



Request for Industrial Consultation

Reference No: ITI/COR/P&T/RIC/UBR/2025

Date: 10.01.2025

ITI LIMITED
Registered & Corporate Office
ITI Bhavan, Dooravaninagar
Bengaluru - 560 016
CIN No: L32202KA1950GOI000640

Request for Industrial Consultation

ITI invites industrial consultants either from individuals or from representing companies to discuss regarding Unlicensed Band Radio (UBR) for BharatNet Phase-III requirement.

About ITI:

ITI Limited is the first Public Sector Undertaking of India, under the ITI Limited (ITI), a Public Sector Undertaking under the Department of Telecommunications, Ministry of Communications, is a leading Telecom equipment manufacturer and turnkey solution provider in Information and Communication Technologies (ICT) and Telecom Domain in India. ITI is having state of the art electronic manufacturing infrastructure in its plants situated at Bengaluru, Palakkad, Rae Bareli, Mankapur and Naini. It has PAN India presence through its Marketing, Services & Project offices (MSP). The major customers are Government/ Defence/ Paramilitary forces/Railways/PSUs like BSNL, MTNL/Private Corporates. More information can be viewed on www.itild.in.

Unlicensed Band Radio (UBR) for BharatNet Phase-III:

ITI has participated in the RFP for Development (Creation, Upgradation and Operation & Maintenance) of Middle mile network of BharatNet on Design Build Operate and Maintain (DBOM) Model (BharatNet PH-III) and has received few packages in this Tender. There is requirement of Unlicensed Band Radio (UBR) in BharatNet Phase-III Project with specifications as per Annexure-A.

Industry Consultation:

In view of the BharatNet Phase-III Project, ITI is intended to conduct an industry consultation with domain experts and to invite individual experts or company representative to share their capabilities in the Unlicensed Band Radio (UBR) domain and finalising the open tender for the same.

Eligible Consultants/ Domain Experts / Individual Experts or Company Representative may give the consent in the attached format.

Tentative date of consultancy meeting will be from 15.01.2025 to 22.01.2025. **Venue:** ITI Bhavan, ITI Limited, Dooravaani Nagar, Bangalore – 560016/VC (on request). Interested attendees are advised to share their convenient time slot in advance to ensure the availability of ITI Team through mail pp_crp@itilttd.co.in.

Disclaimer:

ITI Ltd. reserves the right to accept or reject any offer, cancel the this notice at any time, without thereby incurring any liability to the offers or any obligation to inform the consultant or Company of the grounds for ITI Ltd.'s action.

Qualification and Experience for Consultants:

The qualification and experience criteria for the experts are as follows.

- 1) Number of years in associated domain: 0-2 years
- 2) Compliance of Technical specification as per Annexure-A

CONSENT FOR REQUEST FOR INDUSTRIAL CONSULTATION

Dated:

To,

General Manager
Products & Technology,
ITI Limited,
Regd. & Corporate Office,
ITI Bhavan, Doorvaninagar
Bangalore - 560 016

Dear Sir/Madam,

I, Mr/Ms -----, hereby giving my consent to participate in the Industrial consultancy meeting arranged by ITI. I am a consultant/ domain expert / individual expert or company representative ----- (please strike whichever not applicable).

My credentials / Company approvals (please strike whichever not applicable) are attached for the reference.

My contact details further correspondence on this service will be as under:

Mobile no:

Telephone no:.....

Email: -----

Address:-----

Yours Faithfully,

Signature and Seal

Annexure-A

Note* Requirement is extracted from the BSNL Tender No. MM/BNO&M/BN-III/T-791/2024 issued on 15.02.2024 which may vary during actual execution

1. The Bidder shall supply, install and commission microwave links in 5.X GHz unlicensed band. The transmission equipment shall conform to latest TEC specifications/ GR: TEC/GR/R/ISM-MOD-001/04. MAR 2016 (except for those specific requirements stated in this section or those that have been outdated due to technology advances and the functional requirement has been met or exceeded) complete with Antenna, feeder and installation material. 23/25/27/29/32dbi antennae shall be used in the engineering of the links. The provision of BITE is not essential, provided other provisions like LED to broadly indicate the health of the system for split radio and LCT for full outdoor unit (FO), Ethernet port for IP connectivity to external EMS or NMS of BSNL and connectivity to local terminal [LCT/laptop] are all available.

2. The Antenna System of UBR should be Dual polarized (Horizontal & Vertical) and shall support Frequency range- 5150 to 5875 MHZ. The failure of either horizontal or vertical polarization shall not lead to failure of the system as a whole. The entire antenna supplied shall be dual polarized for the hop concerned.

3. The UBR system shall be of Full Outdoor architecture (FO). The necessary cables/accessories required for extending the bandwidth from the system to the user equipment like BBU shall be provided as part of the installation material. MCB addition, if required, at any site shall be done as part of I&C.

4. The system configuration, commissioning and monitoring shall be possible to be done using a local terminal [laptop] connected externally through standard Ethernet interface. One such terminal shall be supplied with every 200 hops. There shall be appropriate LCT with Browser-based user interface with GUI which shall indicate PMON/RMON to assess the performance of the system with last 7 days historical data.

5. BSNL is in the process of commissioning a nationwide network monitoring platform and it shall be possible to integrate these Digital Microwave nodes through their EMS to the upcoming platform through standard interfaces including SNMP v.1/v.2/v.3. All the required support shall be extended during warranty and AMC for such integrations.

6. One electrical GE ports [10/100/1000 Base-T[X] type with auto negotiation] or 1 GE optical ports (1310nm, all with auto-negotiation, 5 Km range SFPs) shall be provided for FO. Applicable modulation schemes of QPSK to up to 1024 QAM with AMR shall be equipped with for achieving spectral efficiency in 5.X GHz bands.

7. The UBR shall provide the throughput as below: BSNLCO-MMT/14(11)/3/2024-MMT I/614512/2024 Page 154 of 595

7.1 The throughput for a hop distance of 6-10km shall be minimum 500 Mbps (uplink and downlink) without packet loss for 90% of such sites and remaining 10% sites can be accepted with 25% reduced throughput (375Mbps) without packet loss.

7.2 The throughput for a hop distance of 10-14 km shall be minimum 400 Mbps (uplink and downlink) without packet loss for 90% of such sites and remaining 10% sites can be accepted with 25% reduced throughput (300 Mbps) without packet loss.

7.3 The throughput for a hop distance of 14-18 km shall be minimum 200 Mbps (uplink and downlink) without packet loss for 90% of such sites and remaining 10% sites can be accepted with 25%reduced throughput (150 Mbps) without packet loss.

8. All network elements handling IP shall support IPv6 addressing and routing with backward compatibility for IPv4. All equipment (Hardware, firmware, software) / services / features should be available on both IPv4 and IPv6 simultaneously (dual stack). All the network elements located within the LSA including the IPMPLS networking elements shall use only private IP address.

9. Ethernet latency shall be < 30 Milliseconds. However, bidder shall specify the exact value for various configurations, frame size and packet sizes

10. The MW radio shall be housed in a weatherproof casing (IP 65 compliant) designed for all weather operation and shall be preferably directly integrated with the antenna. It should be leaking proof during monsoon/snow fall.

11. There shall be dedicated auto-tests in all the network elements and equipment required for installation, troubleshooting, Maintenance, etc.

12. All network elements shall have the ability to upgrade software or hardware in the live system without any interruption or degradation of

services. Any planned outage for major upgrade is permissible in maintenance window only, but the traffic shall be protected through stand-by systems wherever feasible.

13. It shall be possible to expand the capacity of Microwave link by adding hardware & software to a live system without any interruption or degradation of services. Further, in general, all hardware and software expansions shall be possible without any downtime. However, In case of any major upgrades which require downtime, they shall be done in the maintenance window with the approval of in- Charge of operations.

14. The UBR microwave system availability shall be at least 99.9% measured over a period of one year and accordingly each network element forming part of the system shall have much improved fault tolerance and higher reliability.

15. The software version of equipment to be supplied shall be the latest and same for all configurations and for all the sites including validation site. The hardware version to be supplied shall be the latest version and the same for all configurations and for all sites including the validation site. BSNLCO-MMT/14(11)/3/2024-MMT I/614512/2024 Page 155 of 595

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

17. The Frequency Support and EIRP norms shall be as per MOC (Wireless Planning and Coordination Wing) Notification 2018. Equipment type approval (ETA) shall be submitted with the technical bid.

18. There shall be Selectable channel bandwidth of 20, 40, 80,160 MHz without any SW licenses or restrictions.

19. The Radio shall support Automatic Transmit Power Control (ATPC).

20. The radio modem shall support Ethernet Features like: i. Q-in-Q ii. Access, Trunk, Transparent, and management VLAN iii. 4 Level Priority quality of service (QoS) as per IEEE 802.11d WMM iv. 9000 bytes Jumbo Frame v. Both IPv4 & IPv6 IP addressing

21. The radio modem shall support Layer 2 Bridge.

22. Interference Mitigation Methods: 22.1 Automatic Dynamic Channel Selection: The link should automatically select the best channel available in

case the interference level in the present channel exceeds a threshold. This switch shouldn't cause any disturbance to traffic. 22.2 Dynamic Data Rate Selection: DDRS switches to the subsequent possible modulation in case of site-specific interference. Radio should support asymmetric TDD (Uplink and Downlink ratios) which should also be Dynamic or Fixed based on application needs.

23. The radio link shall have 256-bit AES encryption or higher.

24. Radio must support GPS based synchronization to avoid interference from multiple mast located in same area.

25. It should be possible to run bulk upgrades in field. Schedule upgrades should also be possible. New firmware download in radio shouldn't affect user traffic.

26. The Radio shall have inbuilt spectrum analyzer to check the result of both ends.

27. The microwave Antenna shall have a snow resistant Radom for extended temperature variants. 28. Radios should come with support for a link planning tool without any extra cost to the buyer. Link planning tool should support creating of reports including link budget and path profiles based on Google Earth data. BSNLCO-MMT/14(11)/3/2024-MMT I/614512/2024
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29. In case, any item/ service/ functionality are required for successful interworking, the supplier will have to supply the same at no additional cost. The inter-working and interoperability with all the existing network elements is the sole responsibility of the Successful Bidder.

30. The Purchaser reserves the right to specify the details of redeployment. Redeployment of such items has to be done by the supplier as per the price finalized through this tender.

31. The successful bidder shall undertake to do the necessary customization as and when required by BSNL besides providing details of the APIs data structures so as to ensure smooth integration without any cost to USOF, DoT/BSNL.

32. A soft copy of the documentation shall be supplied in each of the network elements.

33. Radio shall have DC surge immunity as per IEC 61000-4-5, Level 2.

34. Radio shall support modulation of 1024QAM or better and throughput capability of 1 Gbps or Higher.

35. Radio should support detailed Ethernet interface monitored from NMS

35.1 Ethernet Tx/Rx (Data rate) counters that can be

36. Radio should support detailed Wireless interface monitored from NMS counters that can be

36.1 Wireless Tx/Rx (Data rate)

36.2 Wireless Tx/Rx usage

36.3 Wireless drop packet

37. EMS System: The successful bidder shall have to supply EMS for each of the Network elements supplied in the package with access provided to all circles of the concerned package. The EMS to be supplied shall conform to TEC standard EMS-TEC-SD-IT-EMT001/01/MAR-16 or latest. It is the responsibility of successful bidder to integrate EMS on package basis with NMS by providing standard open interfaces so as to collate the O&M reports/data/logs.

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

37.2 If all the traffic and statistical reports as required by the Purchaser are not available then necessary post processing software for off-line generation of traffic reports is also to be provided to each Circle along with necessary hardware including printer. However, sometimes, the data need to be changed due to modifications to be carried out at site, supplier has to ensure that necessary modification of the system, office and network data shall be possible to be modified at site together with re-configuration, BSNLCO-MMT/14(11)/3/2024-MMT I/614512/2024 Page 157 of 595 if required. Necessary tools and commands have to be provided by the supplier for the same.

37.3 All server-based applications shall have latest servers equipped with processors having processing speed of 2.2 GHz or higher. The servers shall be of minimum 16 cores scalable to 48 cores within same chassis with minimum 256GB DDR4 RAM and minimum 48MB L3 cache memory. Scalability shall

be in all the related components within the chassis and can be implemented easily without shutting it down. Partitioning of the servers is allowed for multiple applications. All the servers and storage shall be powered by DC (nominal - 48V) for the four zonal centers. The bidder shall provide full details regarding power, space, and heat dissipation for each node/platform. 37.4 The processor loading at rated capacity of the network elements shall not exceed 70% of the total processor capacity. Dimensioning of all nodes shall be done with a maximum loading of 70% for memory, signaling, CPU usage etc. Similarly, all critical storages are to be dimensioned to be occupied not more than 70% at the rated load of the Network Element.

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

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

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

38. 4 Ports managed PoE switch with one Uplink:

38.1 The 4 Ports managed PoE switch will be deployed.

38.2 The PoE Switch shall be able to supply sufficient power to the UBR so as to achieve the throughput requirement.

38.3 The L2 LAN switch shall have full IPv4 and IPv6 support.

38.4 L2 Switch being procured through this tender shall be Dual Stack configurable and Non-Blocking Architecture.

38.5 The no. of 10/100/1000Base-T PoE interfaces or ports on LAN switches shall be as per SoR ordering.

38.6 The backplane Switching capacity of LAN switch shall be 10 Gbps or better and non-blocking.

38.6.1 IEEE 802.3ad LACP- Link Aggregation.

38.6.2 IEEE 802.1AB LLDP. BSNLCO-MMT/14(11)/3/2024-MMT I/614512/2024 Page 158 of 595 38.6.3 IEEE 802.1p prioritization, DiffServ/COS.

38.6.4 Broadcast and Multicast Suppression.

38.6.5 ACLs/filters.

38.6.6 Support for Rate limiting/Queue Shaping.

38.6.7 Dynamic VLAN Assignment.

38.6.8 Configuration backup and restoration

38.6.9 Port Mirroring

38.6.10 Forwarding rate 8.93 Mpps 64 bytes

38.6.11 Memory Buffer: 4 MB RAM: 1 GB Flash: 128 MB

38.6.12 Jumbo frame 9.600 bytes

38.6.13 MAC address 8.000 (automatic updates, two-way learning) 38.6.14 Network Management L2+

38.6.15 Port aggregation "LACP, Static aggregation

38.6.16 PoE IEEE 802.3af/at, Supports PoE management (programable PoE, power limit, Iority...) 38.6.17 Power Consumption "Max 30W per port IEEE 802.3af/at Stand by < 50 Milliseconds or better. However, bidder shall specify the exact value for various configurations, frame size and packet sizes

38.6.18 Feeding vo-tage DC48 - 57V

38.7 Management Features:

38.7.1 Console Management Port on the front panel.

38.7.2 Zero Touch Provisioning 38.7.3 SMMP v1, v2 and v3 Support. 38.7.4 SSHv2 Support. 38.7.5 Telnet Support, TFTP, FTP, SCP and SFTP client.

38.7.6 Port Mirroring.

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

38.8 Quality of Service:

38.8.1 IEEE 802.1p Priority.

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

38.8.3 Shaping and Policing.

38.9 Security Feature:

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

38.9.2 RADIUS / TACACS+ Authentication support

38.9.3 MAC limiting per Interface/Port

38.9.4 SSH Remote Login

38.9.5 HTTPs

38.9.6 SNMPv3

38.9.7 MAC lockdown, MAC notification

39. Installation and Commissioning spares & consumables

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

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

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

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

40. Installation Material Per Hop Installation material for MW wi-l include –

i. Grounding cable including lugs.

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

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