion of the Administrator it is necessary or expedient to do so in public interest or in the interest of the security of the State. However, the Administrator shall not be responsible for any damage, claim or loss caused or arising out of such action. The suspension of the Agreement will not be a cause or ground for extension of the period of the Agreement and suspension period will be counted towards period spent under the validity of Agreement.

2.6.2 The Administrator reserves the right to revoke the Agreement at any time in public interest by giving a notice of 60 days counted from the date of issue of such notice.

2.6.3 Wherever considered appropriate, Administrator may conduct an inquiry to determine whether there has been any breach in compliance of the terms and conditions of the Agreement by BBNL and during such inquiry BBNL shall extend all reasonable facilities and shall endeavour to remove the hindrance of every type.

2.6.4 It shall be the responsibility of BBNL to maintain the Quality of Service as described in this Agreement, during the period of notice for termination of Agreement.

## 2.7 Disputes Settlement

2.7.1 In the event of any dispute or difference between the parties hereto, such disputes or differences shall be resolved amicably by mutual consultation. If such resolution is not possible, then the unresolved dispute or difference shall be referred to arbitration of the sole arbitrator to be appointed by the Secretary, Department of Telecommunications on the recommendation of the Secretary, Department of Legal Affairs ("Law Secretary"), Government of India. The provisions of **Arbitration and Conciliation Act, 1996 (No. 26 of 1996)** shall not be applicable to the arbitration under this clause. The venue of such arbitration shall be at Delhi or any other place, as may be decided by the arbitrator. The language of arbitration proceedings shall be English. The arbitrator shall make a reasoned award (the "Award"), which shall be final and binding on all parties. The expenses of the arbitrator as determined by the arbitrator shall be shared equally by the party to the agreement. However, expenses incurred by each party in connection with preparation, presentation shall be borne by the party itself.

2.7.2 Pending the submission of and/or decision on a dispute, difference or claim or until the arbitral award is published, the Parties shall continue to perform all of their obligations under this Agreement without prejudice to a final adjustment in accordance with such award.

2.7.3 Subject to the above provisions, the courts at Delhi shall have exclusive jurisdiction.

## **2.8 Force-Majeure**

2.8.1 If at any time, during the continuance of the Agreement, the performance in whole or in part, by either party, of any obligation under this is prevented or delayed, by reason of war, or hostility, acts of the public enemy, terrorism, civic commotion, sabotage, Act of State or direction from Statutory Authority, explosion, epidemic, quarantine restriction, strikes and lockouts (not limited to the establishments or facilities of BBNL), fire, floods, natural calamities or any act of GOD (hereinafter referred to as EVENT), provided notice of happenings of any such EVENT is given by the affected party to the other, within 10 Calendar days from the date of occurrence thereof, neither party shall, by reason of such event, be entitled to terminate the Agreement, nor shall either party have any such claims for damages against the other, in respect of such non-performance or delay in performance. Provided SERVICE under the Agreement shall be resumed as soon as practicable, after such EVENT comes to an end or ceases to exist.

2.8.2 The decision of the Administrator as to whether the service may be so resumed (and the time frame within which the service may be resumed) or not, shall be final, binding and conclusive.

2.8.3 It is understood and declared that any strike, lock out or labour dispute or unrest only in the undertaking of BBNL or the reasonable harshness of the nature due to the terrain or difficulties arising from remoteness of the area will not be treated as an EVENT.

## **2.9 Set off Clause**

2.9.1 In the event any sum of money or claim becomes recoverable from or payable by BBNL to the Administrator either against the Agreement or otherwise in any manner, such money or claim can be (without restricting any right of set off for counter claim given or employed by law) deducted or adjusted against any amount or sum of money then due or which at any time thereafter may become due to BBNL under this Agreement or any other Agreement or Contract between the Administrator/Department of Telecommunications, Govt. of India and BBNL.

2.9.2 The aforesaid sum of money payable to BBNL shall include any valuable security, which can be converted into money.

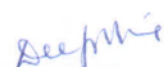
2.9.3 After exercising the right of set off, a notice shall always be given immediately by the Administrator to BBNL.

## **2.10 Other Obligations**

2.10.1 BBNL shall be bound by the terms and conditions of the Agreement as well as by such orders/directions/regulations/ guidelines issued by TRAI from time to time and instructions as issued by the Administrator.

2.10.2 BBNL will abide by the terms & conditions of the tripartite MoU signed with various State Governments/UTs and coordinate with the State Governments/ UTs.

2.10.3 BBNL represents and warrants to the Administrator that





- a) It is duly organized and validly incorporated under the laws of India, and has full power and authority to execute and perform its obligations under this Agreement;
- b) It has taken all necessary corporate and other actions under applicable laws to authorize the execution and delivery of this Agreement and to validly exercise its rights and perform its obligations under this Agreement;
- c) This Agreement constitutes its legally valid and binding obligation, enforceable against it in accordance with the terms hereof;

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*Accepted*

# Section-III

## Operating Conditions

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3.0. The terms and conditions of the, NLDO or BSO or CMTS or UASL or UL License Agreement and any future evolution of licenses from time to time, as applicable, shall prevail and shall be binding *mutatis mutandis*. The same shall also be applicable in case of migration to or award of new license in lieu of the NLDO/BSO/ CMTS/ UASL/UL license.

### 3.1. PROVISION OF BANDWIDTH ON LEASE

3.1.1. BBNL shall make all associated arrangements regarding finalization of the terms and conditions for providing bandwidth on lease to Service Providers, accepting and processing their applications, collection of deposits, bandwidth provisioning, billing/charging and payment realization, booking and handling the complaints and setting up of redressal mechanisms in consonance with interconnect regulatory norms. It will make provisions for hassle free standard based interconnect to facilitate non-discriminatory access by all operators under licensing framework.

3.1.2. During the validity of the Agreement, BBNL shall proactively inform and place the above details, including the capacity available, the terms and the leasing tariffs in the public domain, including on the web-site.

3.1.3. BBNL shall be solely responsible for provision and operation of necessary equipment and systems, treatment of customer complaints, collection of lease charges and issue of receipts thereof, attending to claims and damages arising out of its operations.

### 3.2. NETWORK OPERATIONS RECORD

3.2.1. BBNL shall keep a record of the OFC transport network created under the scheme, along with the equipment details and OFC connectivity of nodes, network bandwidth created and provided to various Service Providers, types of traffic transported from different nodes and also maintain Service Provider-wise and node-wise faults and rectification reports of the OFC system and associated infrastructure and other related details in respect of the service rendered, which will be produced before the Administrator or TRAI, as and when and in whatever form desired.

3.2.2. It is desired that BBNL will create a GIS mapped record of the OFC transport network augmented and created under the scheme.

3.2.3. **Utilisation of NOFN:** BBNL shall provide the commissioning report for the Gram Panchayats on monthly basis as per Appendix (I) and Appendix (II) to ANNEXURE I, and the details of the bandwidth provided GP wise, on quarterly basis as per Appendix (III) to ANNEXURE I. This will be certified in the prescribed Performa by a competent and responsible representative duly authorized by BBNL. BBNL shall proactively

coordinate with service providers for effective utilisation of NOFN and shall facilitate them in off-take of bandwidth. BBNL shall provide the progress report of the project on monthly as per Appendix (IV) to Annexure-I.

### 3.3. HANDLING SERVICE PROVIDER'S COMPLAINTS

3.3.1. Proper arrangement such as web based portal, call centre etc. should be made by BBNL for reporting/ booking service related complaints. BBNL shall be responsive to the complaints lodged by the Service Providers and shall rectify the deficiencies and maintain the history sheets for each installation, statistics and analysis on the overall maintenance status.

### 3.4. RIGHT TO INSPECT, TEST AND MONITOR

3.4.1. The Administrator or his authorized representative shall have the right to inspect the created OFC network, the associated nodes and also the equipment installed for providing the network bandwidth by BBNL in particular, but not limited to, physical inspection of terminating interfaces, distribution frames, etc. and conduct the service monitoring and performance tests as per the Section: IV, TECHNICAL CONDITIONS. BBNL will provide the necessary facilities at its own cost for monitoring of the system, as required by the Administrator or its authorized representative(s). The Inspection will ordinarily be carried out after reasonable notice except in circumstances where giving such a notice will defeat the very purpose of the inspection.

3.4.2. Wherever considered appropriate, Administrator may conduct any inquiry, either suo-moto or on a complaint, to determine whether there has been any breach in compliance of terms & conditions of the Agreement by BBNL, and during such inquiry, BBNL shall extend all reasonable facilities without any hindrance.

### 3.5. ROLL OUT

3.5.1. BBNL shall have to commission OFC network in all Gram Panchayats of India.

3.5.2. BBNL shall submit an indicative roll out plan for each State within two months' period from the date of signing of the Agreement, which will be followed by a PERT chart for the monitoring of the scheme.

3.5.3. The Rollout period may be extended, if deemed fit, by the Administrator under exceptional circumstances.

3.5.4. BBNL shall provide a statement giving, details of the nodes, where the OFC network has been commissioned on monthly basis as per Appendix- I to annexure I and the bandwidth provided from the nodes on quarterly basis during the quarter respectively and cumulative as on last day of quarter.



### 3.6. COMMISSIONING THE OFC TRANSPORT NETWORK

- 3.6.1. BBNL should conduct a detailed site survey, immediately after award of contract, at all existing/new proposed sites, including all the Gram Panchayats, and new and existing routes, to assess and provision for land / building / shelter / space requirements, deciding of new OFC routes, inlet arrangements for OFC into buildings/ equipment rooms/ shelters, available and additional air-conditioning, requirements for upgrading the existing DC power supplies / storage batteries or installing new ones, green energy solutions and electricity connections and all other aspects required for complete site and route engineering. Administrator USOF will be kept informed of the survey and the results obtained as also the engineering plans developed accordingly for each of the Panchayats (District-wise) for monitoring the progress on monthly basis.
- 3.6.2. BBNL shall be fully responsible for Network **Design & Engineering** of the OFC network from Blocks to Gram Panchayats. It includes detailed link engineering, based on optical fibre characteristics and optical transmit power and optical receiver threshold levels of the equipments to be used. It will also lay down the procedures for smooth changeover of existing traffic on to the higher capacity replaced equipment and assessing the requirement of adequate space and other facilities such as power supply, earthing, etc. for terminating the service providers equipment, desiring to take the bandwidth from BBNL on lease. BBNL will do a detailed dimensioning and quantification of items, D.C. power supply up-gradation at existing locations, including power plant equipment and storage batteries, A.C. power supply up-gradation at existing locations.
- 3.6.3. BBNL has the primary responsibility to integrate both new and existing routes/networks and carry out inspection and testing of supplies and services at all stages viz., FAT (Factory Acceptance Testing), verification of supplies, local testing of system and of A.C./D.C. power supplies at the equipment Node locations, testing of alarms and status display, loop testing, commissioning tests, tests on network management system and trial run including simulated/active traffic loading.
- 3.6.4. On completion of NOFN, BBNL shall self-certify and declare the OFC network successfully commissioned in the district, in all respect, as specified in **Section:IV TECHNICAL CONDITIONS**, inter-alia, the installation, testing and commissioning of the OF cable connecting all the nodes. OF Equipments of appropriate transport technology to create minimum 100 Mbps bandwidth, meeting all the deliverables, and BBNL is ready for sharing network bandwidth with Service Providers as per the terms of the Agreement. BBNL shall provide details in the **Appendix (I) to Annexure I**.

### 3.7. VALIDATION AND CERTIFICATION OF THE COMMISSIONED OFC TRANSPORT NETWORK

- 3.7.1. On completion of the roll out, the Designated Monitoring Agency (DMA), to be appointed by Administrator, shall carry out inspection and testing of the created OFC transport network and network bandwidth as per prescribed test schedules for their conformity to the specifications. DMA will conduct the inspection and testing and issue the certification as per **Appendix (V) to Annexure I**, as applicable. BBNL shall provide all reasonable facilities and assistance like testing instruments and other test gadgets, including access to drawings and other details to DMA at no cost to the Administrator.

3.7.2. BBNL shall be fully responsible for making the system work. In case, at the time of validation by DMA, it is established that the technology/system deployed fails to meet the specified requirements or is unable to effectively extend the transport services to rural/remote areas through the node equipment, BBNL shall replace the entire equipment at own cost, wherever deployed.

3.8. During the validity of the Agreement, BBNL shall carry out software and hardware upgrades, add additional interface modules and reconfigure, as per requirement and demand for the provisioning of transport services to rural/remote areas. It will be ensured that all performance parameters of the network and QOS parameters are maintained.

### 3.9. PERFORMANCE LEVEL

3.9.1. BBNL shall ensure that the OFC transport network performance level meets the TRAI Quality of Service parameters defined for OFC transport network. The OFC network availability at each node shall be better than or equal to 95%.

3.9.2. BBNL will work under the licensing framework and all the conditions viz. confidentiality of information, security conditions, prohibition of certain activities etc. of the applicable license shall be binding *mutatis mutandis*.

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# Section-IV

## Technical Conditions

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- 4.0 BBNL shall work within the framework of the Technical conditions of the BSO/ CMTS/ UASL /NLDO/ UL licence, as the case may be.
- 4.1 The Technical requirements of the scheme described in this section shall supplement all other terms and conditions of the Agreement.
- 4.2 DETAILS OF THE SCHEME
- 4.2.1 The technical specifications of the scheme for creation and management of NOFN between Block and Gram Panchayats are explained in the forthcoming clauses.
- 4.3 OUTLINE OF THE SCHEME
- 4.3.1 BBNL shall create and manage NOFN connecting all the Gram Panchayats from respective Blocks so that each Panchayat is having a minimum bandwidth of 100 Mbps by utilising existing fibres of BSNL, Railtel and PGCIL (and any other desirous private telecom operator) and laying incremental fibre wherever necessary and installing OF equipment of appropriate transport technology and associated electrical and battery connections at the connected or new unconnected nodes on the existing or new installed OF cable in cost effective manner. This network will meet the futuristic requirement in terms of capacity and technology for various applications and services. The created high-capacity network bandwidth in the OFC transport network shall be provided to eligible service providers on commercial terms and in **non-discriminatory manner** for providing telecom services to rural/remote areas.
- 4.4 TECHNOLOGY NEUTRAL APPROACH
- 4.4.1 BBNL shall select the best appropriate technology, compliant with relevant ITU-T/IEEE/IETF/IEC/TEC standards, as applicable, to meet the deliverables of the scheme. In no case, the technology used should be proprietary one. The DMA may call for such documentary evidences ensuring the compliance with the prescribed standards, as applicable, from accredited test labs/designated agencies at the time of verification and testing.
- 4.4.2 The selected technology should be capable of interfacing with existing national long distance and Inter-DHQ networks for transport of all types of digital traffic with various data rates and formats and/or protocols from source to destination location as per the requirement and demand. The deployed equipment should be interoperable and meet open standards both on the optical line and drop-insert/ingress-outgress ports side. It should be modular and support expansion in bandwidth capacity on interface side as well as optical line side through add-on hardware and/or software.
- 4.4.3 The desired technical specifications for meeting the respective features and performances such as system timing, synchronization and power supply by the



deployed OF equipment and associated interfaces, OF cable and associated accessories, Network management system for monitoring and provisioning, DC power supply, power plant, battery backup for guidance of BBNL are placed at ANNEXURE II

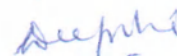
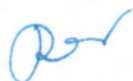
#### 4.5 DELIVERABLES OF THE SCHEME

- 4.5.1. BBNL shall deploy appropriate transport technology equipment at each node ensuring each Gram Panchayat to have a minimum bandwidth of 100 Mbps, conforming to ITU-T Standard and performance level for availability of the OFC network as per Performance Level requirement given in **Section: III, OPERATING CONDITIONS.**
- 4.5.2. The OFC network shall have the capability to efficiently transport various protocols, conforming to ITU-T rates and standards to facilitate maximum utilisation by stakeholders.
- 4.5.3. BBNL, at each node, shall provide equipment with tributary/interface/ add-drop modules of required capacity and type on demand, for transport of rural/remote traffic.
- 4.5.4. BBNL shall be responsible for **procurement, installation, up-gradation of existing** OFC Equipment & OF Cable with accessories and all related items and testing and **commissioning** of the NOFN to meet the deliverables as specified in this Section.
- 4.5.5. BBNL shall build, operate and manage the NOFN to meet the deliverables of the scheme, which shall include, but not limited to, Project management, Survey, Design & Engineering, Procurement, Installation, Testing, Integration, Trial run and Commissioning of all equipment & cables and related works, including electrical and civil works, preparation of the related drawings as well as taking all necessary permissions/approvals. BBNL shall abide by all the clauses of the tripartite MoU signed/to be signed with State Governments.

#### 4.6 SPECIFICATIONS AND NETWORK FEATURES ENSURING DELIVERABLES OF THE SCHEME

- 4.6.1 BBNL shall design the NOFN and deploy the equipment with associated infrastructure with the following features:
  - a) **Scalability:** The NOFN and the equipment should be technologically as well as capacity-wise scalable, compatible and flexible so as to support the future bandwidth and service needs, to carry and route all traffic protocols. Each Gram Panchayat bandwidth should be 100 Mbps (minimum) and expandable as and when required.
  - b) **Connectivity requirements:** The network and equipment should meet service provider's connectivity needs as per ITU-T standards.
  - c) **Network Management System:** The TMN/NMS shall manage the multi-service OFC transport system by an integrated and open standard interface so that it can interconnect with other vendor's systems also. The TMN/NMS shall provide the capability to monitor, configure, re-configure and control the network elements including fibre of the telecommunication network from a centralized location.

#### 4.7 INSTALLATION, LAYING AND CONSTRUCTION SPECIFICATION:



BBNL shall adopt standard practice of installation, laying and construction while executing the project. The details are placed at **ANNEXURE - III**.

#### 4.8 RESPONSIBILITY OF BBNL

- 4.8.1 BBNL shall bring to the prior notice of Administrator USOF, any deviation in meeting any of the deliverables and specifications, as prescribed in the **section: IV TECHNICAL CONDITIONS**.
- 4.8.2 At Gram Panchayat level, BBNL shall plan sufficient battery capacity to provide 24X7 services taking in to consideration the availability of electricity and sunlight.
- 4.8.3 BBNL shall make suitable arrangements for safety and security of the equipment installed under the project.
- 4.8.4 BBNL shall obtain all necessary statutory clearances, including custom clearance, excise, octroi clearances, environmental clearances, etc. from central/state/local authorities, regulatory bodies, statutory bodies of the central/state Government, municipality, highway authority, electrical utilities, forest department, gas authorities, pollution board for clearance for DG set operation and any environmental clearances, and any other clearances, if required. BBNL shall abide by all the clauses of the tripartite MoU signed/to be signed with State Governments.

#### 4.9 QUALITY OF SERVICE PARAMETERS

- 4.9.1. The Quality of Service Parameters (QOS) for lease bandwidth, as prescribed by TRAI, shall be applicable.
- 4.9.2. BBNL shall ensure provision of bandwidth on lease to the services providers as per the Quality of Service (QOS) prescribed by the TRAI from time to time. BBNL shall adhere to such QOS standards and provide timely information as required therein.
- 4.9.3. The Administrator or TRAI may carry out performance tests either directly themselves or through Designated Monitoring Agency and also evaluate the QOS parameters at any time during the tenure of the Agreement. BBNL shall provide access and other support, including documents, instruments, equipment etc. for carrying out such performance tests and evaluation of Quality of Service.
- 4.9.4. BBNL will keep a record of equipment installed at the stations. OF cable provided for connecting, and lease bandwidth provided from, the node installed under the scheme. BBNL shall also maintain faults and rectification reports of the nodes, OF cable and other related items of the transport network such as Battery. Power Plant in respect of the bandwidth, provided to the service provider on lease, which will be produced before the Administrator or TRAI. as and when and in whatever form desired.
- 4.9.5. BBNL shall be responsive to the complaints lodged by the customers. They shall rectify the deficiencies and maintain the history sheets for each installation, statistics and analysis on the overall maintenance status.
- 4.9.6. Proper arrangement should be made by BBNL for reporting/ booking service related complaints.

#### 4.10 INSPECTION AND TESTS

- 4.10.1. The Administrator or his representative or the agencies authorized (**Designated Monitoring Agency**) shall have the right to inspect and test the network bandwidth created in the OFC transport network for leasing as per prescribed test schedules for their conformity to the specifications. Where the Administrator decides to conduct such tests on the Network Bandwidth created in the OFC transport network by BBNL, all reasonable facilities and assistance like testing instruments and other test gadgets including, access to drawings and other details, shall be furnished to the Designated Monitoring Agency at no charge to the Administrator.
- 4.10.2. Should any inspected or tested components of the OFC transport network fail to conform to the specifications, the Administrator may reject them and BBNL shall either replace the rejected components of the infrastructure or make all alterations necessary to meet specification/ requirements free of cost to the Administrator.
- 4.10.3. If any equipment or any part thereof is found defective or fails to fulfil the requirements of the Agreement, the Designated Monitoring Agency shall give notice to BBNL setting forth details of such defects or failure and BBNL shall, at their own cost, make the defective equipment good, or alter the same to make it comply with the requirements of the Agreement forthwith, and in any case, within a period not exceeding one month of the initial report. These replacements shall be made by BBNL free of all charges at site.
- 4.10.4. Nothing in the Clause above shall, in any way, release BBNL from any warranty or other obligations under this Agreement.





# SECTION-V

## Financial Conditions

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**5.1.** USOF would fund the entire Capital Expenditure (Capex) and Net Cost of Operating Expenditure (Opex) net of Revenue streams for a period of five years w.e.f. 25.02.2012. BBNL will strive to become self-sustaining during this period

**5.2.** Suitable incentives would be provided to BBNL for maximizing revenues.

**5.3.** The Net Cost for establishing and maintaining NOFN will be funded by USOF based upon approved bids. The administrative expenses (centage) of BBNL will form part of Opex of NOFN, and shall be included for calculation of Net Cost. The absolute amount of the entire Capital Expenditure and Net Cost of Operating Expenditure net of Revenue [inclusive of administrative expenses] shall be subject to approval by the Telecom Commission.

**Explanation:** Net Cost includes Capex and Opex net of Revenue. Thus,  
Net Cost = Capex + (Opex – Revenue).

**5.4.** Funding from USOF will depend on the following three factors

- i. Requirement of Fund
- ii. Physical Progress of the project
- iii. Approval of Telecom Commission/DoT

**5.5.** Given the complex nature of NOFN, the widespread geographical area and multiplicity of agencies involved, precise estimates of total financial outgo cannot be made as of now, since actual cost will depend on per km cost of OFC as well as the length of OFC required for network will be known only after the detailed survey.

**5.6.** The total funding to be provided by USOF to BBNL under this Agreement shall be restricted to Rs. 20,100/- (Rupees twenty thousand one hundred) crore. However, this amount shall be revised as and when the absolute Net Cost amount as indicated at clause 5.3 above is determined and has been approved by the Telecom Commission.

**5.7.** The physical progress of work along with relevant financial details of the project will be required to be submitted on a monthly basis in the prescribed format (given at Appendix-IV to Annexure-I)

**5.8.** Release of fund for Capex would be based on the physical progress of the work under NOFN Project. BBNL would be required to submit the physical and financial Progress Report on monthly basis to the respective CCAs (as per format at **Appendix-IV to Annexure-I**).

**5.9. Schedule for Release of Fund under Capex:**

**5.9.1.** Initial 10% of the total funding as described in Clause 5.6 above may be paid as mobilisation advance on requisition of fund by BBNL.

**5.9.2.** Subsequent release of fund up to the extent of 25% of the total funding would depend on demand and utilisation certificate to be furnished by BBNL. Thereafter, release of fund has to be commensurate with physical progress of the Project. It shall be the endeavour of BBNL to match physical progress with the proportionate financial expenditure approved for the Project.

**5.9.3. (i).** BBNL has to ensure 55% of the physical progress with respect to physical targets of the project before release of fund beyond 75% of the approved amount. Matching of the physical and financial progress has to be submitted District/State/Circle-wise. Thereafter, for every 5% increase in physical progress, 5% of the fund shall be released upon requisition for the same. However, funds would be released up to the extent of 95% of the approved amount. Within two months of release of the last instalment of the fund (taking cumulative release to 95%), a certificate to the effect of 100% physical completion of the physical targets has to be furnished. The balance 5% shall be released after one year of commissioning.

**5.9.3. (ii).** Within the overall approved amount for the project, the fund released for the material procurement would be regulated as given below.

On requisition by BBNL, fund for material procurement to the extent of 95% of the cost of materials shall be released. The balance 5% shall be released by USOF, upon requisition, after completion of specified period as per BBNL's contractual obligation with their vendors/suppliers after material has been put to use/commissioned by BBNL. BBNL is required to ensure efficient inventory management so that there is proper utilization and minimum accumulation of inventory. Report with regard to utilization of the inventory on District/State/Circle-wise has to be furnished within a reasonable time and before fresh requisition of fund for the said purpose is made by BBNL.

The prescribed format for requisition of fund is as per **Annexure-IV**

**5.9.4.** The schedule for release of fund under Opex would be prescribed separately.

#### **5.10. Release of Fund:**

**5.10.1. Sanction Order:** Sanction Order for payment of subsidy shall be issued with the approval of the Administrator. The payment to BBNL may be effected centrally and/or Circle-wise depending on the requirement and stage of completion of the Project.

**5.10.2. Mode of Payment:** Disbursement of subsidy shall be by cheque/electronic transfer of fund through the Cash Section, DoT HQ, Sanchar Bhawan on the basis of the Sanction Order till payment to BBNL is effected centrally by USOF.

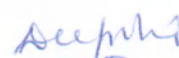
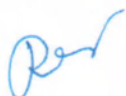
**5.11. Annual Audit:** The aforesaid requisition of fund by BBNL for each financial year shall be required to be audited by the auditors of BBNL appointed under Section 225/Section 619 of the Companies Act, 1956. The report of the Auditors should be in the prescribed form given in **Annexure-V** to be filed with the Administrator USOF within 7 (seven) calendar days of the date of signing the audit report but not later than 30<sup>th</sup> September of the following year.

**5.12.** No interest shall be payable for any short/late payment made to BBNL by the Administrator USOF.

**5.13.** All the relevant records of BBNL shall be subject to such scrutiny as may be prescribed by the Administrator so as to facilitate independent verification of the funds released for the Project.

**5.14.** Administrator, USOF reserves the right to prescribe procedures, formats and certificates with respect to physical and financial progress of the project, financial reports for reconciliation and verification. Depending on the stage of completion of the project and requirements, the same may be prescribed which has to be furnished by BBNL.

**5.15.** In order to ensure proper utilisation of funds released and verification thereof, the Administrator can modify, alter, or substitute and amend, if deemed necessary, whatever is stated herein.



**5.16. Bank Guarantees:** Performance Bank Guarantee (PBG) is not required from BBNL so long as BBNL continues to be wholly owned by the Government of India.

**5.17. Maintenance and Supply of Records:**

**5.17.1.** The Administrator shall have the right to call for and BBNL shall be obliged to maintain, supply and provide for examination the relevant NOC (Network Operation Centre) data, books of accounts, measurement books, log books and any record(s) relating to NOFN.

**5.17.2.** BBNL shall invariably preserve all accounting records and other records (electronic as well as hard copy) for a period of three years from the date of publishing of duly audited and approved accounts of the company. Any dereliction thereof shall be treated as a material breach independent of any other breach, sufficient to give cause for cancellation of the Agreement.

**5.17.3.** The relevant records of BBNL shall be subject to such scrutiny as may be prescribed by the Administrator so as to facilitate independent verification of the amount due to BBNL as funding from USOF.

**5.18. Release of Funds under Opex:** The guidelines, procedure and requisite forms for release of funds under Opex net of revenue, verification procedures subsequent to release and utilisation of the fund would be issued separately.

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*Red*

*Deepika*



# SECTION-VI

## Commercial conditions

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6.1. The Agreement, signed by BBNL with the Administrator USOF, shall be subject to the terms and conditions of the Registration/Certificate/License conditions for Infrastructure Providers Category-11 (IP-II)/ BSO (Basic Services)/ CMTS (Cellular Mobile Telephone Services)/ UASL (Unified Access Service Licensees)/ NLD (National Long Distance) License issued by DoT, as applicable

6.2. BBNL shall not charge tariffs higher than the tariff as per TRAI Orders / Regulations / Directions issued with regard to such service in rural areas from time to time from the customers / users for the service. BBNL shall submit a self certification to this effect on quarterly basis.

6.3. The **Tariff Plans**, for provision of bandwidth at Gram Panchayats, shall be submitted to the Administrator USOF for record within a month of signing of the Agreement and subsequent changes made, if any, shall also be reported to the Administrator.

6.4. Liability/risk of default/misuse/misappropriation of bandwidth provided under the agreement will be the responsibility of BBNL.

6.5. BBNL shall give wide publicity to the scheme by way of appropriate marketing tools such as media advertisements, road-shows, banners, display boards, etc.

6.6. BBNL shall provide single window interface to the customer for all pre as well as post provisioning activities such as booking, provisioning and handling the complaint.

6.7. BBNL shall evolve suitable procedures to ensure that the bandwidth capacity is utilized to the fullest extent and is made available to all eligible Service Providers in non-discriminatory manner and not monopolized by any one of the Service Providers.

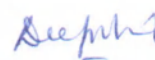
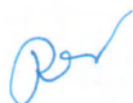
6.8. BBNL shall give wide publicity to the present scheme and place detailed information about the capacity being offered for sharing on lease and the prescribed rates in the public domain including its website. This information shall include, inter-alia, location of the physical sites, network elements available for sharing, pricing, technical conditions related to sharing of bandwidth capacity, ordering and provisioning procedures, maintenance and repair procedures, usage restriction, equipment characteristics and restrictions, security issues, safety standards, rules for allocation where space is limited, conditions for Service Providers to inspect sites available, lead time to provide services, service level Agreements, billing, faulty, repairs, compensation etc.

### 6.9. SERVICE LEVEL AGREEMENTS

6.9.1 BBNL shall enter into Service Level Agreements (SLA) with the Service Providers for bandwidth hired from it.

6.10. BBNL shall maintain, **State-wise** list of all **the registered** Service Providers for bandwidth, which should be provided from the effective date of the Agreement.

6.11. The Administrator shall not be responsible or liable for any default of Service Providers/non-payment of lease-charges by them for the bandwidth provided under the Agreement. BBNL shall make necessary arrangements to safeguard its interests in such an event



# SECTION-VII

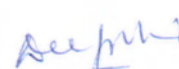
## DEFINITIONS

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### 7. Interpretation of Terms/ Definitions

Unless the context otherwise requires, the different terms and expressions used shall have the meaning assigned to them in the following paragraphs:

- 7.1 **ADMINISTRATOR** means the Administrator, Universal Service Obligation Fund in the Department of Telecommunications under Ministry of Communications & IT.
- 7.2 **AGREEMENT** shall mean the Agreement signed by BBNL with the Administrator, related to creation, operation and maintenance of the National Optical Fibre Network (NOFN) for provision of Broadband connectivity to the Gram Panchayats to be executed by BBNL.
- 7.3 **DESIGNATED MONITORING AGENCIES** refers to the agencies authorized by the Administrator to carry out inspection of the records, claims and installations including physical verification in order to ensure compliance with conditions of the Agreement.
- 7.4 **EFFECTIVE DATE** is the date on which this Agreement comes into effect.
- 7.5 **LICENSE** means a License granted or having effect as if granted under Section 4 of the Indian Telegraph Act 1885 and Indian Wireless Act 1933.
- 7.6 **SERVICE AREA** means the territorial jurisdiction as specified under the Basic Service Licence except the areas that may be notified to be excluded from time to time.
- 7.7 **TRAI** means Telecom Regulatory Authority of India constituted under the TRAI Act, 1997 as amended from time to time.
- 7.8 **USO** means Universal Service Obligation as enunciated in Indian Telegraph Act and the Rules framed there under.
- 7.9 **USO FUND** means the fund established under Indian Telegraph (Amendment) Act, 2003, Indian Telegraph (Amendment) Act, 2006 and Rules framed there under.
- 7.10 **CCA** means Controller of Communications Account



**Annexure-I**

**Appendix-I: Commissioning report for the month of:**

*Dr*  
**Name of State**

**Name of the Telecom Circle**

SI No	Name of GP	Code of GP	Name of DHQ	Name of Block HQ	Address of Node at BHQ	Address of Node at GP	Name of Route serving (See note)

*See page 1*  
Columns continued on next page



Continued from previous page

Type of equipment used in node at GP	Total bandwidth available	Number and type of ports available	Date of commissioning

**Note:** XXXYNN where XXX is for Block name, Y is L for linear and R for ring and NN is sequential number

As per

Per

**Appendix-II: Commissioning Report - Route Details for the Month of:**

**Name of the Telecom Circle**

**Name of State**

**Name of district**

*Pr*

Sl No	Name of Route (See Note)	Total Length (Kms)			Name and Address of BHQ node	Total GPs covered	Date of completion
		Existing	Incremental	Total			

**Note:** XXXYNN where XXX is for Block name, Y is L for linear and R for ring and NN is sequential number

*Reshmi*

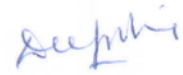
**Appendix-III: Utilisation Report for the quarter ending:**

Name of the Telecom Circle

Name of State

Name of  
District

S. No.	Name of Block	Name of GP	Code of GP	Bandwidth available	Bandwidth utilised	No. of ports available	No. of Ports utilised





**Appendix-IV: Progress Report for the month of:**

Name of state / UT

Name of the Telecom Circle

*RM*

Sl. No	Name of District	Number of BHQ	Number of GPs	Number of OFC routes to be laid	Route Kms of OFC to be laid	Route Kms of OFC laid during the month	Number of OFC routes completed during the month	Number of GPs covered during the month	Number of GPs where infrastructure got readied during the month
1	2	3	4	5	6	7	8	9	10

*Required*

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Cumulative number of GPs connected with >= 100 Mbps and ports ready as on last day of the month	Number of GPs where fibre is available but infrastructure not ready as on last day of the month	Cumulative number of OFC routes completed as on last day of the month	Cumulative route Kms of OFC laid as on last day of the month	Total Expenditure to be incurred	Actual Expenditure	Balance (16-15)
11	12	13	14	15	16	17

Account  
R

**Appendix-V: Certificate Format Certifying the Completion of Network of Relevant Districts**

It is to certify that,

1. We have carried out network validation, inventory checking and performance checking on sample basis covering the below mentioned districts of Assam Service area as per approved manual;

Districts:

.....  
.....

2. We have taken into account the documentary backup made available;

3. We have also observed the network configuration on the network management system;

4. The detailed report is annexed herewith along with exceptional points (if any);

5. On basis of above we conclude that the Operator has installed and commissioned the network as per Agreement No

.....  
Dated ..... in the districts .....

For and on behalf of  
Designated Monitoring Agency

(Authorized signatory)  
Enclosure: Detailed Report.



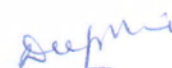
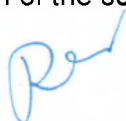
Technical Specifications of OFC Equipment & of Cable Ensuring Deliverables and Network Features Under the Scheme

**1.0 TRANSPORT EQUIPMENT SPECIFICATION**

- a) **System timing and Synchronization:** The deployed system shall have a system wide timing synchronization, in accordance with per ITU-T Rec. G.811/G.812/G.822, as applicable, fully capable to be distributed to all the network element of BBNL as well as to the other service providers sharing the network. The overall system shall synchronize with i) the clock signal of the existing transmission network ii) incoming signal iii) external clock at 2048 KHz as per ITU -T G.703 iv) external clock at 2048- Kbps us per ITU-T G.703 (as applicable).
- b) **Equipment Specification and System Performance:** Optical Transport Equipment including line transport and tributary interfaces, shall conform to ITU-T TEC Standards and shall be capable to carry circuit and packet based traffic, including TDM/IP/Ethernet ATM signals/protocols both in the form of electrical and optical signals.
- c) The system performance shall be equal to or better than 10(-12) as per relevant ITU-T TEC Standards, including Rec. G.821/G.826/TETF/RFC/2544/Standards specific to the deployed technology, and any other approved specifications as applicable.
- d) The equipment shall meet exceed EMC/EMI requirement as per TEC Standard No. TEC/EMI/TEL-001/01/Feb-09 (including latest revisions and amendments) or equivalent ITU-T/International standards.
- e) **OF Equipment and cable accessories:** In addition to the overall specifications, the fibre-optic equipment and cable accessories. shall meet/exceed the relevant ITU-T/TEC Specifications. BBNL shall mention the standard specifications complied with in the testing reports.

**2. UNDERGROUND OPTICAL FIBRE CABLE SPECIFICATION:**

- a) The OFC shall meet/exceed applicable ITU-T/TEC specifications and the materials used in the manufacture of OFC.
- b) The UG OFC shall be of low weight, small volume and high flexibility, suitable for underground installation in pipes through open cut trenches or direct burial through trench-less digging.
- c) BBNL should carry out the installation, testing and commissioning of OFC transport/transmission equipment and OF cable, including system synchronization, system integration with existing and supplied defined interfaces. BBNL should also ensure all civil and electrical works, power supply system (both D.C and AC) and earthing of Telecom equipment including cabling wiring, and connection to the equipment at electrical and Telecom Management System TMN (also termed as Network Management System (NMS)) including Element Management System (EMS for Configuration and monitoring of Channel circuits TCP/IP network and providing suitable interfaces on the F.O. communication system.
- d) Any other work/items required for completion successful commissioning and commercial operation of the scheme shall be responsibility of BBNL.



- e) BBNL should lay permanency lubricated high density polyethylene PLB/HDPE duct & HDPE couplers. RCC pipe. GI pipe and associated hardware/ accessories / consumables/ fitting joint boxes, etc as required for installation of underground OF cable as well as cement bricks. sand for making jointing chambers of prefabricated jointing chambers etc. It will carry out the trenching & backfilling after laying HDPE pipes, and Blowing/pulling of unarmoured underground OF Cable preparation of midsection jointing chambers and jointing/splicing of the fibres, along the route. Termination of OFC cables at the FDF, with the associated accessories like pig tails, patch cords, splice closures etc. Testing of all fibres of the jointed cable and rectification of any defects.
- f) **PLB HDPE Pipe:** Permanently Lubricant High Density Polyethylene (PLB HDPE) pipe shall be laid for blowing or conventional pulling of the fibre optic cable shall meet/exceed the functional requirements major technical parameters and Type and Factory Acceptance Testing requirements as per ITU-T/TEC Standards. The desired overall dimensions of the PLB HDPE Pipe are as follows-

i	Outside diameter	40mm+0.4mm
ii	Wall thickness	3.5mm (+0.2mm/ -0.00mm)
iii	Standard length	1000 meters +- 100 meters
iv	Thickness of permanent lubricant	>-0.4mm
v	Maximum outer diameter of FO cable that can be installed by blowing technique	16mm or 24/48-fibre optical cable dia. Whichever is higher.
vi	Thickness of Inner Layer	Min. 0.28mm. Max. 0.42mm

**3. ENVIRONMENTAL SPECIFICATIONS:** Equipment and their components provided under this specification shall operate reliably under the following **environmental operating limits.**

<b>Temperature Range and relative humidity :</b>	
To Specification	0 to + 50 °C, 50%RH
Operation without damage	5 to +55 °C, 50%/RH
Shipping/storage	-5 to + 60 °C, 50%RH
Max. temperature with guaranteed Specifications	35 °C, 95% RH
Max. Temperature for equipment survival	40 °C, 95%RH
Elevation: (operation)	to 3,500 m

The environmental standard complied shall meet/exceed the provisions prescribed above or in the respective TEC GR as applicable. The testing schedule and procedure shall comply with DoT document QM-333 or any other international standard as applicable.

**4. LIGHTNING AND TRANSIENT VOLTAGE PROTECTION:** Bidder shall provide lightning and transient voltage protection for all telecommunications equipment, in accordance with the following-

- a) Should have proper earthing arrangement as per ITU-T/IEC/BIS/TEC standards.
- b) At the outside cable plant point-of-entry of all cabling penetration, the Bidder shall provide lightning and transient voltage isolation as well as surge protection, wherever applicable, for the inside-plant cabling, wiring, and all terminations and equipment.



- c) All equipment installed, under this specification that requires 230VAC primary power, shall be surge protected.

**5. STATION SAFETY EARTHING AND SIGNAL GROUNDING:** The equipment shall meet the IEC publication 60950 (2001) in general and for optical safety it shall comply with ITU-T G.664 and IEC 60825-1 and IEC 60825-2. For each facility, the Bidder is responsible for meeting the following station and equipment earthing requirements-

- a) All safety earthing and signal grounding shall be in full compliance as per relevant international standards.
- b) Each cabinet (enclosure) shall include suitable signal ground and safety earth networks. The signal ground network shall terminate at a separate signal ground stud connection isolated from safety earth.
- c) Each earth/ ground network shall utilize copper bus bars, copper braids and/or 16 sqmm or bigger earth cable. All equipment earth/ ground connections shall be made directly to the equipment chassis utilizing grounding and secured metal-to-metal with star washers. Use of the enclosure frame, skin or chassis mounting hardware, as part of the earthing/ grounding networks, is not acceptable.
- d) The safety earth network shall be connected to "earth ground" at the safety earth stud. The earth stud connection shall be sized for an external earthing cable equipped with a 2/0 solid copper lug secured metal-to-metal with star washers. Primary AC feeds and distribution within enclosures requires earthing wire connection to the safety earth stud.
- e) The safety earth and signal ground networks shall be inter-connected only at the safety earth stud and signal ground stud.
- f) The Bidder is responsible for providing all required earthing/ grounding cable and installation. The Bidder shall be responsible for providing earthing systems including pits, earthing studs and earthing net etc as required wherever the existing station earthing is found to be unsuitable for equipment being provided. In case, new earthing studs are provided, the Bidder shall be responsible for connection of new studs to the existing studs if any.

**6. NETWORK MANAGEMENT SYSTEM:** BBNL shall provide, a Telecommunication Management Network System (TMN) also referred to as Network Management System (NMS). The TMN/NMS shall manage the multiservice transport system by an integrated and open standard interface so that it can interconnect with other vendor's systems also. The TMN design concept, functional and infrastructural and architecture and physical architecture shall be according to ITU Rec. M.3010. The NMS should be provided, along with carrier-class element management system (EMS), local craft terminal/client terminals/work stations, as applicable. The TMN/NMS shall provide the capability to monitor, configure, re-configure and control the elements of the telecommunication network from a centralized location and also at each node of the network where equipment is located using portable devices (e.g. laptops).

**7. EQUIPMENT AVAILABILITY:** The Mean Time Between Failure (MTBF) of the deployed equipment by BBNL shall be at least 80,000 hours. The calculations shall be as per international standards. An MTRR of maximum 3 hours will be assumed ensuring the equipment availability at least 99.998%.



OFC Construction Practice

**1. INTRODUCTION**

The following are for guidance purpose for OFC Construction Practices. The following practices are summarized here-under, from the point of view of describing scope of work under various items of work.

**2. ROUTE PLANNING AND SURVEY**

The Optical Fibre Cable route will be planned taking a balanced judgement on following issues-

- a) The route should achieve minimum possible route length vis-a-vis route having maximum number of towns with potential telecom growth, as per the scope of this Bid.
- b) The node locations off the main road should preferably be connected by routing the main cable to the node on separate roads (from main road) if possible. If not at all feasible then spur route (single cable to node) may be planned.

**3. ROUTE-SURVEY RECORD**

After deciding above-mentioned issues, a detailed measurement of lengths of cable route along with details of rail/road crossings, culverts, causeways, etc may be recorded in the detailed survey register. The probable locations of mid-section optical fibre joints, three-way joint locations, and major manholes for housing the joints with provision for future branch routes, terminations and re-generators may also be decided and marked on the route map.

**4. PERMISSIONS**

4.1. On the basis of surveys, general permission from road and rail authorities for laying the Optical Fiber Cable along the decided routes and permission for rail / road crossings will have to be obtained.

4.2. It is imperative that the cable is laid after obtaining due permission from all the concerned authorities to avoid any damage/shifting at a later stage and also disruption of services/revenue loss.

**5. ALIGNMENT**

5.1. Generally, O.F.C. is laid straight as far as possible along the road near the boundaries, away from the burrow pits. The O.F.C. is laid along the roads at a minimum distance of 15 meters from the centreline of the road or in accordance with the permission from the concerned road authorities in view of their read-widening plan.

5.2. In special cases, where it may be necessary to avoid burrow pits or low lying areas, the cable may be run underneath the shoulders at a distance of 0.6 meters from the outer edge of the road embankment provided the same is located at least 4.5meters away from center line of road and 1.2 meter below the road surface.

5.3. In **city 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 when cutting across road with specific permissions from the authorities responsible for maintenance of that road.

5.4. **Outside the City limits** trench will normally follow the boundary of the roadside land.

5.5. However, where the road side land is full of burrow pits or a forestation or when the cable has to cross culverts, bridges or streams, the trench may be closer to the road edge or in some cases, over the embankment or shoulder of the road as per approval of site-engineer.

5.6. The line up of the trench must be such that HDPE 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.

## 6. DEPTH AND SIZE OF TRENCH

- 6.1 The Optical Forcible is laid through HDPE Pipes buried at a nominal depth of 165 cms. The detailed specifications and further steps involved in OF Cable construction are as under -
- 6.2. 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 also in city limits. The trench will be excavated to a depth which is not less than 165 cms from top of the surface, unless otherwise permitted.
- 6.3. In **rocky soil** where chiselling/blasting is required, minimum 90 cm. depth shall be achieved.
- 6.4. The width of the trench shall be sufficient to lay requisite number of HDPE/GI/RCC pipes and also concreting wherever required.
- 6.5. When trenches are excavated in slopes/uneven ground/inclined portion, the lower edge shall be treated as top surface of land and depth of trench in measured accordingly.
- 6.6. In a certain locations, such as uneven ground/hilly areas and all other places due to any other reason, excavation may be done beyond standard depth of 165 cm. so that the bed of the trench is as smooth as possible.
- 6.7. Near the culverts, both ends of the culverts shall he excavated to a depth of more than 165 cm. so that the gradient is less than 15 degrees with horizontal.
- 6.8. In large burrow pits, excavation shall he done not less than 165 cms. in depth and both sides of burrow pit shall be excavated more than 165 cms in depth to keep gradient of bed less than 15 degree with horizontal.
- 6.9. If excavation of trench is not possible up to the minimum depth of 165 cm. then the trench-depth may be kept less with approval of site-engineer.
- 6.9.1 In **non-rocky soil**, the depth from top of PLB may be relaxed to 150cm, as per decision of site-engineer.
- 6.9.2 In **rocky soil**, where excavation, has to be done by chiselling/blasting, trench depth should be minimum 90cm. from top of PLB.
- 6.9.3 In non-rocky and built-up area where it is not found feasible to go deeper, a depth of minimum 1.0m from top of PLB may be allowed.
- 6.9.4 If depth is less than 1.2m, then, suitable mechanical protection by CC or RCC/GI pipe should be provided.
- 6.10. Rail/Road crossing depth should be minimum 1.5 meter and encased in RCC pipe or 65mm. dia GI pipe.
- 6.11. On culverts, around bridges or places with some obstruction for small stretches of maximum 10-15 metres, OFC should be laid at the most possible depth with suitable protection of CC/ RCC/ GI pipe:s.

## 6.12. Warning Bricks

Warning bricks shall be used in city area i.e. within municipal limits. Bricks (non-modular) class designation-5(50) of the actual size 225 mm (length) x 111 mm (width) x 70 mm (thick) shall be laid breadth-wise, average 8 bricks per metre immediately above the sand layer in which PLB HDPE pipe is installed.

## 6.13. Warning Tape

A Warning Tape (width. 10cm, thickness: 500 micrometer), made of HDPE/LDPE (low density poly ethylene)/other suitable inert material, containing a printed warning message shall also be laid over the pipe throughout the cable route at a depth of 1000mm in normal soil (the depth of warning tape in soft rock, hard rock and at less-depth stretches shall be as per site-engineer), for warning the person who may be excavating the trench in future.

## 7. FINISHING TRENCH - BED

After trench is excavated to the specified depth the bottom of the trench has to be cleared of all stones or pieces of rock & leveled up properly. A layer of ordinary soil/sand of not less than 5 cm. thick is to be used on the trench-bed for leveling, the trench to ensure that cable when laid will follow a straight alignment and possibility of damage to HDPE duct and/or O.F. cable is avoided.

## 8. REMOVING OBSTRUCTING VEGETATION

In order to prevent damage to HDPE Pipe/PLB Blowing Type/Pre-installed rope over a period of time, due to the growth of trees, roots, bushes, etc., such vegetation shall be removed at the time of construction.

## 9. AVOIDING DAMAGE TO EXISTING UNDERGROUND INSTALLATIONS

While trenching, no damage should be caused to any underground installations belonging to others agencies; any such damage caused should be made good by the successful bidder.

## 10. CLEARANCE FROM EXISTING UNDERGROUND INSTALLATION

A minimum free clearance of 15 cm. should be maintained above or below any existing underground installations.

## 11. EXCAVATION

11.1 In city limits as well as in built up area, only manual labour will be used to ensure that no damage is caused to any underground or surface installations belonging to other public utility services and/or private parties.

11.2 Along the High ways and cross country mechanical means of excavation may be used, provided that no underground installation existing in the path of excavation if any, are damaged,

11.3 Water present in the trench at the time of laying the HDPE Pipe/PLB Blowing Type/Pre-installed ropes shall be pumped out before lowering in the pipes to ensure that no mud or water gets into the pipes.

11.4 **Horizontal boring method** shall be used to bore a hole of required size and push through G.I. Pipe of 65mm./40mm. dia. for encasing the HDPE Pipe/PLB Blowing Type/Pre-installed rope which is also pushed through at road crossing or rail crossing or small hillocks etc.

11.5 In **Rocky strata** excavation shall be carried out by use of electro-mechanical means like breakers or by blasting, wherever permissible with express permission from the competent



authority. If blasting operations are prohibited or not practicable, chiseling shall be carried out for excavation in hard rock. Minimum 90cm, trench depth shall be achieved.

11.6 The classification of soil is given in Clause 18 below.

11.7 Where soil is likely to cave in, sufficient width and slope of trench sides should be excavated.

11.8 In all cases, the slope of the trench shall not be less than 15 degrees with the vertical. The width of the trench shall normally be 45cm. at the top and 30 cms 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.

## 12. LAYING OF PLB-HDPE DUCT

12.1 Preparatory to aligning the pipe for jointing, each length of the duct 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/blown at a later stage. The ends of each pipe and inside of each PLB-HDPE Socket shall be thoroughly cleaned of any dirt or other foreign materials.

12.2 After the trench is cleaned the PLB-HDPE Pipe/Coil shall be laid in the cleaned trench, jointed with 'O' ring type PLB-HDPE Couplers/Sockets & 6 mm PP rope should be drawn through the PLB-HDPE Pipes at the time of laying the pipes to facilitate cable pulling at a later stage. At every manhole approximately at every 200m. or at bends or turns the PP rope will be tied to the HDPE end caps used for sealing the HDPE pipes, to avoid entry of rodents/mud etc.

12.3 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 HDPE pipe until the work is resumed.

12.4 HDPE Pipe/PLB Blowing Type/Pre-installed ropes coupled by HDPE/PLB sockets shall be laid in excavated trenches and on bridges and culverts. 6 mm Polypropylene Para pro rope (P. P. rope) shall be drawn through the HDPE pipes/coils and HDPE pipe ends sealed at every manhole by HPE end caps of suitable size.

12.5 The HDPE Pipe/PLB Blowing Type/Pre-installed ropes can be of 75 mm dia and 50 mm dia with collar jointing arrangement or spigot.

12.6 The HDPE Pipe/PLB Blowing Type/Pre-installed ropes shall be laid in 150/100 mm dia RCC spun pipes, at road crossings and through G.L Pipes on culverts and bridges and also in exceptional cases where the depth of the trench is less than 165 cm.

12.7 At road crossings, two or more extra HDPE Pipe/PLB Blowing Type/Preinstalled ropes should be laid for future, provision.

## 13. PROTECTION TO PLB-HDPE DUCT/OFC IN THE DUCT

13.1. In **cross country routes**, where depth of trench is less than 1.20m, HDPE Pipe/PLB Blowing Type/Pre-installed ropes should be laid within GI/RCC pipes. Alternatively, HDPE Pipe/PLB Blowing Type/Pre-installed ropes may be encased in reinforced concrete casing of dimensions 275mm x 275mm.

13.2. In **built-up areas**, irrespective of depth suitable protection shall be provided. Where the depth of trench is **not less than** 165 cm. HDPE Pipe/PLB Blowing Type/Pre-installed ropes should be laid within GI/RCC pipes. In case of trench depth **being less than** 165 cms, the HDPE



Pipe/PLB Blowing Type/Pre-installed ropes may be encased in reinforced concrete casing of dimensions 275 mm x 275 mm.

13.3. In case of **nullahs**, which are dry for nine months in a year, the HDPE Pipe/PLB Blowing Type/Pre-installed ropes shall be laid within the RCC pipe laid at a minimum depth of 165 cms. The RCC pipes shall be extended 2 mtrs. beyond the bed of nullah on either side.

13.4. Wherever GI pipes are used, rubber bushes shall be used at the two ends of the GI pipes to protect the damages of HDPE Pipe/PLB Blowing Type/Pre-installed ropes.

13.5. Wherever RCC pipes are used for protection, two ends must be properly sealed to bar entry of rodents, as described below. 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). 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 40cm.(L)x40cm.(W)x25cm.(H) of 1:2:4 cement concrete mix (1: 53 grade cement of reputed brand, 2:coarse sand, 3: stone aggregate of normal size of 20 mm.) so that the alignment of RCC pipes remain firm and intact and to avoid entry of rodents.

13.6. Normally, 100 mm RCC Pipe shall be used for protecting HOPE Pipe but if more than one HDPE Pipe is to be laid and protected, RCC Pipe of suitable size to accommodate the required number of HDPE Pipe shall be used.

13.7. On road crossings, the HDPE Pipe/PLB Blowing Type/Pre-installed ropes shall be laid a depth 165 cms. encased with full round RCC pipe. The RCC pipes shall be extended 3 meters on either side of the road.

13.8. On Rail bridges and crossings, the HDPE Pipe/PLB Blowing Type/Pre-installed ropes shall be encased in suitable cast iron/RC pipes as prescribed by the Railway Authorities.

## **14. MECHANICAL PROTECTION MATERIAL SPECIFICATIONS**

### **14.1 RCC Full Round Pipes**

Reinforced cement concrete pipes (Spun type) coupled with RCC collars sealed with cement mortar are used to provide mechanical protection to HDPE pipes/coils. The RCC pipes/collars should be of NP-2 class for 150 mm outer dia. and 100 mm internal dia. full-round, conforming to IS standard 458-1988 revised up to date. The pipes should have a nominal length of 2 meters.

14.1.1 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 the mechanical protection is provided by RCC pipes, every third joint will be embedded in a concrete block of size 60cm.(L) x 40 cm.(W) x 25 cm. (H) of 1:2:4 cement concrete mix 1:2:4 {1: cement, 2: coarse sand, 4: stone aggregate of 20mm nominal size) so that the alignment of RCC pipes remain firm and intact. Both ends of RCC/GI pipes would have been sealed by providing concrete block of size 40cm.(L) x 40cm.(W) x 25cm.(H) of 1:2:4 cement concrete mix to avoid entry of rodents.

### **14.2 G.I. Pipes**

G.I. Pipes should be of medium duty class having dia. of 65/40 mm. The G.I. Pipe should conform to IS 554/1985 (revised upto date), IS 554/1989(Part-I) 1900 Sockets (revised upto date) and IS-1239 (Part.II)/ 1992 (revised upto date). As space on parapet wall on Bridge/culverts is limited, 40mm GI pipes may be used with 32mm HDPE coil drawn inside.

### 14.3 M.S. Weld Mesh

The HDPE pipes can be protected by embedding it in concrete of size of 275 mm, x 275mm reinforced with MS weld mesh. The MS weld mesh used should be of 50mm x 100mm size, 12 SWG, 120 cm. in width, in rolls of 50 m each. One meter of MS weld mesh caters to approx. 3 meters of concreting.

## 15. BACKFILLING AND DRESSING THE TRENCH

15.1 The earth used for filling shall be free from all roots, grass, shrubs, vegetation, trees, saplings and rubbish.

15.2 After the HDPE Pipe/PLB Blowing Type/Pre-installed ropes have been properly laid in the trench at the specified depth, the back filling operation shall follow as closely as practicable. The back filling operation shall be performed in such a manner as to provide firm support under & above the pipes and avoid **bend or deformation of the HDPE Pipe/PLB Blowing Type/Pre-installed ropes** when these get loaded with the back filled earth. No debris shall be allowed in the back fill at any time.

15.3 At locations where the back filled material contains hard clods, rock fragments and other materials which may cause injury to HDPE Pipe/PLB Blowing Type/Pre-installed rope & where excavated or rock fragmi are intended to refill the trench in whole or in part, the trench should be initially filled, with a **layer of ordinary soil or derocked loose earth of not less than 10 cm. above the pipes.**

15.4 Back filling on public, private roads, railway crossings, and foot paths in city areas shall be performed immediately after laying the HDPE Pipe/PLB Blowing Type/Pre-installed ropes. Back filling at such locations shall be thoroughly rammed, so as to ensure original condition & made safe to traffic. All excess soil/material left out on road/footpath/railway crossing shall be removed. However, along the high ways and cross country, the dug up material left out should be kept as heap above the trench while refilling.

**15.5 In city limits no part of the trench should be kept open for more than 50 meters length at any time** and in all places where excavation has been done, **no part of the trench should be kept open over-night** to prevent any mishap or accident in darkness.

## 16. LAYING PROTECTION PIPES ON BRIDGES AND CULVERTS

16.1 The work involves laying of HDPE pipes /PLB Blowing Type/Pre-installed ropes through GI Pipes of not more than 4" dia or GI Troughs of size 4" x 4" laid on the Bridges/Culverts.

16.2 In bridges/Culverts, where proper ducts are already provided, the HDPE Pipe/PLB Blowing Type/Pre-installed ropes will be laid through the ducts.

16.3 Normally in the Bridges/Culverts, where there are no ducts and where the cushion on the top of the Arch is 0.5m or more thick the G.I. Pipe/ G.I. Trough carrying HDPE Pipe/PLB Blowing Type/Pre-installed rope & Cable may be burred on the top of the Arch adjoining the parapet wall, by digging close to the wheel guards.

16.4 Where the thickness of the Arch is less than 0.5m, the pipes must be buried under the wheel guard masonry and the wheel guard rebuilt.

16.5 If any of the above methods is not possible, the G.I. Pipe/G.I. Troughs must be clamped outside the parapet wall with suitable clamps. If necessary, the pipes may be taken through the parapet wall at the ends where the wall diverges away from the road.



16.6 In cases, where the methods explained in clause 15.4 & 15.5 above, are not possible, the G.I. Pipes/G.I. Troughs can be fixed on the top of the road kerb close to the inside face of the parapet wall by means of clamps, supplied, using rawl plugs & wood screws or small diameter bolts, without damaging concrete & limiting external diameter of the bolts to 7.5 mm. The permission for carrying out this work will be obtained from the Road Authorities.

16.7 Methods cited in clauses above should be carried out under close supervision of the Road authorities and restoration of any damages to the structures in any of the methods adopted should be done to the entire satisfaction of the road authorities.

16.8 When HDPE Pipe/PLB Blowing Type/Pre-installed ropes are laid on bridges/ culverts, except when pipes are clamped outside of the bridge, cement concreting shall be provided over the protection pipes/troughs.

16.9 If PLB-HDPE duct is laid in culvert bed (second option vis-a-vis using the overhead bridge/culvert), protection like GI+CC, RCC pipe shall be provided.

## 17. SPECIFICATIONS FOR CONCRETING

17.1 The nominal dimension of concreting is of 275 mm x 275 mm. section. However depending on the actual situation, this cross section may be varied to ensure uniformity with any existing structure / base, on which the GI pipes/ GI troughs are placed, as required by the road authorities.

17.2 As the RCC is cast at site, it is imperative to ensure that proper curing arrangements are made with adequate supply of water. Mechanical mixer should be used for providing consistency of the mix.

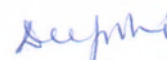
17.3 The concreting surface should be thoroughly cleaned and leveled before concreting. Necessary wire mesh of adequate size shall be provided as reinforcement for the concrete.

17.4 For carrying out concreting work in trenches, yellow PVC sheets of width not less than 1.0 m and weight not less than 1 kg./8m<sup>2</sup> 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 HDPE pipes. The HDPE pipes shall then be laid above this bed of concrete. After laying the HDPE pipes, MS weld mesh would have to be wrapped around and tied and concrete mix is poured to form the required cross sectional dimensions. 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.

17.5 At both the ends of the Bridges/Culverts, where the GI Pipes/Troughs slope down and get buried, the concreting should be carried out to ensure that no portion of the GI Pipe/ Trough is exposed and further down as required by the site in charge to protect the Pipe-Trough from any possible damage externally caused.

17.6 Any damages, caused to the existing structure such as Foot-Path or base of the Parapet or Kerb wall on which GI Pipes/Troughs are placed, should be repaired and original condition restored to the satisfaction of Road Authorities.

17.7 Where white wash/colour wash exists on the Bridges/Culverts, the same should also be carried out on the concreted portion to ensure uniformity.



17.8 Cement Concrete Mixture used should 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, and reinforced with MS weld mesh.

17.9 Smooth finishing of exposed surface should be done with a mixture of 1:3: i.e. 1 Cement: 3 Fine Sand.

17.10 Portions where cement concreting has been done shall be cured with sufficient amount of water for reasonable time to harden the surface.

## **18. NATURE OF SOIL**

The nature of soil strata from the standpoint of excavation is categorized as under-

### **18.1. Non -rocky soil (soft soil)**

This will include all types of soils- soft soil/hard soil/murum, i.e. any strata, such as sand, gravel, loam, clay, mud, black cotton murum, single, river or nallah, bed boulders, soiling of roads, paths etc. and hard core, macadam surface of any description (water bound, grouted tarmac etc.) line concrete, mud concrete and their mixtures for excavation of which need application of picks, showels, scarifiers, ripper and other manual digging implements.

### **18.2. Soft - rocky soil (hard soil)**

This type of soil is generally any rock which can be excavated by splitting with crow bars or picks and does not require blasting, wedging or similar means for excavation such as lime stone, sand stone, hard conglomerate. The un-reinforced cement concrete roads as well as other type of roads (except RCC) are also included under this category. If required, light blasting may be resorted to for loosening the materials.

### **18.3. Hard- rocky soil**

Generally any rock or boulder for the excavation of which blasting is required such as quartzite, granite, basalt, reinforced cement concrete (reinforcement to be cut through but not separated from concrete) and the like.

## **19. SAFETY CONSIDERATIONS**

### **19.1 Precautions while working on roads**

19.1.1 Necessary barricades will be provided to prevent any accident to pedestrians or vehicles and night lamps, warning boards and required watchmen will be provided. Sufficient manpower for this shall be employed with caution boards, flags, sign writings etc.

19.1.2 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.

19.1.3 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 pole at a 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.

19.1.4 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 1.25m 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 conspicuously not less than 1.25m above the ground and close to the excavation.

19.1.5 Where any excavation is not clearly visible for a distance of 25 m 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 kerbed 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.

19.1.6 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.

19.1.7 Wherever required, a passage for pedestrians with footbridge should be provided.

19.1.8 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 carriage way should be guarded adequately for their own protection and also that of the public.

19.1.9 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 would 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.

#### **19.1.10 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.

### **19.2 Work along Railway lines**

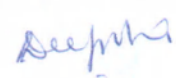
19.2.1 Normally all works at Railway crossing is to be done under supervision of the railway authorities concerned, but it is to be borne in mind that use of white, red or green flags by the Bidder's staff is positively forbidden to be used when working along a railway line as this practice may cause an accident through engine drivers mistaking them for railway signals. When working along a 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.

19.2.2 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 authorities.

### **19.3 Working in excavations close to electric cables**

19.3.1 Before undertaking the work, full information should be obtained from Electricity Authorities regarding any electric cables which are known or suspected to exist near the proposed excavation. Preferably, Electricity Undertaking should be asked to send a representative for consultation.

19.3.2 Only wooden handled tools should be used until the electric cables have been completely exposed.



19.3.3 A cover slab or concrete, brick or stone, usually protects from above power cables, not laid in conduits. They may or may not be protected on the sides. Digging work should be accordingly done.

19.3.4 No workman should be permitted to work alone where there are electric cables involved. At least one more man should be working near by so that help can be given quickly in case of an accident.

19.3.5 If disconnection of power could be arranged in that section, it will be better.

19.3.6 No electric cable 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.

19.3.7 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 needs not to be assumed as wholly accurate.

19.3.8 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.

#### **19.3.9 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.

#### **19.4 Danger from failing 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 trench thereby injuring any workman who may be working inside the trench.

#### **19.5 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. 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.

#### **19.6 Danger of cave in**

When working in deep trenches in loose soil, timbering up/shoring the side will prevent soil subsidence. The excavated material should be kept at sufficient distance from the edge of the trench or pit. Vehicles or heavy equipment must not be permitted to approach too close to the excavation. When making tunneled 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.

*Per*

*Deepthi*



## 20. JOINT CHAMBER

The joint chamber is provided at every joint, normally at a distance of 2 kms, to keep the O.F.C joint protected and also to keep extra length, of cable, which may be required in the event of faults at a later date. The joint chambers are made at site using bricks and mortar or are of pre-cast RCC type.

### 20.1 Construction of brick chamber at site.

20.1.1 For constructing brick chamber, first: a pit of size 2m x 2m x 1.8m (D) is dug.

20.1.2 Then, base of the chamber is made using PCC mix of 1:5:10 (1:cement, 5:coarse sand, 10:graded stone aggregate 40 mm nominal size) of size of 1700mm x 1700mm x 80mm (thickness) is constructed.

20.1.3 Walls of brick chamber having internal dimensions of 1200mm x 1200mm x 1000mm (H) should be constructed on this base having wall thickness of 225mm using cement mortar mix of 1:5(1: cement, 5: line sand). The bricks to be used for this purpose should be of size 9" x 4.5" x 3" and of best quality available having smooth rectangular shape with sharp corners and shall be uniform in colour and emit clear ringing sound when struck.

20.1.4 The joint chamber should be so constructed that HDPE pipe/PLB Blowing Type/Pre-installed ropes ends remain protruding minimum 5cm. inside the chamber on completion of plastering. The HDPE pipes should be embedded in wall in such away so that, the bottom, brick should support the pipe and upper brick should be provided in a manner that HDPE pipe remains free from the weight of the construction.

20.1.5 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.

20.1.6 Pre-cast RCC slab in two halves with two handles to facilitate easy lifting, of size 700mm x 1400mm each and of thickness of 50mm having one handle for each half in center 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 kgs/sq.m. The joint chamber is filled with clean sand before closing. Lastly, back filling of joint chamber pit with excavated soil is carried out.

### 20.2 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 is required to be dug. Pre cast RCC chamber consists of three parts (i) round base plate in two half of 140 cm dia. and 5 cm thickness (ii) full round RCC joint chamber with dia of 120 cm and height of 100 cm and thickness of 5cm (iii) round top cover will be in two halves with dia of 140 cm and thickness of 5 cm having one handle for each half in center and word 'OFC ' engraved on it. After, fixing the pre cast RCC joint chamber, the joint chamber is filled with clean sand before closing. Lastly, back filling of joint chamber pit with excavated soil is carried out.

## 21. ROUTE/JOINT INDICATOR

21.1 The route/joint indicators are co-located with each manhole/joint chamber. The route-indicators are to be placed at intervals of 200m, along the route. In addition, route indicators are also to be placed where route changes direction like road crossings etc.

21.2 The route/joint indicators made of pre-cast RCC, should have the following dimensions-  
Base - 250 mm x 150 mm

*Rev*

*Supra*

Top - 200 mm x 75 mm

Height - 1250 mm

21.3 The route indicators are painted yellow and the same are placed at 2 ft away from the center of the trench towards jungle side.

21.4 The joint indicators are placed at OFC joints and placed 1 ft away from wall of the joint chamber facing jungle side and are painted red.

21.5 The engraved word '*(initials of service provider)* OFC' should be painted in white, on route- as well as joint-indicators.

21.6 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 route indicator means 6<sup>th</sup> route indicator after 2nd joint.

21.7 Additional joints on account of faults at a later date should be given number of preceding joint with suffix 'A, B, C, 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.

21.8 Enamel paints of reputed brand should be used for painting and sign writing of route- as well joint-indicators.

21.9 The pits for fixing the indicator shall be dug for size of 60 cm x 60 cm and 75 cm (depth). The indicator shall be secured in up right position by ramming with stone and murrum up to depth, of 60 cms 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 cms. Necessary curing shall be carried out for the concreted structure with sufficient amount of water for reasonable time to harden the structure.

## 22. P.P. Rope (for cable pulling)

6mm PP rope is drawn through the HDPE 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 PP rope used is 3 strands Polypropylene Para Pro rope having yellow colour and shall be of 6 mm diameter and it should have a minimum breaking strength of 550 kgs. The length of each coil of rope should be 205 meters and it should conform to (i) BS4928 Part-II of 1974, (ii) IS 5175 of 1982, (iii) It should be of special grade and should have ISI certificate mark (iv) It should be manufactured out of industrial quality Polypropylene.

Per

Accepted



Format for Requisition of Fund For Capex under NOFN Project

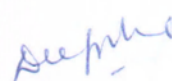
Agreement No. -----

Dated -----

1. I ....., aged about ..... years s/o, d/o of Shri ....., resident of ....., do solemnly affirm and state as under:
2. That I am ..... (Designation) of Bharat Broadband Network Limited, BBNL for creation and implementation of National Optical Fibre Network (NOFN) and I am duly authorized by the resolutions dated ..... passed by Board of Directors of the Company to furnish a Certificate on behalf of Bharat Broadband Network Limited for Requisition of Fund.
3. That a requisition of fund of Rs. .... (Rupees (in words).....) for ..... (works/material procurement) is being made for the NOFN Project. The details of calculation of fund requirement are as per Attachments enclosed.
4. That
  - a. the requisition of fund made through this Annexure is in accordance with the relevant provision(s) of the Agreement, and
  - b. cumulative release of funds made so far including this requisition is within the overall approved Project Cost.
5. That the contents of Attachments to this Annexure (i.e., Annexure-IV) are true and correct to the best of my knowledge, based on records of the company and the financial & physical progress with respect to the physical targets of the project are as per state wise/circle wise progress reports for the relevant period as already submitted through Appendix IV to Annexure -I.

For and on behalf of (Name of BBNL)

Signature of the authorized signatory of BBNL



**Format for Annual Auditor's Report on Statement(s) of Requisition & Utilization of Funds for NOFN Project**

To

The Board of Directors

.....  
.....

We have examined the attached Statement(s) of Requisition of Funds from USO Fund of M/s Bharat Broadband Network Limited for the period ending \_\_\_\_\_. We understand that the aforesaid statement(s) is /are to be furnished to the Central Government for assessment of the fund payable to M/s Bharat Broadband Network Limited by the Government, in terms of the Agreement No. .... for release of funds for Creation and Implementation of National Optical Fibre Network for provision of Broadband Connectivity to the Panchayats.

We report that:

We have obtained all the information and explanations, which to the best of our knowledge and belief were necessary for the purposes of our audit.

In our opinion and to the best of our knowledge and belief and according to the explanations given to us, the Statements have been prepared in accordance with the conditions contained in the said Agreement and clarification thereon in this behalf and gives a true and fair view of the funds requisitioned and utilised for the period computed on the basis of the aforesaid conditions.

**(NAME AND SIGNATURE WITH COMPANY'S SEAL)**

