ITI Limited

ITI Bhavan, Dooravani Nagar, Bengaluru – 560016

**CIN No: L32202KA1950GOI000640**

**CORRIGENDUM – 3**

# Request for Proposal (RFP) For the Selection of Antenna Technology Provider

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| **Corrigendum Ref: ITI/COR/PP/RFP/Antenna/CORG-3** | **Dated 21st Nov 2022** |
| Corrigendum Ref: ITI/COR/PP/RFP/Antenna/CORG-2 | Dated 15th Nov 2022 |
| Bidder's meeting | Dated 08th Nov 2022 |
| Corrigendum Ref: ITI/COR/PP/RFP/Antenna/CORG-1 | Dated 3rd Nov 2022 |
| RFP Ref : ITI/COR/PP/RFP/Antenna | Dated 28th Oct 2022 |

The queries were raised by prospective bidders and the same has been addressed as ITI's response in **Annexure – A**

There is no change in other Terms & Conditions

एस.जयंती / S. JEYANTHI
महाप्रबंधक – उत्पाद और प्रौद्योगिकी
General Manager - Products & Technology
आईटीआई लिमिटेड / ITI Limited
पंजीकृत एवं निगमित कार्यालय/ Regd. & Corporate Office
आईटीआई भवन, दूरवाणीनगर/ ITI Bhavan, Dooravaninagar,
बेंगलूरु / BENGALURU - 560 016

S. Jeyanthi
GM(P&T)
21/11/22

**Annexure – A**

**QUERIES AND CLARIFICATIONS: Request for Proposal (RFP) For the Selection of Antenna Technology Provider**

**Ref No: ITI/COR/PP/RFP/Antenna** **Date: 21.11.2022**

| SN | Clause No | Details as per RFP | Query | ITI's Response/Clarification |
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| 1 | 4.1.(C) | The Antenna system comprises of the following:<br>(a) Antenna.<br>(b) Remote Electrical Tilt (RET) sub-system [for antennae with UMTS & LTE ports] shall be provided as per Schedule of Requirements from customers.<br>(c) RF Cables | Vendors wanted to know about the Type and Length of RF cables to be used | Type of Jumper cable and connectors on Antenna side to be decided by the vendor and Length can be identified as per the site requirement during project execution.<br><br>All the terms and conditions of BSNL EOI MM/NWP-GSM-II/REG-POC-4G/E 697/2021 issued on 01.01.2021, its Annexures and subsequent BSNL RFP, Purchase Orders, Work Orders, Letter of Intents(LOIs) will be applicable to the selected Technology partner on back to back basis for successful completion of the this project. |

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| 2 | 4.6 | Antenna Technology Provider must agree to supply kit of the proposed product in Completely Built Unit (CBU) and Semi Knocked down (SKD) to ITI as per ITI requirement. | SKD Level will be decided by supplier | As per tender<br>Ref: ITI/COR/PP/RFP/Antenna |
| 3 | 4.9 | The Agreement on Antenna system manufacturing will includes the Mechanical tools, Hardware/software design, manufacturing, assembly. inspection, testing, quality assurance methods, troubleshooting, supply, Installation, Commissioning, servicing/ maintenance during the warranty/post warranty period, training, documentation, design upgrades , system integration etc. as per various customer requirements for SKD manufacturing of Antenna System. | Requested Amendment as OEM will not take responsibility of Installation, Commissioning and Integration. | This Clause is amended as below,<br>"The Agreement on Antenna system manufacturing will includes the Mechanical tools, Hardware/software design, manufacturing, assembly inspection, testing, quality assurance methods, troubleshooting, supply, Installation and Commissioning **if required** , servicing/ maintenance during the warranty/post warranty period, training, documentation, design upgrades , system integration **if required** etc. as per various customer requirements for SKD manufacturing of Antenna System". |

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| 4 | 4.11 | The Antenna Technology Provider should be responsible to provide free software /firmware/patches/ upgrades to ITI for the product as per customer order such as BSNL EoI MM/NWP-GSM-II/REG-POC-4G/E-697/2021 issued on 01.01.2021 and its Annexure – B.1 during the pre-sales and post sales phases of the product to ascertain the compliance of the product with the standards and specifications. | Kindly clarify how this clause is applicable for passive antennas | As per the tender<br>Ref: ITI/COR/PP/RFP/Antenna |
| 5 | 4.12 | The Antenna Technology Provider shall be responsible on behalf of ITI to obtain all necessary certifications and necessary approvals such as TEC/TSEC, CACT Certificate from BSNL (QA) and Test certificate from NABL/International accredited agencies for ITI make product if required. However, one time Certification & Testing Fees will be paid/reimbursed by ITI. | • Certification and testing responsibility will be of ITI, however ATP will only provide the resource to help ITI for obtaining the necessary certifications.<br>• ATP Scope will be limited to arranging samples for TSEC ITI to confirm whether all Antenna models will be tested or only few.<br>• All the Certification & Testing Fees will be paid by ITI. | Accepted |

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| 6 | 4.14 | ITI shall be procuring Completely Built Units (CBUs) and Semi knocked Down Units (SKDs) kits from the Technology Provider. Partner shall also extend the technical support for using the equivalent items from alternate source compatible to the kits provided. | Requested to remove line "Partner shall also extend the technical support for using the equivalent items from alternate source compatible to the kits provided." | The Amended Clause is as below,<br>"ITI shall be procuring Completely Built Units (CBUs) and Semi knocked Down Units (SKDs) kits from the Technology Provider". |
| 7 | 4.15. | The Antenna Technology Provider has to support ITI in setting up the infrastructure for the manufacturing of 4G Antenna and test set up upgradable to 5G Antenna manufacturing. | Requested more clarification | Bidder should provide the quote (Details of testers cost etc.) for the infrastructure set up required for CBU and SKD process of Antenna Manufacturing along with the bid. So that ITI can perform SKD manufacturing and testing. |
| 8 | 4.16 | The Antenna Technology Provider at their cost shall support ITI for field trial/proof of | Requested Amendment that integration of Antenna system with back end | In the field/sites the bidder has to perform the testing to the satisfaction of the customer. However number of PoC sites will be decided by ITI. |

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| | | concept (PoC)/TSEC by providing samples of 3 sets for each type approved Antenna System free samples as per customer requirement towards the pre-supply qualification for the customer orders. The Antenna Technology Provider has to undertake the responsibility of integrating the Antenna System with the back end system in coordination with the Telecom solution provider of the customer during the PoC as per the requirement of BSNL EOI MM/NWP-GSM-II/REG-POC-4G/E-697/2021 issued on 01.01.2021 and its Annexure. | system is not the responsibility of OEM. | |
| 9 | 5 B (XX) | A Performance Bank Guarantee (PBG) for Project rollout of 3% of the work order would be required to be submitted for the period of project execution, which would be released after rollout of the project and after receipt of payment from customer. Period | Request to remove PBG clause | As per Tender<br>Ref: ITI/COR/PP/RFP/Antenna |

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| | | of project execution will be considered up to obtaining the NOC (No Objection Certificate)/Commissioning Certificate from the customer. If PBG Validity is going to expire before obtaining NOC, it will be obligatory to vendor to extend the PBG validity Period accordingly<br>The PBG will be encashed in case of the following events.<br>i) The manufactured product by ITI will not meet the quality specifications of the prototype and is rejected by BSNL/TEC authorities.<br>ii) Manufacturing defect is attributed to the design of the product.<br>iii) Technology partner fails to correct the failure of the manufactured product within the reasonable time as per the requirements of the customer/BSNL. | | |
| 10 | D.i | **Technical Evaluation Criteria**<br>Antenna Technology Provider should have manufactured and supplied minimum 30000 Nos. per year of 3G/4G/5G types | The Purchase order copy will be too voluminous for sending experience of 30000 Nos of Antennas. Instead excel sheet mentioning PO details along with customer | Bidders to provide Excel sheet duly signed by the authorised signatory mentioning Purchase order(PO) date, Customer name, Supplied quantity, customer email id and contact number. If required party has to provide documentary proof for the above. |

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| | | Antenna System to Indian or Global entities in last 2 Years.<br>Documentary evidence (Customer POs and performance certificate along with contact no, email address of the customer) to prove experience to be submitted.<br>>40,000 numbers per year-25 marks<br>>=30,000 numbers per year -20 marks<br><30000 numbers per year –Bid will be rejected | email id and contact numbers may be accepted. | |
| 11 | D.ii | **Technical Evaluation Criteria**<br>Antenna Technology Provider should have designed, engineered, integrated, manufactured/ assembled "Antenna System meeting IS Standard or TEC GR standards as per Annexure-V" and obtained the required Type Approval Certificate from any | The capability of OEM should be accessed by visiting their manufacturing facility. Submission of IS /Type approval certificate from any NBL/International accredited agencies for the device should not be insisted. | The clause is modified as below.<br>"Antenna Technology Provider should provide a compliance statement that they have designed, engineered, integrated, manufactured/ assembled "Antenna System meeting IS Standard or TEC GR standards as per Annexure-V of the RFP" and will support ITI to obtain the required Type Approval Certificate from |

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| | | NABL/International accredited agencies for this device if required. Antenna Technology Provider must confirm that there are no Patent / legal issues that might become hindrance as per scope of RFP at any stage. Certification Document to be provided. | | BSNL/NABL/International accredited agencies for this device if required. Antenna Technology Provider must confirm that there are no Patent / legal issues that might become hindrance as per scope of RFP at any stage". **Above Compliance Document to be provided.** |
| 12 | D. vi | **Technical Evaluation Criteria**<br>Antenna Technology Provider's possession of Quality and Process certifications –<br>7) Certifications ISO 9001- 2 marks<br><br>ISO14001 – 2 marks<br>ISO 17025 – 2 marks<br>ISO 27001- 2 marks<br>b) (CMI LEVEL-3/ CMI LEVEL-5) – 2 marks | ISO certifications ISO 17025, 27001 and CMI level 3 and CMI Level 5 is not pertaining to Antenna System manufacturing. Requested to remove them from the RFP requirements. | Amended Clause is as below,<br>Antenna Technology Provider's possession of Quality and Process certifications –<br>7) Certifications ISO 9001- 2 marks<br><br>a. ISO14001 – 2 marks<br>b. Next Generation Mobile Networks Alliance (NGMN) Membership – 2 marks<br>c. 3GPP( 3rd Generation Partnership Project) membership- 2 marks<br>d. Antenna Interface Standards Group (AISG) Membership– 2 marks |

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| | | c) Tie-ups with standard world level Scientific/Technical Organisations in field of Radio Engineering -2 | | e. Tie-ups with standard world level Scientific/Technical Organisations in field of Radio Engineering -2 |
| 13 | B.ii | **General Commercial conditions**<br>The Antenna Technology Provider shall enter into an Agreement with ITI to enable ITI for the manufacturing and servicing of the product. | | Agreement draft is placed at Annexure-XIII |
| 14 | B.xxiii | **General commercial Conditions**<br>The bidder should submit an Earnest Money Deposit (EMD) of Rs. 3Cr (Rupees Three Crores) for participating in this EOI in the form of Demand Draft/bank Guarantee from a nationalized/scheduled bank in India in favour of "ITI Ltd" | Bidders requested that the EMD amount of Rs. 3 Crores is very high as the Bidders themselves have to take care of Material, technology handover etc. requested to relook on EMD amount based on the ITI financial exposure to the RFP | The bidder should submit an Earnest Money Deposit (EMD) of Rs. 1Cr (Rupees One Crores) for participating in this RFP in the form of Demand Draft/bank Guarantee from a nationalized/scheduled bank in India in favour of "ITI Ltd" payable at Bengaluru or online transfer to the account as below<br>Name of Account Holder: ITI Limited<br>Name of Bank: STATE BANK OF INDIA, DOORAVANINAGAR, BENGALURU |

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| | | payable at Bengaluru or online transfer to the account as below<br>Name of Account Holder: ITI Limited<br>Name of Bank: STATE BANK OF INDIA,<br>DOORAVANINAGAR,<br>BENGALURU<br>Bank Account Number: 10637729821<br>IFSC Code: SBIN0001438<br>MICR Code: 560002016 | | Bank Account Number: 10637729821<br>IFSC Code: SBIN0001438<br>MICR Code: 560002016 |
| 15 | 6 | **Financial Bid** | Financial bid page 14- More clarity required on % margin of combination of CBU and SKD with equal weightage to both categories. Right now, we do not have clarity on price that ITI will get from BSNL and this % margin is a relative factor. Hence need to understand how evaluation will be done? | As per tender<br>Ref: ITI/COR/PP/RFP/Antenna |

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| 16 | 7.1.3 | **Payment Conditions**<br>The payment to the Antenna Technology Provider towards its deliverables shall be made on receipt of payment from the customer in the back to back basis including LD, any other recoveries imposed by customer. Request for change in terms will not be entertained at any point of time. | Antenna is only the line item and bidder's responsibility will be only to supply the Antenna. Linking the turnkey project payment with Antenna supply may be relooked. | As per tender<br>Ref: ITI/COR/PP/RFP/Antenna |
| 17 | General | Transportation Charges (Loading Unloading) | There will be additional cost for sending the finished products from Bidders place to ITI and then to BSNL. | Mode of delivery will be decided after Purchase Order from BSNL is received. |
| 18 | General | Packaging of SKD and CBU Units | Packaging of SKD and CBU Units | CBU should be in Pallet form. For SKD items Technology partner has to provide the design of Pallet to enclose the Antenna for packaging. |
| 19 | General | | It is extremely important that Eligibility Criteria gives highest weightage to locally | Please refer Clause 11.1 of RFP Ref: ITI/COR/PP/RFP/Antenna |

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| | | | designed and manufactured Antenna Solutions. The extend of localization which is proven should be a part of the Criteria. | |
| 20 | General | | The value of the Antenna reflects the degree of complexity of the solution and the Technological Competence of the Partner and therefore should be accorded weightage together with the quantities. | As per tender<br>Ref: ITI/COR/PP/RFP/Antenna |
| 21 | General | | Considering the Pandemic situation in the last 2 years, a relaxation on the minimum quantity / value of the PA Antenna supply should be extended. | As per tender<br>Ref: ITI/COR/PP/RFP/Antenna |
| 22 | General | | Weightage should be given to Bidders who have received PLI Approval from Ministry of Communications (GOI) vendors as this reflects commitment towards development of localized ecosystem. | As per tender<br>Ref: ITI/COR/PP/RFP/Antenna |

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| 23 | General | | Special consideration/weightage should be given for MSME Applicants inline with the government policies. | Please refer Clause 10 and 11 of RFP Ref: ITI/COR/PP/RFP/Antenna |
| 24 | 5.D.I | Antenna Technology Provider should have manufactured and supplied minimum 30000 Nos. per year of 3G/4G/5G types Antenna System to Indian or Global entities in last 2 Years.<br>Documentary evidence (Customer POs and performance certificate along with contact no, email address of the customer) to prove experience to be submitted.<br>>40,000 numbers per year-25 marks<br>>=30,000 numbers per year -20 marks<br><30000 numbers per year –Bid will be rejected | Relaxation in work experience is requested | The clause is modified as<br>"Antenna Technology Provider should have manufactured and supplied minimum 30000 Nos. per year for any 3 years of 3G/4G/5G types Antenna System to Indian or Global entities in last 7 Years. "<br>Documentary evidence (Customer Pos and performance certificate along with contact no, email address of the customer) to prove experience to be submitted.<br>>40,000 numbers per year-25 marks<br>>=30,000 numbers per year -20 marks<br><30000 numbers per year –Bid will be rejected" |
| 25 | 5.A.V | Antenna Technology Provider should have manufactured and supplied minimum 30,000 Nos. of 3G/4G/5G types Antenna System to Indian or Global entities per year in last 2 Years. | Relaxation in work experience is requested | Antenna Technology Provider should have manufactured and supplied minimum 30,000 Nos. of 3G/4G/5G types Antenna System to Indian or Global entities per year in any 3 years in last 7 years. |
| 26 | | Annexure-V-A | Requested for Latest Technical Specifications | Please refer Annexure –XIV for latest GENERIC TECHNICAL SPECIFICATION |
| 27 | | Annexure-V-B | | As per the Tender document |

**Annexure-XIII**

## AGREEMENT FOR MANUFACTURING ANTENNAS

This Agreement for manufacturing of Antennas ("Agreement") is effective as of 4th day of November 2022.

BY AND BETWEEN

ITI Limited, a Government of India company registered under the Companies Act, 1956, having its corporate and registered office at ITI Bhavan, Doorvaninagar, Bengaluru - 560016 (hereinafter referred to as the "ITI" on the first part, which term or expression shall include its administrators, successors and permitted assigns)

AND

_____, a company registered under the Companies Act, 1956, having its Registered Office at _____
(hereinafter referred to as the "PARTNER" on the other part, which term or expression shall include its administrators, successors and permitted assigns)

With either 'ITI' or 'Partner' being singularly referred to as a 'Party' and both 'ITI' and 'Partner' being collectively referred to as the 'Parties'.

WITNESSES THAT:

WHEREAS, ITI is 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.

AND WHEREAS _____ the Partner has expressed its desire to partake in the partnership agreement for manufacturing and assembling Antennas, on the terms, conditions and stipulations contained herein.

NOW, THEREFORE, in consideration of the mutual covenants, agreements and obligations, the ITI and the Partner agree as follows:

**DEFINITIONS**

"_____" means either; i) a Public Sector Enterprise, or ii) a Registered Indian industrial manufacturing Enterprise, where the control by way of majority shareholding, and/or the controlling Directors, is not held by foreign body or corporate(s).

"Third Party" in singular or "Third Parties" in plural means any external entity, individual, organization or institution other than the _____or the _____ who is referred to in this Agreement.

"Intellectual Property" means any invention, patent, utility model, copyright, trade-mark, industrial design, electronic design or integrated circuit topography right, or any right of whatsoever nature in computer software and data, trade secrets or Know-how, or any intangible right or privilege of a nature similar to any of the foregoing, in every case in any part of the world and whether or not registered, and includes all granted registrations in respect of any such right.

"Confidential Information" means any information, including Proprietary Information, Logic Manuals, drawings, samples, devices, demonstrations, Know-how, software, reports and other materials of whatever description, whether subject to or protected by copyright, patent, industrial design or any other form of Intellectual Property protection, howsoever disclosed or communicated before or after the effective date of this Agreement by one Party to the other Party, which if in written form is labeled as "Confidential", and if disclosed orally and identified as confidential at the time of oral disclosure is furnished to the receiving party within thirty (30) days after such disclosure in a written summary labeled as "Confidential", but does not include information which:

a) is now, or hereafter, through no act or failure to act on the part of the receiving party, becomes generally known or available to the public without breach of this Agreement or any subsequent agreement made pursuant thereto;

b) is known to the receiving party at the time of disclosure of such information or is developed by the receiving party independently of such disclosure, as evidenced by written records;

c) is hereafter furnished to the receiving party by a third party without that third party being in breach directly or indirectly of an obligation to the disclosing party to keep the information confidential; or

d) is disclosed as required by statute or judicial decree provided ITI shall have been given notice and an opportunity to appear and object to such disclosure, but is unsuccessful.

"Territory" means India and any other country or countries explicitly mentioned herein.

"Effective Date" means the later of the dates on which the two parties sign this Agreement, or in the case of an Addendum, Effective Date means the later of the dates on which the two parties sign the Addendum in question.

"Term" of this Agreement or its applicable Addendum will commence on the Effective Date and shall continue for the duration or until terminated by either Party as set forth in this Agreement.

"Law" means law of the land, i.e. law of India.

## 1. PURPOSE

ITI intends to manufacture "Antenna System for GSM, UMTS and LTE and 5G technologies " meeting Telecom Engineering Centre (TEC) GR Standards in vogue to participate & supply against upcoming & future Tenders/EOI/RFP of BSNL, MTNL, BBNL or other Organisations.

For Generic Technical Specification please refer to Annexure - V.

The selected Antenna Technology Provider, should be willing to enable ITI with technological details for manufacturing and servicing of Antenna System for GSM, UMTS and LTE and 5G.

## 2. SCOPE OF WORK

2.1. The Antenna system comprises of the following:

(a) Antenna.

(b) Remote Electrical Tilt (RET) sub-system [for antennae with UMTS & LTE ports] shall be provided as per Schedule of Requirements from customers.

(c) RF Cables

2.2. The Antenna Technology Provider shall enable ITI to meet the compliance of the Antenna system as per the latest TEC GRs for Antenna System mentioned in Annexure-V.

2.3. Antenna Technology Provider shall be willing to enable ITI to manufacture Antenna System meeting IS Standard or TEC GR standards as mentioned in BSNL EoI MM/NWP-GSM-II/REG-POC-4G/E-697/2021 issued on 01.01.2021 and its Annexure –B.1, through an Agreement, to enable ITI to assemble, manufacture , Market, Sale & Service and provide maintenance service on the product to its customers.

2.4. Antenna Technology Provider must provide Antenna System Software code & its upgraded versions progressively as and when available to enable ITI to operate and maintain the system.

2.5. Antenna Technology Provider shall provide all the upgrades developed for the offered product (including ITI product based on Technology enablement) during the contract period, without any commercial implication. They should also ensure to develop the upgraded Antenna System to meet upgraded Technical Specification as per prevailing standard, if any, to overcome any obsolescence.

2.6. Antenna Technology Provider must agree to supply kit of the proposed product in Completely Built Unit (CBU) and Semi Knocked down (SKD) to ITI as per ITI requirement.

2.7. The strategic alliance between ITI and the Antenna Technology Provider (ATP) shall be for a period of minimum five years or as per agreed time period from the date of the agreement. The Antenna Technology Provider shall provide all the assistance in setting up/upgrading the assembly/ manufacturing facilities at ITI units.

2.8. Antenna Technology Provider must assist ITI in setting up the production lines and give necessary Technical Support including Specification, process diagrams & training to ITI personnel for the smooth and efficient functioning of the Antenna System Production. ITI desires that Antenna Technology Provider shall assist in supply of all the necessary

Infra required for Manufacturing & Testing of Antenna System except High End SMT facility & PCB Facility (available with ITI) & Test Bench (ITI is going to procure). They may visit ITI Production facilities already available/planned to be made available before award of this RFP.

2.9. The Agreement on Antenna system manufacturing will includes the Mechanical tools, Hardware/software design, manufacturing, assembly. inspection, testing, quality assurance methods, troubleshooting, supply, Installation, Commissioning if required, servicing/ maintenance during the warranty/post warranty period, training, documentation, design upgrades , system integration if required etc. as per various customer requirements for SKD manufacturing of Antenna System.

2.10. The Antenna Technology Provider shall ensure compliance, in totality, of his product to applicable Indian Standard specifications or any other standard, as referred in the customer requirement.

2.11. The Antenna Technology Provider should be responsible to provide free software /firmware/patches/ upgrades to ITI for the product as per customer order such as BSNL EoI MM/NWP-GSM-II/REG-POC-4G/E-697/2021 issued on 01.01.2021 and its Annexure –B.1 during the pre-sales and post sales phases of the product to ascertain the compliance of the product with the standards and specifications.

2.12. The Antenna Technology Provider shall be responsible on behalf of ITI to obtain all necessary certifications and necessary approvals such as TEC/TSEC, CACT Certificate from BSNL (QA) and Test certificate from NABL/International accredited agencies for ITI make product if required. However, one time Certification & Testing Fees will be paid/reimbursed by ITI. Certification and testing responsibility will be of ITI, Antenna Technology Provider has to provide the resource to help ITI for obtaining the necessary certifications. Antenna Technology Provider Scope will be limited to arranging samples for TSEC. ITI to confirm whether all Antenna models will be tested or only few. All the Certification & Testing Fees will be paid by ITI.

2.13. After/During successful technology enablement process, the Antenna Technology Provider shall also support ITI for the Tenders / Purchase orders of Government, PSUs, Defence and Private customers for the products / services.

2.14. ITI shall be procuring Completely Built Units (CBUs) and Semi knocked Down Units (SKDs) kits from the Technology Provider.

2.15. The Antenna Technology Provider has to support ITI in setting up the infrastructure for the manufacturing of 4G Antenna and test set up upgradable to 5G Antenna manufacturing. Bidder should provide the quote (Details

of testers cost etc.) for the infrastructure set up required for CBU and SKD process of Antenna Manufacturing along with the bid. So that ITI can perform SKD manufacturing and testing.

2.16. The Antenna Technology Provider at their cost shall support ITI for field trial/proof of concept (PoC)/TSEC by providing samples of 3 sets for each type approved Antenna System free samples as per customer requirement towards the pre-supply qualification for the customer orders. The Antenna Technology Provider has to undertake the responsibility of integrating the Antenna System with the back end system in coordination with the Telecom solution provider of the customer during the PoC as per the requirement of BSNL EOI MM/NWP-GSM-II/REG-POC-4G/E-697/2021 issued on 01.01.2021 and its Annexure.

2.17. All the terms and conditions of BSNL EOI MM/NWP-GSM-II/REG-POC-4G/E-697/2021 issued on 01.01.2021, its Annexures and subsequent BSNL RFP, Purchase Orders, Work Orders, Letter of Intents(LOIs) will be applicable to the selected Technology partner on back to back basis for successful completion of the project.

**3. General Commercial Conditions**

3.1 The PARTNER shall enter into an Agreement with ITI to enable ITI for the manufacturing and assembling of the product.

3.2 The PARTNER shall provide comprehensive support to ITI for the installation, commissioning, warranty and post warranty servicing of the product.

3.3 The PARTNER shall support ITI in tenders floated for the product, by meeting the technical conditions of the tender.

3.4 All The terms and conditions of RFP **ITI/COR/PP/RFP/Antenna** dated 28-10-2022 will be applicable to this agreement.

3.5 The details of Technology for the Antenna system manufacturing along with Gerber data, PCB layouts, schematic diagrams, component sourcing details including arrangement with the PARTNER suppliers, as applicable, through-hole details, software and mechanical assembly details etc., are to be provided by the PARTNER to ensure smooth manufacturing and delivery of finished product once the agreement is signed.

3.6 The process of Technology enablement should be completed within two months after signing the agreement and after issue of order for the Capex items.

3.7 The BOM/BOQ is to be provided by PARTNER as per the requirement received for new opportunities from time to time.

3.8 The PARTNER shall impart necessary training to ITI Engineers for undertaking manufacturing, testing, calibration, troubleshooting, installation acceptance testing including Pre- Despatch Inspection for successful commissioning at the premises designated by the customer. The Design/R&D issues however shall remain in the scope of the PARTNER only.

3.9 The Contract Agreement between ITI and PARTNER shall be signed by authorized signatories of ITI and the PARTNER, duly supported by Power of Attorney issued by respective parties in the name of these signatories.

3.10 Since ITI is known to have all the inherent strength of manufacturing telecom switchgear, it sees a larger role to play in the manufacturing of Antenna System to be used in the customer order. The Partner shall sign an agreement to enable ITI for manufacturing of Antenna System through its technology and provide full support in planning, manufacturing, implementation, upgrading of manufacturing facilities and rehabilitation of the manufacturing lines so that ITI is fully equipped and capacitated to service the potential customer order. The Technology enablement activity and manufacturing shall start in parallel just after issue of LoI by ITI. Any delay in Technology enablement shall be seen as a default on the part of PARTNER and may be termed as non-seriousness and may prompt ITI to look for next available alternative towards selection of PARTNER.

3.11 A Performance Bank Guarantee (PBG) for Project rollout of 3% of the work order would be required to be submitted for the period of project execution, which would be released after rollout of the project and after receipt of payment from customer. Period of project execution will be considered up to obtaining the NOC (No Objection Certificate)/Commissioning Certificate from the customer. If PBG Validity is going to expire before obtaining NOC, it will be obligatory to vendor to extend the PBG validity Period accordingly

The PBG will be encashed in case of the following events.

3.11.1 The manufactured product by ITI will not meet the quality specifications of the prototype and is rejected by BSNL/TEC authorities.

3.11.2 Manufacturing defect is attributed to the design of the product.

3.11.3 Technology partner fails to correct the failure of the manufactured product within the reasonable time as per the requirements of the customer/BSNL.

## 4. SPECIAL CONDITIONS

4.1 The Transfer of Technology for manufacturing Antenna Systems shall be non-exclusive to ITI and ITI will also be free to take the similar technology from other Technology Partner in future if required.

4.2 The Antenna Technology Provider , in addition to technology enablement, should not only be doing hand holding in leveraging its resources to streamline the production of Antenna System at ITI but also shall supply the initial lot of Antenna System for the customer tender, as per ITI's need to service its customer.

4.3 In case any PARTNER 's statement is found false and misleading, the barring process against such defaulting PARTNER shall be initiated by ITI and the next eligible PARTNER shall be selected to go ahead in the process of proving technical compliance and competence to the required Antenna System standards and specifications.

4.4 The PARTNER should liaison with BSNL, TEC and other potential customers for resolution of issues.

## 5. METHODOLOGY

5.1 This Agreement specifies how the work to achieve the above purpose will be conducted, the mutual objectives of the Parties be attained and their respective responsibilities be discharged.

5.2 This Agreement along with various Addendums with applicable Schedules, shall be construed as the full Agreement between the ITI and the Partner.

5.3 Headings included in this Agreement are for convenience only and are not to be used to interpret the agreement between the Parties.

5.4 The failure of either Party to enforce at any time any of the provisions hereof shall not be construed to be a waiver of the right of such Party thereafter to enforce any such provisions.

5.5 This Agreement may be modified only by a writing signed by each Party.

## 6. INDEMNIFICATION

Each Party shall retain exclusive responsibility for its obligations under this Agreement.

6.1 Subject to the limitations set forth herein below, Partner shall indemnify the ITI with respect to any claim, suit or proceeding (each, a "Claim") brought against ITI to the extent it is based upon a claim that any Licensed Product sold pursuant to this Agreement. However, ITI shall provide the assistance and full cooperation for the defense of same, and, settlement of such Claim.

6.2 This Section represents remedy of ITI and the entire liability and obligation of Partner with respect to infringement or claims of infringement of any intellectual property right by the Licensed Products.

## 7. LIMITATION OF LIABILITY

7.1 PARTNER shall be liable to ITI or any End User or Third Party for any special, incidental, indirect, punitive or consequential damages, including loss of goodwill, costs of procurement of substitute

components/goods/services, or any other pecuniary loss, arising in any way under this Agreement or from defects in or use of the Licensed Products and under any theory of liability. ITI liability will be limited to the extent of the commission it receives.

## 8. CONFIDENTIALITY

8.1 The Parties undertake to treat all information herein and all discussions relating to this MoU as strictly confidential information and neither Party directly or indirectly disclose such information to any third party for any purpose whatsoever without the prior written consent of the other Party.

8.2 Except where required by law to do so, each Party will refrain from disclosing to any Third Party any information obtained from the other Party concerning the other Party's operations, business plans or other Proprietary or Confidential information which the other Party has designated as confidential, all such information to be termed Confidential Information.

8.3 For this purpose, the party owning rights in or disclosing Confidential Information is termed the "Discloser", and the party receiving such information is termed the "Recipient".

8.4 The confidential and proprietary information of Discloser provided to the Recipient under this Agreement must be utilized only for the purpose of the Agreement. All the information furnished including product information and know-how of the Discloser must not be used in any manner outside the scope or beyond the term of this Agreement.

8.5 The Parties shall also sign the confidentiality and non-disclosure agreement attached as Annexure VIII.

## 9. COMPLIANCE

9.1 The PARTNER shall ensure that the Agreement is complied with both, in letter and spirit, and if any situation arises where this Agreement is silent on a particular issue, decision of the ITI shall be final and binding upon the PARTNER.

9.2 The PARTNER shall not, at any time hereafter, deny or dispute the legality, validity or enforceability of this Agreement or any of its obligations prescribed herein.

## 10. TERM AND TERMINATION

10.1 Either Party may terminate this Agreement and/or an applicable Addendum: (1) on thirty (30) days' written notice, for breach of Agreement, unless such breach is corrected within a cure period of thirty (30) days by the other Party; or (2) immediately if the other Party shall cease conducting business in the normal course, make a general assignment for the benefit of creditors, suffer or permit the appointment of a receiver for its business or assets, or shall avail itself of or become subject to any proceeding of bankruptcy or any other statute relating to insolvency or the protection of rights and creditors.

10.2 Failure on part of either Party to notify the other Party of a breach of this Agreement, or to terminate this Agreement, or recover damages because of such breach, shall not constitute a condonation of the breach to terminate this Agreement or recover damages, in accordance with the provisions herein contained.

10.3 The PARTNER acknowledges that any breach of this Agreement would cause irreparable harm and significant injury to the ITI and lead to termination of the Agreement. The PARTNER further understands that compensation for such injuries are immense but difficult to ascertain and determine legally, hence the same is to be mutually agreed between the ITI and the PARTNER. In case the Parties fail to reach a mutually agreed compensation, then either Party can refer it for dispute resolution. Notwithstanding the above, the PARTNER agrees that the ITI shall have the right to seek and obtain immediate injunctive relief from a court of competent jurisdiction.

10.4 Termination of this Agreement shall not release the Parties from their obligations and liabilities, which have accrued up to the termination and later on, as a consequence thereof.

10.5 Specific provisions for the PARTNER's obligations towards including but not limited to Confidentiality, Indemnification, Payment, Intellectual Property Rights, and the ITI's obligations towards Limitation of Liability, shall survive the expiration or prior termination of this Agreement. However, any other provisions that are by their sense or nature or context, like dispute resolution, intended to survive termination of this Agreement shall so survive.

10.6 This Agreement shall remain effective for a period of _____ from the Effective Date of signing by both the Parties. However, before expiry of this period, this Agreement may be renewed for an extended period subject to prior mutual written agreement of both the Parties.

10.7 Nothing in this Clause shall annul or abridge other rights and remedies of the Parties under this Agreement, and under the Law.


## 11. AMENDMENTS

This Agreement may only be amended in writing with the mutual consent of authorised representatives of the Parties.

## 12. ASSIGNABILITY

12.1 The provisions of this Agreement shall inure to the benefit of and be binding upon the Parties hereto, their successors in interest and permitted assigns. Partner cannot assign this Agreement without the express written consent of the ITI.

12.2 In the event of assignment by either Party of this Agreement, the assigning Party shall notify the other Party in writing of the assignment and the Third Party to whom rights are to be assigned shall separately and in writing confirm to the other Party that the Third Party understands and accepts all terms and provisions of the Agreement including assuming all payment obligations. Assignment of the Agreement shall not be effected until the other Party receives both, the notification from the assigning Party and the confirmation from the Third Party.

12.3 Notwithstanding anything to the contrary in this Agreement, in no event shall any such assignment result in an expansion of the scope of the licenses granted under this Agreement and its Addendum with applicable Schedules.

## 13. WAIVER

13.1 Progress of the work under this Agreement shall be reviewed by the ITI from time to time.

13.2 The failure of ITI to insist upon strict compliance with any of the terms or conditions of this Agreement by the ITI shall not be deemed as a waiver of such terms and conditions by the ITI, nor shall waiver of any right at any one or more times be deemed a waiver or condonation of liability of the PARTNER at any time.

## 14. GOVERNING LAW

This Agreement shall be governed by, interpreted and construed in all respects in accordance with the laws of India.

## 15. FORCE MAJEURE

15.1 Each Party shall be excused from the punctual performance of any of its obligations under the Agreement and such obligations shall be extended for a period reasonable under the circumstances if the performance is prevented or delayed by any existing or future cause beyond such Party's reasonable control which, without in any way limiting the generality of the foregoing, shall include acts of God, riots, wars, accidents, epidemic, pandemic, industrial disputes, embargo or requisition (acts of government), including non-availability of an export license or visa and permits for a Party's personnel, any change in Government policies adversely affecting the performance of a Party, or delays in the performance of its sub-contractors caused by any such circumstances as referred to in this clause ("Force Majeure"). In case of Force Majeure, the affected Party shall promptly notify the other Party in writing but not later than 14 days of occurrence of Force Majeure event and furnish it with all relevant information thereto.

15.2 The right of relief shall apply irrespective of whether the cause of prevention or delay occur before or after the agreed due time for such obligations. In such event, the non-performing Party shall use best efforts to recommence performance or observance of the obligation(s) so affected based on mutual agreement between the Parties.

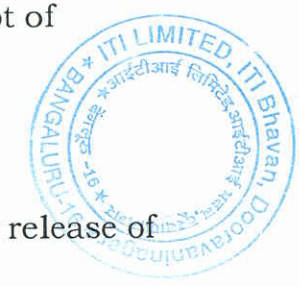
15.3 As of the date of the Definitive Agreement, the Parties acknowledge that the potential development, scope and impact caused by or related to COVID-19 is unpredictable and may affect the performance of obligations hereunder. Therefore, the Parties hereby acknowledge that any delay or failure in the performance of their respective obligations that is directly caused by or directly results from COVID-19 shall constitute a force majeure condition, and the Parties hereby reserve their respective rights under this clause, with respect thereto. Such situations may include but are not limited to Ericsson's inability to source or deliver required materials or in the event of material cost increasing unreasonably due or related to COVID-19.

## 16. PAYMENT

16.1 The payment term should be only on Back to Back basis and Payments will be made only upon receipt of payment from the beneficiary/BSNL.

16.2 Technology Partner should not hold only ITI liable for the payments.

16.3 Both parties (Technology Partner and ITI) together shall make efforts (including taking legal action) for release of payments by the beneficiary/BSNL



## 17. NOTICES

Any notice permitted under this Agreement will be delivered to the following addresses by courier and/or registered mail:

To ITI Limited:

_____

_____

_____

_____

To _____:

_____

_____

_____

_____

Such addresses for notice will remain in effect until written notice to the contrary is given to the other Party.

## 18. ARBITRATION

21.1 In the event that any dispute between the Parties arising in connection with this Agreement cannot be resolved then either Party may refer such dispute to arbitration by a sole arbitrator, under the Indian Arbitration and Conciliation Act, 1996 by giving written notice (an "Arbitration Notice") to the other Party. The English language shall be used in all arbitral proceedings. The seat and place of arbitration shall be Bangalore. The costs of arbitration shall be equally borne by the Parties.

21.2 This Agreement will be governed by the laws of India and the courts in Bangalore, Karnataka, India shall have the exclusive jurisdiction. This Agreement constitutes the entire agreement between the Parties with respect to the subject matter herein and supersedes any other agreement or understanding, written or oral. Obligations which by their nature should survive the termination or expiration of this Agreement shall survive for a term of one year from the date of expiration/termination of the Agreement.

## 19. SEVERABILITY

If any provision or condition of this Agreement Is prohibited or rendered in valid or unenforceable such prohibition, invalidity, or unenforceability shall not affect the validity or enforceability of any other provisions and conditions of the Agreement.

## 20. GOVERNMENT IMMUNITY

It is expressly understood and agreed by and between parties that ITI is entering into this agreement solely on its own behalf and not on behalf-of any other person or entity. In particular, it is expressly understood and agreed between the Parties that the Government of India is not a party to this agreement and has no liabilities, obligations or rights hereunder. It is hereby expressly understood and agreed that ITI is an independent legal entity with power and authority to enter into contracts solely on its own behalf under the applicable Laws of India and general principles of Contract Law. ITI represents and PARTNER expressly agrees, acknowledges and understands that ITI is not an agent, representative or delegate of the Government of India. It is further understood and agreed between the Parties that the Government of India is not and shall not be liable for any acts, omissions, commissions, breaches or other wrongs arising out of the contract. Accordingly, PARTNER hereby expressly waives releases and foregoes any and all actions or claims, including cross claims, impleader claims or counter claims against the Government of India arising out of this contract and covenants not to sue the Government of India as to any manner, claim, and cause of action or thing whatsoever arising of or under this Agreement.

**GENERIC TECHNICAL SPECIFICATION**
**(For Antenna System)**

**A. Technical specification**

a. Compliance shall be provided for each clause of the specifications given below.

## 1. Antenna System

12.12.1 The Antenna system comprises of the following:

(i) Antenna.

(ii) Remote Electrical Tilt (RET) sub-system to be provided as Integrated built in solution with Antenna for all the ordered Antennas.

(iii) RF Cables

(iv) AISG cables connecting internal RET & RRH.

12.12.2 The antennas to be supplied shall generally conform to TEC GR No. GR/ANT-21/02.OCT2006 except for the frequency operation and other parameters specified herein. In case of non-availability of TEC GR compliance certified products, or such products/vendors are less than 3, products not certified against TEC GR but are compliant for major features for relevant TEC GR and DTR clauses of this tender can be proposed. Such products, if they are indigenous, will be subjected to QA testing. If they are imported, they will be validated to ensure compliance.

12.12.3 The termination at antenna can be N (female) or 7/16 DIN (female) or 4.3-10 (female); 50 ohms. In BSNL existing network only DIN based termination is available. In the event the bidder chooses to supply antenna with 4.3-10 termination at sites where the existing antennas of BSNL are to be replaced, then it shall be the responsibility of the successful bidder to terminate the existing DIN based terminations onto the new 4.3-10 termination, any additional

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hardware/adapter shall be supplied by the successful bidder as part of installation without any additional cost, wherever demanded by BSNL.

12.12.4 The antennas to be supplied for LTE systems shall operate in the following frequency bands:

(a) FDD-900 – Band 8: 890 - 960 MHz .

(b) FDD-2100 –Band 1: 1920 – 2170 MHz .

(c) TDD-2500 – Band 41: 2496 – 2690 MHz

(d) FDD-850 – Band 5: 824-894 MHz

(e) FDD-1800 – Band 3: 1710- 1880 MHz

(f) FDD-700 – Band 28: 703 - 803 MHz

(g)

| The antennas shall be of multi-band and dual polarised with variable electrical tilt with the beam widths specified below Antenna Port | Gain [dbi] | HBW [as per SoR] [deg] | Mechanical Tilt [deg] | Electrical down tilt (deg) | VBW min [deg] |
|---|---|---|---|---|---|
| 698 to 960 MHz | 17.5/20.5 | 65/33 | 0 to 8 | 0 to 8 | 7 |
| 1710 – 2690 MHz | 18.5/20.5 | 65/33 | 0 to 8 | 0 to 8 | 6 |
| Dual Band (698 to 960 MHz & 1710-2690) | 18.5/20.5 | 65/33 | 0 to 8 | 0 to 8 | 6 |
| OMNI -698 to 960 MHz | 10.5 | 360 | fixed 0 to 8 | 0 to 8 | 7 |
| OMNI - 1920-2690 MHz , 4port | 10.5 | 360 | fixed 0 to 8 | | 7 |
| Broadband 1710-2690 | 18.5 | 65 | 0 to 8 | 0 to 8 | 7 |

12.12.5 A tolerance of -0.7 db for antenna gain, ±2 degree for down tilt and ±5 degrees for HBW will be allowed. All the antennas supplied shall be of bottom feed or rear feed and with variable electrical tilt. Antenna and RETs shall conform to AISG standards.

12.12.6 **Dual Beam Antennae**

In order to cater to the need of reducing tower loading/footprint, dual beam antennae are required with a beam separation of +30/-30 degrees from the centre point in azimuth direction. This is particularly intended for deployment for four-sectored and six-sectored sites. The individual beams shall have a typical HBW of 40 deg and a gain of 18.5 dbi

12.12.7 **4/6/8 Port Antennae**

4/6/8-port antennae shall have 0.7λ column spacing.

12.12.8 **Broadband-Multi Band Antennae**

BSNL intends to have Broadband-Multi Band Antennae in order to reduce tower loading and also to have suitable antenna positions so as to enable running multiple wireless networks from the same infrastructure and also to enable sharing of infrastructure with other operators. The following types of antennae are shall be supplied in this Tender [all 65° horizontal beam width]

| Systems | Type | Band( MHz ) | | | |
|---|---|---|---|---|---|
| | | Port-1 | Port-2 | Port-3 | Port-4 |
| Triple System | I | 700-960 | 1710-2170 | 2300-2690 | |
| | II | 700-960 | 1710-2690 | 1710-2690 | |
| Quad System | III | 700-960 | 700-960 | 1710-2170 | 1710-2690 |

12.12.9 **Combiners**

a) Dual band, triple band and quad band combiners shall be provided as per SoR. They shall be IP65 grade and shall have insertion loss of less than 0.3 db [guaranteed limit] in the respective bands at the applicable ports. The bands to be combined will be mentioned in the purchase order.

b) 2-ports per band [system] will be required for the combiner for a dual band [system] combiner. Hence a dual combiner shall have 2 X 2 = 4 ports on equipment side and 1 x 2 =2 ports on the Antenna side and vice-versa at the other end. Similarly ports are required for triple band and quad band combiners as well. One port in the dual band combiner shall be of ultra broadband type to cater from 1710 MHz to 2700 MHz , covering GSM 1800, UMTS and TD-LTE bands. The other port will need to support only one band, which will be provided in the PO.

c) The combiners shall be supplied with all requisite fixtures and recommended sealants in order to ensure smooth indoors and out door operations.

d) The intermediation performance shall be better than 150 dbc.

**12.13 Massive MIMO Antenna (The requirement of Massive MIMO is a deferred requirement as specified in clause no- 1.40 of DTR.).**

12.13.1 The massive MIMO AAS solution/product shall be of 64T64R configuration with 128 Antenna array. It shall also have the flexibility to deploy as 32T32R variant depending on the deployment scenarios.

12.13.2 The Massive MIMO AAS solution shall support implementation of SU-MIMO and Multi-User MIMO (MU-MIMO) and shall be upgradable to 5G NR by SW upgrade only.

12.13.3 The AAS solution shall be HW ready for 4G + 5G configuration with support Split mode. AAS unit shall operate in Split Mode for 4G and 5G, without any limitation in RF performance compared to single mode of operation (4G only, 5G only). 5G in this regard refers to operating NR in AAS.

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12.13.4 The TDD Massive MIMO AAS shall provide and support 16Layers of downlink and 8 layers of uplink when operating in MU-MIMO & SU-MIMO mode for TDD.

12.13.5 The vendor shall have transmission modes of TM3, TM4, TM7, TM8, TM9, TM10 for TDD Massive MIMO in downlink and TM1, TM2 in uplink.

12.13.6 The supplied system shall provide Carrier Aggregation between Massive MIMO (M-MIMO) cells and non-Massive MIMO cells.

12.13.7 Baseband shall support e-CPRI that for deployment of TDD Massive MIMO, which uses 25 Gbps of SFP.

12.13.8 The bidder shall provide number of eCPRI interface on Massive MIMO AAS and as per the bandwidth required for 20 MHz&40 MHz LTE Bandwidth.

12.13.9 The base band unit shall be software upgradable for support of Dual Connectivity 4G-5G across eNB-gNB interface.

12.13.10 Baseband configuration shall support at least 3 LTE Massive MIMO cells with 20 MHz

12.13.11 The system shall support DMRS (demodulation reference signal) based DL Beam forming

12.13.12 The feature of UL 64 antennas receive diversity (64 RX full IRC) shall be provided.

12.13.13 Typical Power consumption of baseband shall be < 200 Watts and Massive MIMO AAS shall be < 1000 W.

12.13.14 Massive MIMO AAS shall be IP65 compliant.

12.13.15 The Massive MIMO system shall support cell shaping and shall support both vertical and horizontal spread of users in Macro, hotspot or Vertical scenarios.

12.13.16 Massive MIMO AAS shall support 60 MHz IBW.

12.13.17 Beam forming shall be possible to increase effective coverage. The system shall provide feature for L1 beam forming in which AAS Radio shall be capable of doing beam forming locally in Radio.

12.13.18 The requirement of massive MIMO for FDD (for example in 2100 MHz or 900 MHz or 1800 MHz ] will be with 32T32R for 10 MHz bandwidth. SoR may be referred for the requirements, if any.

**12.14 Installation of Equipment at Access network Cell Sites:**

(i) The installation materials provided at the sites must be of very high quality. The power cable used for extension of DC shall be of multi-strand type and very flexible. The external gantry (cable tray for waveguide / RF feeders from the tower to the building/prefab/OD eNodeB sites which is exposed to the environment) should be made of 45x45x6mm angles and should be of hot dip galvanized iron material. The same should be at least 45 cm wide in order to give provision for future cables. It should be supported strongly on reinforced cemented base on the ground on coupled dual pipes so as to ensure proper support for working personnel on the gantry.

(ii) The minimum material that needs to be supplied has been provided as part of this tender. Any other material that is required for I&C, which are specific to the vendor or generic, shall also be supplied against the SoR line item of Installation material without any additional cost.

(iii) The DC Distribution Box provided for the site should have at least two circuit breakers equipped as extra for future equipment and/or as spare. The input DC cables laid should be rated for these circuit breakers as well.

(iv) The installation material supplied under SoR items shall include DCDB, feeder cable termination connector as applicable, feeder clamps(@1/3m run), ½" jumper cables for tower top connection from feeder cable to antenna of 8m length on an average, equipment side jumper cables, feeder cable grounding kits, power cable connectors, CPRI cable as per field requirement , clamps for CPRI cable routing with appropriate opening, cat-6 LAN cable for media connectivity with connectors & power and earthing cables. The quantities for all these items shall be as per the requirement of the

given type of a site(swap/redep/Greenfield, ID/OD/RRH, MIMO config, Single band/dual band mix). The installation material supplied shall be exhaustive such that in case BSNL decides to do the installation, all required material shall be available

There shall be a BSNL emblem imprinted on antennae, BBUs and RF modules in order to enable quick identification at shared sites.

**12.15 Design, Implementation and commissioning of eUTRAN**

12.15.1 It is proposed to expand/roll out LTE in more cities/areas in each LSA. The details of cities/areas and the coverage objective will be shared with the successful bidder who shall plan the access network in consultation with the planning wing of the respective circle which would result in an approved plan. The required eNode-Bs as per the approved plan would be ordered on the supplier who shall roll out the network as per the said plan.

12.15.2 Link Budget Parameters – FD-LTE [2 x 2 MIMO]: The following link budget parameters shall be assumed:

(a) Cell Edge throughput : DL 1024 Kbps / UL 384 Kbps

(b) Channel Bandwidth : 20 MHz

(c) SINR for the above to be stated by the bidder based on his equipment performance for the channel model of Enhanced Pedestrian A 5Hz [EPA05]

(d) Cell Load : DL40%/UL30%

(e) Building penetration Loss : 25/20/15/10 in DU/U/SU/R

(f) Handset/eNB Noise Figure : 7 dB/2.2 dB

(g) Feeder Loss: 0.5 dB with RRH solution with min feeder

(h) Tx Power at Antenna port of RRH : 46dBm

(i) UE Tx power : 23 dBm

(j) BS Antenna Ht DU/U/SU/R: 25m/30m/30m/40m

(k) UE height 1.5m

(l) BS Antenna gain: 17.5 dBi

(m) Cell area probability: 90%

(n) Standard deviation DU/U/SU/R: 10/9/8/7 Db

(o) Body loss : 1 dB

(p) Feeder Loss: 0.5 dB

(q) The link budget shall be calculated and submitted for all the four bands as stated in clause 9.1.1 of DTR, i.e. Band-5/8/3/1

12.15.3 The optimisation of the network for a period of 6 months for each city after the roll out of the LTE network in that city with all the sites that are made over within 3 months of the PO shall be carried out by the supplier. It shall be the responsibility of the supplier to train BSNL engineers in optimisation and regular O&M activities during that period. Two dedicated drive test teams shall be assigned to each circles for the said activity. The KPIs that shall be maintained shall be part of bid submission. The same can be modified mutually by BSNL and the supplier before the commencement of the optimisation. The basic KPIs to be maintained in general during this period as given below:

- RRC setup success rate : > 98%
- RRC drop rate : <2%
- E-RAB setup success rate :>98%
- PS Drop Call Rate [PDP Busy Hour] : <1%

- PS handover success rate [LTE intra system] : > 95%

For the 95% of the cases throughput as per TRAI

12.15.4 Simultaneous Active Users in eNB shall be minimum 500 per site/BBU as a pooled resource across all sectors. There shall not be any limit for Simultaneous number of RRC Connected Users [CU] in eNB, but if a design limit is required, the same shall be designed as 2000 per site/BBU for 4G apart from NB-IOT/M2M connections across all sectors. CU definition should be as per 3GPP i.e. the Connected terminals served by the eNodeB, residing in the 3GPP defined "RRC Connected state".

**12.16 Performance Specifications**

12.16.1 Antenna Cross polar ratio [CPR]: The beams pertaining to the two cross polarised antennae shall exhibit excellent diversity performance. The Cross polar ratio between the two beams in the main direction shall be a minimum of 20db (except for 700 MHz band in which case the same shall be a minimum of 18 db) and at least 10 db in the ±60°. For Multi-band antennae, the cross polar ratio in the main direction of up to 18db will be permitted in maximum of one band. In other bands of the multi-band antenna, the required CPR of 20 db shall be met.

12.16.2 Inter-modulation performance of the antenna shall be better than 150 dbc

12.16.3 Squint: The difference between the direction of the physical body of the antenna front plane and the actual beam [squint] shall not be worse than ±5% at the 3 db points.

12.16.4 Symmetry of beams: The two cross polarised beams from the same antenna shall exhibit similar patterns and the deviation if any shall not exceed 2db when measured at ±60° for a 65 ° antenna, at ±25° for a 33 ° antenna and at ±75° for a 90 ° antenna.

12.16.5 Testing of Antennae: The antennae being central to the performance of the cellular systems, highest quality standards are to be maintained during production, despatch, transportation and installation. In order to ensure that the supplied antennas are meeting the performance requirements stipulated in this Tender and also in the GRs, BSNL would reserve the right to inspect and certify up to 1% of the antennas at the factory before they are despatched.

12.16.6 All antennas supplied shall be with built in Remote Electrical Tilt (RET).

12.16.7 The lightning protection unit (related to antenna) shall be equipped with devices suitable enough to handle worst hazards caused by the lightning and ensure safety of the entire installation.

12.16.8 It is preferable, not to use any jumper cable in the RF feeder at the antenna end. In case the supplier's construction practice recommends use of jumper cable to adjust the antenna mounting height, then all the connectors to be supplied for this purpose shall be especially water-tight to prevent rain water and moisture from entering RF feeder cable and the connected equipment.

S. Jeyanthi
GM (P&T)
21/11/22

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