
ANNEXURE A**TECHNICAL SPECIFICATIONS AS PER TEC GR**

1. Aerial Drop Optical Fiber Cable (For Last Mile Application): As per TEC GR No. : TEC/GR/TX/OFC-024/01/MAR-15 with latest amendments, if any.
2. Aerial OF Cable (ADSS Cable): 24/48 pair ADSS on power lines: As per TEC GR No. TEC/GR/TX/OFC-022/02/MAR-17 with latest amendments if any.
3. HDPE: As per TEC GR No. TEC/GR/TX/CDS-008/03/MAR-11 with latest amendments, if any.
4. FDMS: As per TEC GR No. GR/FDM-01/02. APR 2007 with Amendment Dated 02.05.2012, with latest amendments if any.
5. FTB: As per GR No. TEC/GR/TX/FTB-02/02/APR-2010 . Type . II, with latest amendments if any.
6. SJC: As per GR No. TEC/GR/TX/OJC-002/03/APR-2010, with latest amendments if any.
7. BJC: As per GR No. TEC/GR/TX/OJC-002/03/APR-2010, with latest amendments if any.
8. TENSION POLE ASSEMBLY SET (TUBULAR): As per GR No. GR/OFA-01/02.Jul 2005, with latest amendments if any.
9. TENSION POLE ASSEMBLY SET (RAIL): As per GR No. GR/OFA-01/02.Jul 2005, with latest amendments if any.
10. SUSPENSION POLE ASSEMBLY SET (TUBULAR): As per GR No. GR/OFA-01/02.Jul 2005, with latest amendments if any.
11. SUSPENSION POLE ASSEMBLY SET (RAIL): As per GR No. GR/OFA-01/02.Jul 2005, with latest amendments if any.
12. FIXED ATTENUATOR: As per GR No. TEC/GR/TX/OPA-003/03/Oct 14, with latest amendments if any.
13. SPLITTERS 1:2: As per TEC GR No. TEC/GR/TX/OPT-001/01/ APRIL-12, with latest amendments if any.
14. SPLITTERS 1:4: As per TEC GR No. TEC/GR/TX/OPT-001/01/ APRIL-12 with latest amendments.
15. SPLITTERS 1:8: As per TEC GR No. TEC/GR/TX/OPT-001/01/ APRIL-12 with latest amendments.
16. SPLITTERS 1:16: As per TEC GR No. TEC/GR/TX/OPT-001/01/ APRIL-12 with latest amendments.
17. SOLAR PANEL: As per TEC GR No GR/SPV-02/03 May 2008, with latest amendments if any.

18. BATTERY: As per TEC GR NO. GR/TX/BAT-001/04/068 JUL 2016 dated 29.07.2016 (with latest amendment, if any)
19. PATCH CORD: As per TEC GR no. TEC/GR/TX/OFJ-01/05/Nov-09, with latest amendments if any.
20. GPON equipment: As per TEC GR no. GR/PON-01/02 APRIL 2008 with all amendments
21. GPON network: As per TEC GR no. GR/PON-01/02 APRIL 2008 with all amendments
22. OFC: 48 Pair OFC: As taken from BSNL Tender No. : Tender Enquiry No.: CA/Ent.-CNP/OFC/T-553/2016 issued on 24-June-2016.
Note: Draft GR GENERIC REQUIREMENTS NO. TEC/GR/OFC-23/01/XXX-2011 (under finalization in TEC, finalized GR and its latest amendment, thereof, will be considered).

TECHNICAL SPECIFICATIONS (DTR)/REQUIREMENTS FOR 24F and 48F METAL FREE OPTICAL FIBER CABLE WITH DOUBLE HDPE SHEATH (G.652D Fiber)”

- i. GR No. TEC/GR/TX/ORM-01/04 SEP.09 Specification for Raw Material used in Manufacturing of Cables.
- ii. GR No. GR/OFT-01/03. APR 2006 Tools for installation & Operating the OFC & for assembly of the OF Splice Closures.
- iii. GR No. G/CBD-01/02. NOV 94 Drum specifications for Cable ends.
- iv. GR No. TEC/GR/TX/OJC-002/03/APR-2010 Specifications for Splice Closure for Optical Fiber Cable.

Note: All the materials as above have to be TSEC/Type approved by BSNL QA/TEC against mentioned TEC GR or as per the approval procedure of BBNL for which TEC GR not there.

Annexure-B

GENERAL REQUIREMENTS FOR DATA CENTER AND NOC

Network Operations Center(NOC):

The NOC is hub for monitoring and management of network operations which can be implemented in distributed manner . BBNL NOC will have pan-India view of network operations through umbrella NMS. The present BharatNet-NOC is also designed to support distributed NOC operations. The State NOC shall be implemented in such a manner that both umbrella NOC and States NOC will have common database and efforts shall be complement to each other. Creation, editing and viewing rights of NMS shall be assigned to the different stake holders as per the policy decided by State Govt.

Generally there will be only one Network operation Center (NOC) for managing all Network elements commissioned under Bharat Net Phase -1 & Bharat Net Phase-II in Odisha State. However, presently bidder will quote the price for establishment of one NOC Centre for managing Network elements covered under Bharat Net Phase-II only. But, NOC should have capacity for augmentation of its resources both hardware and software for managing all network elements in future, whenever it is desired by the owner , cost calculated in a scalable manner.

The overall Scope of Work (SOW) for the Bidder includes the following.

- . Design of the proposed Virtual Private Cloud DC
- “ Bidder may suggest innovative interior design layout for the NOC Operations area, and prepare working drawings / shop drawings good for execution of interior fit out works for the layout and BOM for design in consultation and approval of consultant / purchaser.
- “ Design layout of the NOC operations area in accordance with the team segregation & NOC resource requirements. Bidder should take consultation and approval of consultant / purchaser, for the interior layout and material to be procured for the operations area.
- . NOC area consists of the network operation center (NOC) room, helpdesk, reception area, meeting room, manager cabin, Electrical room and Conferences room. . Design, Supply, installation and setting up of the necessary basic Infrastructure Civil interior work, electrical, air-conditioning system, fire prevention detection and suppression System, Rodent replant system, water leak detection system etc. . Design, Supply, installation and setting up of the multi-layer Physical Security infrastructure like bio-metric based access-control system, CCTV/ surveillance systems.

- Design, Supply, installation of operation Area at NOC.



NOC OPERATION CENTER

As part of this RFP, it is proposed that a Network Operations Center (hereinafter referred to as "NOC") shall be established for monitoring the network infrastructure laid as part of Bharat Net II in Odisha across all locations as proposed in this RFP. The minimum requirements/ specifications for the NOC area are detailed in the following sub-sections. While it is mandatory for the Bidder to meet these minimum requirements, if the Bidder estimates that a particular requirement would need a higher category of equipment, the Bidder shall provision for the same in the bid response. The Bidder shall however provide basis for arriving at the solution being proposed as part of his bid.

The NOC shall analyse network problems, perform troubleshooting, communicate with various NMC officials / technicians and track problems through resolution. The key objective of the NOC is to ensure the health and availability of components. When necessary, NOC shall escalate problems to the appropriate stakeholders. The Bidder shall develop service catalogue for NOC and get a sign off on the same from purchaser / authorized entity.

Features of NOC

- Incident Management based on incident Category

- Remote Infrastructure Management for Configuration, fault diagnosis, preventive maintenance
- “ Tracking and reporting of all contractual SLAs in an automated way.
- “ Update knowledge base for technical analysis and further help end-users to search solutions for previously solved issues.
- “ The NOC shall escalate issues in a hierarchical manner, so if an issue is not resolved in a specific time frame, the next level is informed to speed up problem remediation.
- “ The Services Catalogue for the NOC has to be prepared by the Bidder and get a sign off from Purchaser. Indicative list of services that have to be provided through the NOC are mentioned below.

Core Infrastructure Requirements

- “ Access Switches
- “ Video Wall & Video Conferencing solution
- “ Sitting Infrastructure
- “ Cooling
- “ Power and LAN Connectivity

NOC Requirements

- “ NOC to be established at Bhubaneswar in a space provided by the Authority complying the best-in-class standards
- “ NOC will act as centralized management on full-network resource inventory to improve utilization of in-service resources
- “ Provide key correlation analysis for network fault processing to improve network fault processing efficiency
- “ Provide the function of automatic service design and resource distribution
- “ Provide performance & trend development analysis of network equipment and impact range of network fault and supply end-to-end service quality management & control, which control network & service quality continuously and enhance customer satisfaction
- “ Provide FOA (Field Operation Assistance) for field engineers
- “ Contractor needs to survey the site; design the layout of the site including all the standard furnishings etc. to make the NOC operations. The complete BOQ of the work to be done at NOC needs to be submitted along with the design and approval to be taken from the Authority before start of the work
- “ Integration with National NOC - NOC will integrate with a National NOC which is being set-up at the National Capital Region (New Delhi). This integration will include:
- “ Integration of state NMS with national NMS for monitoring of the state network status at the national NOC

“ In case of different technologies deployed at the state and the centre, the technologies for monitoring will also be different probably. The bidder selected for the Bharat Net-II in odisha will have to develop the required connectors wherever needed (to tackle the integration between open as well as proprietary network interfaces) to realize this integration, and also have to understand other systems and integrate it with the monitoring solution of NOC. In short, whatever additional development will be required for this implementation, will be part of the bidder's (Bidder's) responsibility. This also means that the national NOC (NNOC) shall be provided a view into the Odisha NMS by providing them with user credentials that would enable them to have read-only access into the state NMS, and if required NNOC shall be provided with single consolidated view of certain features of state NOC, mutually agreed upon.

NB: The owner reserves the right to take out the Scope (establishment of NOC works) from the Schedule of Requirement (SOR) for either of the lowest bidders for Package-I or Package-II since only one NOC is required for the entire project covered under Package-I & Package-II. The lowest bidder either for Package-I or Package-II found suitable financially shall be awarded the establishment of NOC works.

Annexure-C

TECHNICAL SPECIFICATIONS OF GPON & SOLAR POWER EQUIPMENT

1. The technical specification applicable for GPON equipment under the scope of this tender is as per the TEC GR No. GR/PON-01/02 APRIL 2008 with all amendments. In the GR for the purpose of this tender.
2. The constituents of GPON network shall be as per TEC GR No. GR/PON-01/02 APRIL 2008 with all amendments along with the following modifications as per the requirement of JCNL.
3. The upstream & downstream shall be 1.244Gbps and 2.448Gbps respectively per OLT GPON Port with link/optical budget.
4. There shall be various options provided to JCNL e.g. 1:2, 1:4, 1:8, 1:16, 1:32, 1:64, 2:2, 2:4, 2:8, 2:16, 2:32 and 2:64 splitters. JCNL may use a combination of these split options.
5. The RF delivery shall not required by JCNL.
6. OLT specifications: Hardware capability:

6.1) OLT Chassis

6.1.1) OLT Chassis & allied Accessory including 19" standard rack/ ETSI 21" rack, 24 U size with 1+1 power module etc. and the installation materials equipped with the line cards in N+1 redundancy mode (where N = no. of line cards). Type/Model of OLT Chassis supplied shall be same across all OLT sites. Type/Model of GPON Line Cards supplied for one OLT chassis shall be same.

6.1.2) The OLT chassis shall have a capacity of 32 PON ports or above. 6.2) Line Termination Requirement 6.2.1) Capacity of each line card shall be either of (i) Four (4) PON Ports (ii) Eight (8) PON Ports (iii) Sixteen (16) PON Ports

6.2.2) (The above specifications are minimum requirement. The vendors can supply higher versions at their choice)

6.3) NETWORK TERMINATION CARD

6.3.1) Two Network termination cards should be provided per OLT in redundancy/load sharing configuration.

6.3.2) Each network termination card equipped with Four (4) 1 GigE uplink interfaces.

6.3.3) 1 GigE Interfaces shall have SFP optics with either of the following requirement.

(i) 850 nm MMF (500m) – Qty 1

(ii) 1310 nm SMF (10Km) – Qty 1

(iii) 1550 nm SMF (40Km) – Qty 1

(iv) 1550 nm SMF (80Km) - Qty 1 (The exact requirement shall be indicated at the time of installation)

6.3.4) Network termination card equipped with two (2) 10 GigE uplink shall be optional and may be used in future.

6.3.5) 10 GigE interfaces shall be XFP optics with either of the following requirement.

(i) 10G base LW 1310nm interfaces.

(ii) 10G base ZW 1550nm.

7. The adapters to be provided for terminating in adapters/ connectors on OLT side shall be SCPC. The connectors/ adapters at ONT side shall be SC-APC.

8. Types of ONT

8.1.1 ONT shall have following subscriber interfaces: Type 1/4 (Business ONT for deployment at GP HQ) a. One Uplink PON Port b. Four (4) Ethernet ports with 10/100/1000 Base-T interface c. IEEE 802.11n Wi-Fi Interface with in-built implementation. d. 1 USB 2.0 ports (or better) for interfacing with SPV power systems for online monitoring purposes and other similar management functions e. 2 POTs ports

8.1.2 Business customer at GP may connect to ONT device at GP over fiber. This can be achieved by deploying one Ethernet to Optical Converter (10/100/1000 Base- T interface to SFP) for each of such customers

8.1.3 Ethernet to Optical Converter shall have following specification. General Specification:- Shall convert Electrical Ethernet (10/100/1000 Base-T interface) to Optical Ethernet (1000 Base-FXSFP interface). One 10/100/1000 BASE-T electrical Ethernet port. One 1000Base-FX Optical SFP Ethernet ports Shall cover fiber connectivity up to 02 km distance from ONT site through use of appropriate SFP module. SFP port shall support 1310/1550nm wavelength for Single Mode Fiber Operation. Shall accept -12 V DC +/- 1.5 V power supply. It shall be compatible with the SPV power supply systems to be procured. Shall be robust to operate in temperature range from -40C to 55C Transparent pass through of VLAN tagged and untagged user traffic LED indications for Link, Activity & Speed Compliance FCC Class A, EN55022, EN55024

9. Ethernet user interfaces at UNI of ONT and SNI of OLT Specifications:

9.1 The following Ethernet interface options for SNI of OLT shall be supported:

9.1.1 1000 Base SX (50 μ multimode) 850 nm interfaces.

9.1.2 1000 Base LX (10 μ singlemode) 1310 nm interfaces.

9.1.3 1000 Base ZX (10 μ single mode) 1550 nm interfaces

9.1.4 10G base SR 850 nm interfaces.

9.1.5 10G base LW 1310 nm interfaces.

9.1.6 10G base ZW 1550 nm interfaces Requirement of these interfaces are site specific, quantity of which is to be ascertained by bidder base on site survey.

9.2 The following Ethernet interface options for UNI of ONT shall be supported.

9.2.1 10 Base T

9.2.2 100 Base T

9.2.3 1000 BaseT

9.3 The specifications for these interfaces shall comply with TEC GR No.: GR/EMC 01/01.JUN.2006 on Ethernet Media Converter or latest amendments, if any.

10. The OLT shall provide In-band connection to the EMS through GigE and out-band management connection to the EMS through minimum one 100 BaseT Ethernet port.
11. The Control card should have provision for minimum one management ports (100 BaseT Ethernet) for connecting to EMS or for connecting LCT (Laptops).
12. Supply of EMS software over CDs by the vender is mandatory. (Two Sets per EMS Site).
13. The bidder has to submit a statement of deviation with respect to TEC GR document. In case there is no deviation NIL statement should be submitted.
14. Hybrid Solar Photovoltaic (SPV) Power Supply System

14.1 The technical specifications of the hybrid SPV power supply shall be as per the TEC GR No. No.GR/SPV-02/03 JUN 2008. In case of any conflict in interpretation of this GR, specifications of this tender supersedes GR.

14.2 The SPV Power Supply system shall be supplied as complete package by the vendor along with the ONT. SPV system shall provide power supply to ONT system, Ethernet to Optical Converters.

14.3 SPV power supply system shall consist of following subsystems: VRLA battery (for 12Hrs Back-up) : 12V, 17AH Solar Panel: 12V / 60W SMPS: 12V / 7A Charge Controller: 120W

14.4 Solar Panel

14.4.1 Solar Panel shall be put on roof top structure or, on Mast. The specification of roof top structure / Mast shall be site specific which shall be decided along with JCNL.

14.4.2 AR Coated tempered toughened Glasses should be used with Solar Panel.

14.4.3 Solar Module must be with positive tolerance of Power.

14.4.4 Only Silicon Sealant shall be used while manufacturing the solar modules.(Sealing tapes are not allowed).

14.4.5 Micro Crack in solar cells must be checked as part of process to manufacture modules

14.4.6 Power cable length from Solar Panel to CCU shall be minimum 20meter in length however it shall not lead to drop in charging voltage.

14.4.7 Shall use screw-less anodized aluminum frame to provide structural strength.

14.4.8 Manufacturing facility shall be certified to ISO 9001:2008, ISO14001:2004.

14.5 VRLA Battery

14.5.1 The batteries to be supplied with the SPV power systems shall be VRLA type from TEC/ TSEC approved vendors and the specifications shall be conforming to TEC GR NO. GR/TX/BAT-001/04 JUNE 2011 (with latest amendments). In case of any conflict in interpretation of this GR, specifications of this tender supersedes GR

14.5.2) Battery would be 12V mono-block type. Battery should not be allowed to discharge beyond 80%. Auto cut-off should happen.

14.5.3) Battery would support charging at rate up to 0.2C or higher where C is batteries AH rating..

14.5.4) Manufacturing facility shall be certified to ISO 9001:2008, ISO14001:2004.

14.6 Charging Control Unit (CCU)

14.6.1 The CCU should have provision that the battery should be charged, as per charging current specified, both from the solar power as well as the grid supply. Solar will be Primary Source and Grid Supply will be Secondary Source.

14.6.2 The CCU supplied with the SPV shall have provision for 1 USB 2.0 ports (or better) for remote control and monitoring the health of the SPV system based on various parameters like battery levels, charging current, rate of discharge, depth of discharge, available capacity and other such values. These parameters shall be recordable and available at EMS (and NMS) for monitoring. The EMS software shall be accordingly provisioned to monitor these parameters also.

14.6.3 Manufacturing facility shall be certified to ISO 9001:2008, ISO14001:2004.

14.7 The bidder should have proper legal agreement with the supplier to guarantee quality, timely supply, performance, warranty and AMC during the full life-cycle of the contract.

15. Maintenance of battery sets provided with the SPV systems: As part of preventive maintenance, the bidder shall carry out the following activities:

15.1) The charge-discharge cycle testing of the batteries at an interval of every six months.

15.2) Take suitable corrective action for repair/ replacement in cases of any deficiency in The performance parameters.

16. Earthing at ONT sites: The bidder shall provide suitable earthing arrangement as specified in TEC GR No. GR/SPV-03/02 JUN 2005, clause 2.5, at all the ONT locations. The bidder shall measure the earth resistance value once every year during warranty and AMC period. The bidder shall provide the schedule of the same. Earthing requirement is for SPV system only.

17. The specifications of the Splitters shall be as per TEC GR No. TEC/GR/TX/OPT-001/01/ APRIL-12 with latest amendments. The Splitter shall be wall mountable (Type-1) type. The patch panel shall be supplied with SC-APC connectors.