



NATIONAL TELECOMMUNICATION CORPORATION
HEADQUARTERS, G-5/2, ISLAMABAD
Tel: 051-9245833, Fax: 051-9245719



No. Proc/01-39/2025-26

Date: 23-02-2026

Subject: Extension in Tender Opening Date - Procurement of Long Haul Core Transmission Network Equipment for NTC on Turnkey DDP Site Basis

Reference: e-Tender Notice # HQ/ADV-29/2025-26.

Reference is made to our above-mentioned tender notice published in daily "Express" & "The News" on 08th February, 2026 and uploaded on NTC and PPRA website. The deadline of tender is extended up to 01st April, 2026. Bid submission & opening time and other terms & conditions shall remain the same.

2. Forwarded for your information and further necessary action, please.


Director (Procurement)
Tel: 051-9245833
Fax: 051-9245719

To:

- **All Prospective Bidders**

Copy to:

- **Tender Opening Committee Members**



**NATIONAL TELECOMMUNICATION
CORPORATION**

HEADQUARTERS G-5/2, ISLAMABAD

e-Bidding Documents

FOR

**Procurement of Long Haul Core Transmission Network Equipment
for NTC on Turnkey DDP Site Basis
Through EPADS (www.eprocure.gov.pk)**

Corrigendum-I

e-Tender Notice # HQ/ADV-29/2025-26

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SECTION-I INSTRUCTIONS TO THE BIDDERS

1 INVITATION TO e-BIDS

Tender Notice No. HQ/ADV-29/ 2025-26

National Telecommunication Corporation (NTC), invites electronic bids from the contractor's / service providers, registered with Income Tax and Sales Tax Department having relevant experience for supply of following Licenses:

Tender No.	Description	Last Date & Time of Bid Submission	Bid Opening Date & Time
29	Procurement of Long-Haul Core Transmission Network Equipment for NTC on Turnkey DDP Site Basis	01-04-2026 @ 1100 Hrs.	01-04-2026 @ 1130 Hrs

Bidding documents as per regulations, containing detailed terms and conditions, specifications and requirements etc. are available for the registered bidders on EPADS at (www.eprocure.gov.pk).

Electronic bids must be submitted through EPADS on or before the bid closing date and time, as specified in the table. Manual bids will not be accepted. Electronic bids will be opened on the same day, at least 30 minutes after the bid closing time, as indicated in the table.

Note: Notification of the GRC constituted in terms of Rule-48 of PPRA rules, 2004 is provided on EPADS at www.eprocure.gov.pk and on www.ntc.net.pk.

Director (Procurement)

Room # 05, Ground Floor, NTC HQs, Sector G-5/2 Islamabad

Phone: 051-9245833, 9245975 **Fax:** 051-9245719

www.ntc.net.pk

2 GENERAL INTRODUCTION

National Telecommunication Corporation (NTC) was established on 1st January 1996 through Pakistan Telecommunication (re-organization) Act 1996 Under section 5 (2) (a) of the subject Act. NTC provides Telecommunication Services to its designated customers in accordance with the rights and privileges granted to the Corporation vide Pakistan Telecommunication (re-organization) Act 1996 and the license issued by the Pakistan Telecommunication Authority (PTA). NTC is registered with Federal and all Provincial Sales Tax Authorities like Punjab Revenue Authority, Sindh Revenue Board, Baluchistan Revenue Authority and Khyber Pakhtunkhwa Revenue Authority.

3 SCOPE OF WORK

National Telecommunication Corporation (NTC) intends to **Procurement of Long Haul Core Transmission Network Equipment for NTC on Turnkey DDP Site Basis** as per detailed Scope of Work at [Annex-A](#), Bill of Quantity at [Annex-B](#), Quality Evaluation at [Annex-C \(Annex-C1 , Annex-C2, Annex-C3, Annex-C4, Annex-C5 and Annex-C6\)](#), Technical Specifications at [Annex-D](#) and Network Design Requirements at [Annex-E](#).

4 QUALIFICATION CRITERION OF BIDDERS

Invitation to submission of e-bids is open to all bidders including firms, Joint Ventures and Consortiums in Pakistan who meet the following conditions: -

Sr	Description	Specific Requirement	Documentary proof Required (Please mention Reference Page#)	Requirement
4.1	Legal Conformance and Registrations	Tax Registration: The bidder must be registered with relevant Tax Authorities and have active status for Income Tax and Sales Tax.	Copy of valid NTN Certificate and GST Registration Certificate.	Mandatory
4.2		Tax Status: Bidder must be on the Active Taxpayers List with FBR	Proof of being on Active Taxpayers List.	Mandatory
4.3		Operations & Presence: The bidder must have been incorporated and present in Pakistan for at least last Four (04) years.	Copy of SECP Incorporation /FBR Registration Certificate.	Mandatory
4.4	PEC Registration	The bidder must be registered with Pakistan Engineering Council (PEC) in C-1 Category with Specialization Code i.e. EE-07.	Copy of valid PEC Registration Certificate.	Mandatory

Sr	Description	Specific Requirement	Documentary proof Required (Please mention Reference Page#)	Requirement
4.5	OEM Authorization	The bidder must be authorized by Original Equipment Manufacturer (OEM) of the proposed equipment / solution to participate in this tender.	Provision of Manufacturer Authorization letter (MAL) for this Tender /Project.	Mandatory
4.6	OEM Partnership	The bidder must be certified partner of OEM for the proposed equipment and solution, Network Design, O&M Support, Software support and Spare Parts Provision during warranty and SLA period as defined in this RFT.	Provision of Manufacturer partnership Certificate.	Mandatory
4.7	OEM Presence	The OEM of the quoted equipment shall be present in Pakistan.	OEM Office presence Proof.	Mandatory
4.8	Financial Strength	The bidder must have an average annual turnover of at least PKR. 1200 million in last Three (03) years.	Audited Reports of last three FY years.	Mandatory
4.9	Equipment	The bidder and OEM should jointly provide an Undertaking on at least PKR. 200 Stamp paper duly verified by Registrar /Notary Public that a. The equipment to be supplied shall be brand new with 10 years life span, unused, not from old stock or refurbished and not smuggled. b. Further that they will provide NTC at least Ten (10) year post warranty OEM and Local Partner Support along with Spare Parts Provision.	Undertaking on at least PKR. 200 Stamp paper duly verified by Registrar /Notary Public	Mandatory

Sr	Description	Specific Requirement	Documentary proof Required (Please mention Reference Page#)	Requirement
		c. The firm shall undertake that the quoted equipment or its OEM has not been involved in contractual non-performance in Pakistan.		
4.10	Tender Document Compliance	The firm must fully comply to all of the tender clauses as per Annex-F .	Signed and Stamped compliance statement	Mandatory
4.11	Undertakings	The bidder must provide undertaking on at-least PKR 200/- Judicial Paper that: a) The bidder is not black listed/debarred by any government organization. b) Quoted Equipment or its components are not manufactured in India or Israel and the firm does not have any linkage with India and/or Israel regarding ownership, sponsoring, IT support, operations. c) The firm has no ongoing litigation that could materially affect its capacity to perform the contract.	undertaking on at-least PKR 200/- Judicial Paper	Mandatory
4.12	Joint Venture Participation:	Joint Venture must comply the following requirements: a) Individual partners must comply each of the criteria at clause 4.1, 4.2, 4.10, 4.11. b) Lead partner must comply each of the criteria at clause 4.1, 4.2, 4.3, 4.5, 4.6, 4.10, 4.11 & 4.12.	All consortium members are required to sign a legally binding agreement that clearly indicates their respective roles, scope of work, and financial obligations. A	As required.

Sr	Description	Specific Requirement	Documentary proof Required (Please mention Reference Page#)	Requirement
		c) Joint Venture and OEM must collectively comply the criteria at 4.4 to 4.12 clauses.	lead partner must be clearly designated, who shall bear full responsibility for the execution of the project	
Passing Criteria: Bidders are required to fully comply all mandatory clauses tabulated above.				

Note: *Prospective Bidder Must Provide Valid Documentary Proof against serial # (4.1 to 4.12) along with the bid. Non-Submission of any of above document will lead to Consideration of a firm as NON-RESPONSIVE & Sub-sequent non-CONSIDERATION for the evaluation.*

5 COST OF TENDERING

The bidder shall bear all costs associated with the preparation and submission of its bid and the NTC will in no case be responsible or liable for those costs, regardless of the conduct or outcome of the tendering process.

6 CLARIFICATIONS OF TENDER DOCUMENTS

6.1 A prospective bidder requiring any clarification(s) regarding technical and commercial aspects of the tender document may notify to NTC on EPADS platform only, however, in case of further clarification/understanding are required, the bidder may contact following NTC Officers:

Divisional Engineer (Procurement)-I	Director (Procurement)
Tel: 051-9245864, Fax: 051-9245977	Tel: 051-9245833, Fax: 051-9245977
Email: shaukat.ali@ntc.org.pk	Email: kashif.nawaz@ntc.org.pk

6.2 The concerned NTC officer will respond to any request for clarification on EPADS, which receives well before (approximate 05 working days or more) to the deadline for the submission of bids.

7 ENGINEERING SURVEY & SYSTEM DESIGN

7.1 The bidder may carry out an engineering survey at its own cost to evaluate the exact requirements and BOQ items required for complete installation of equipment, rectifiers, battery banks, DDF racks, PCM cables, assessment of power supply availability including allied accessories/equipment etc. for complete functionality of the project. Project Director shall facilitate the bidder for site(s) access.

7.2 The bidder shall be responsible for carrying out Link Budgeting of the proposed solution and may propose OLA sites (if required).

8 AMENDMENT OF TENDER DOCUMENTS

- 8.1 At any time prior to the deadline for submission of bids, the NTC may, for any reason, whether at its own initiative or in response to a clarification requested by a prospective bidder, modify or amend the tender documents by issuing an amendment on EPADS.
- 8.2 Any amendment thus issued shall be part of the tender documents. To afford bidders reasonable time in which to take an amendment into account in preparing their bids, the NTC may at its discretion extend the deadline for submission of bids if deemed necessary.

9 PREPARATION OF BID

- 9.1 Bid should be prepared in accordance with **“Single Stage-Two Envelope”** procedure.
- The bid shall comprise a single package containing two separate envelopes (i.e. PDFs). Each envelope (PDF) shall contain separately the financial proposal and the technical proposal;
 - The envelopes (PDFs) shall be named as **“FINANCIAL PROPOSAL”** and **“TECHNICAL PROPOSAL”**;
 - Initially, only the **“TECHNICAL PROPOSAL”** shall be opened;
 - The envelope (PDF) named as **“FINANCIAL PROPOSAL”** shall be retained in the custody of EPADS without being opened;
 - NTC shall evaluate the technical proposal in a manner prescribed in advance, without reference to the price and reject any proposal which does not conform to the specified requirements;
 - During the technical evaluation no amendments in the technical proposal shall be permitted;
 - The financial proposals of bids shall be opened publicly at a time, date and venue announced and communicated to the bidders in advance;
 - After the evaluation and approval of the technical proposal the procuring agency, shall at a time within the bid validity period, publicly open the financial proposals of the technically accepted bids only. The financial proposal of bids found technically nonresponsive shall be returned un-opened to the respective bidders; and
 - Bid documents and all correspondence will be in English language.
 - The scanned copies (PDF) of Technical and Financial proposal along with bid security shall only be submitted online on EPADS. No hard copies of the bid shall be entertained.
 - All pages of the bid must be sequentially numbered and the bidder is required to create a clear table of contents referencing the relevant page numbers and mark each supporting document with corresponding page numbers.
 - All pages of the bid shall be initialed/signed and official seal be affixed by the person(s) authorized to sign. This shall be indicated by submitting a written Power of Attorney authorizing the signatory of the bid to act for and on behalf of the bidder.
- 9.2 Following documents shall be submitted with the proposal:

- a. Duly filled Bill of Quantity as per [Annex-B](#).
- b. Duly filled Quality Evaluation at [Annex-C1](#) and Technical Specifications compliance as per [Annex-C2 to Annex-C6](#).
- c. Duly filled relevant sheets of Network Design Requirement as per [Annex-D](#).
- d. Duly filled Commercial compliance statement as per [Annex-F](#).
- e. Valid Bid Security.
- f. Company Profile.
- g. Audit Accounts of last three years.
- h. PEC Certificate.
- i. Joint Venture agreement (If applicable).
- j. Incorporation Certificate.
- k. OEM Authorization and Partnership Certificate.
- l. Documentary evidence and certificates as per Qualification Criteria.

NOTE: Every participant bidder shall submit all above mentioned documents. Non-submission of any of above documents will lead to declaration of bidder as non-responsive & non-consideration for further evaluation.

10 LANGUAGE OF BID DOCUMENTS

- 10.1 Bid documents and all correspondence will be in English language.
- 10.2 The bid should include a covering letter of the firm with contact information i.e. email and mobile telephone number. All pages of the bid shall be initialed/signed and official seal be affixed by the person(s) authorized to sign.

11 PRICE

- 11.1 Prices should be quoted in Pak Rupees on DDP Site basis as per [Annex-B](#) on Turnkey basis.
- 11.2 The price should be inclusive of all licenses, Installation and commissioning services.
- 11.3 The price quoted should be firm, final, and clearly typed without any ambiguity.
- 11.4 The price should include all the applicable government taxes, duties, freight etc.
- 11.5 The bidder shall be deemed to have obtained all information as to all the requirements thereto which may affect the bid price.
- 11.6 Price of any or all items quoted in a currency other than PKR shall be converted into PKR and for calculation purpose conversion rate (i.e. selling) prevailing on the date of tender opening (Financial Proposal) shall be applied.
- 11.7 The Price quoted by the bidder shall remain valid during the 10 years post warranty /Final Acceptance Certificate (FAC) for the SLA period, the bidder/contractor shall be bound to provide Spares (Equipment including licenses) at the same contractual rates for upgradation of nodes /Network.

12 BID SECURITY

- 12.1 The bidder shall furnish tender security amounting to **PKR. 50,000,000/- (Pak Rupees Fifty Million Only)** in the form of Pay Order or Deposit at Call or a Bank guarantee as per [Annex-G](#) issued by a scheduled bank of Pakistan in favor of Managing Director NTC valid for a period 180 days from the date of tender opening.

- 12.2 The Original Bid Security for the lot(s) being quoted shall be delivered in person or sent by the registered mail which should reach the office of Director (Procurement) Room # 05, Ground Floor, NTC HQ, G-5/2 Islamabad on or before **1100 Hours on April 01, 2026**. Any online bid for which original bid security does not reach before deadline of the bid shall be rejected by the NTC as non-responsive
- 12.3 Scanned Copy of bid security shall be uploaded by the bidder on EPADS before deadline of bid submission. Any bid not accompanied by bid security shall be rejected by the NTC as non-responsive.
- 12.4 The bid securities / earnest money of the unsuccessful bidders will be returned upon award of contract to the successful bidder or on expiry of validity of tender security whichever is earlier. The bid securities of bidders, who are not in competition, can be returned earlier at NTC discretion upon receiving a request.
- 12.5 The tender security of the successful bidder will be returned when the bidder has furnished the required Performance Security and signed contract agreement.
- 12.6 All correspondence regarding release/extension of bid security shall be made with Director (Procurement) NTC HQ.
- 12.7 The bid security may be forfeited:
- If a bidder withdraws his bid during the period of bid validity.
 - If the bidder does not accept the correction of their bid price.
 - In the case of successful bidder, if bidder fails to furnish the required performance security or sign the contract agreement.
 - If bidder does not respond timely to the clarifications called by NTC.

13 VALIDITY OF BIDS

Bid shall remain valid for a period of 180 days from the date of tender opening.

14 DEADLINE FOR SUBMISSION OF BID

- 14.1 The bid shall be uploaded in PDF format on PPRA EPADS website i.e. www.eprocure.gov.pk on or before **11:00 AM April 01, 2026**.
- 14.2 The bidders are required to follow procedure of EPADS and for any clarification/assistance regarding EPADS they may contact PPRA Helpline UAN: 051-111-137-237.
- 14.3 Bid received other than EPADS i.e. hard/Soft copy delivery in person or through e-mail or fax or registered mail will be not accepted by NTC.

15 OPENING OF BID

- 15.1 The NTC tender committee will open/download the bids at **1130 hours on dated April 01, 2026** in the presence of bidders' representatives who choose to attend, at NTC HQ G-5/2 Islamabad.
- 15.2 The bidder's name, bid prices, any discount, the presence or absence of tender security, and such other details as the committee at its discretion may consider appropriate, will be announced at the tender opening.
- 15.3 The tender committee will resolve any issue raised by the bidders, on the spot.
- 15.4 NTC reserves the right to reject any one or all bids prior acceptance of a bid / proposal.

15.5 NTC reserves the right to reject any one or all bids as per Public Procurement Rules, 2004 33(1).

16 RESPONSIVENESS OF BIDDERS

16.1 The bid is valid till required period.

16.2 The bid prices are firm during its validity and inclusive of all taxes, duties & freight charges etc.

16.3 The bidder has furnished valid tender security.

16.4 The bidder is eligible to tender and possesses the requisite qualification.

16.5 The bid does not deviate from basic tender requirements.

16.6 The bid is generally in order.

16.7 The bidder promptly responds to queries sought by NTC.

16.8 The bidder has complied to the tender clauses.

NOTE: "Any bidder found non-compliant in any of above-mentioned conditions will be declared as non-responsive and will not be considered for further Evaluation proceedings. A bidder once declared "non-responsive" shall not subsequently be made responsive by the NTC."

17 EVALUATION CRITERION FOR MOST ADVANTAGEOUS BIDDER

17.1 The tender evaluation committee will evaluate and compare only the bids previously determined to be substantially responsive.

17.2 Evaluation will be carried out on Qualification, Quality and Cost basis.

17.3 The Most Advantageous Bidder shall be the bidder that qualify qualification criteria, qualify quality evaluation criteria and is highest Ranked in Bid Score Formula at Clause 17.8.

17.4 Qualification Evaluation Criteria:

In first step, the received bids shall be evaluated on qualification criteria tabulated in [Clause 4](#). The bidders fully compliant to qualification criteria shall be declared as qualified. The bidders are required to fully comply all mandatory clauses. **Any firm found non-compliant in any of these conditions will be declared disqualified and will not be considered for further evaluation proceedings.**

Quality Evaluation Criteria:

17.5 The qualified bids will be examined for **quality evaluation** i.e. whether the bidder conforms to the **Quality Evaluation** at [Annex-C1](#) and the quoted equipment comply the Technical Specifications at [Annex-C2 to C6](#). The bidders are required to obtain minimum 75% passing Marks in [Annex-C1](#). The weight of [Annex-C1](#) evaluation in overall Bid Score formula at [Clause 17.8](#) shall be 70%. Bid obtaining highest marks in [Annex-C1](#) amongst all bids shall be declared **Technical highest** for the bid score formula. Technical Score is total number of marks obtained by each bidder in Table [Annex-C1](#).

17.6 In addition to the qualification in [Annex-C1](#) , the bidders are required to **fully comply** all the **Mandatory Clauses** of Technical Specifications at [Annex-C2 to Annex-C6](#) and obtain minimum passing marks specified. For this purpose, the bidder's data i.e. Technical statement of Compliance (SOC), Technical Datasheets,

User Manual etc. submitted with the bid will be compared with Technical Specs clauses and evaluation criteria set forth in the tender documents. Supported documents & clarification will be sought in case compliance is not evident from the data submitted.

Any bidder obtaining less than 75 % Marks in [Annex-C1](#) and non-compliance of Technical Specifications mandatory clauses or non-obtaining of requisite passing marks in [Annex-C2 to Annex-C6](#) shall be disqualified by NTC in quality evaluation.

17.7 Cost Evaluation Criteria:

Cost evaluation of the bids shall be carried out by comparison of bids evaluated prices as per bill of quantity at [Annex-B](#). Lowest evaluated bid price amongst all bids shall be declared **Cost_{lowest}** for the bid score formula at **Clause 17.8**.

17.8 Bid Score Formula

$$Score_i = \left(\frac{Cost_{lowest}}{Cost_i} \right) \times 30\% + \left(\frac{Technical_Score_i}{Technical_Score_{highest}} \right) \times 70\%$$

Where:

Score _i	=	Evaluated Score of Bidder i
Cost _i	=	Evaluated Bid Price of Bidder i
Cost _{lowest}	=	Lowest Evaluated Bid Price amongst all responsive Bids
Technical_Score _i	=	Technical Score of Bidder i
Technical_Score _{highest}	=	Highest Technical Score amongst all bids

Technical Score is total number of marks obtained by each bidder in Table [Annex-C1](#).

17.9 The bidder obtaining highest score in above formula shall be considered as highest Ranked and the bidder with second high Score shall be treated as second Ranked and so on. The bidder with highest score shall be declared as **Most Advantageous Bidder**.

17.10 Any effort by a bidder to influence NTC in the tender evaluation, bid comparison or order award decision may result in the rejection of his bid.

17.11 Any minor informality or non-conformity or irregularity in the bid which does not constitute a material deviation may be waived by NTC, provided such waiver does not prejudice or affect the relative ranking of any other bidders.

18 CLARIFICATIONS / CORRECTIONS OF BID

18.1 To assist in the examination, evaluation and comparison of the bids the committee at its discretion may ask the bidder for a clarification of its bid. The request for clarification and the response shall be in writing (i.e. letter or email etc.) and no change in the price or substance of the bid shall be sought, offered or permitted.

18.2 Arithmetical errors will be rectified on the following basis:

“If there is a discrepancy between unit price and total price that is obtained by the multiplying the unit price and quantity, the unit price shall prevail and total price shall be corrected. If there is a discrepancy between the words and figures the

amount in words shall prevail. If there is a mistake in addition / totaling that can be corrected.”

- 18.3 If the bidder does not accept the corrected amount of bid, their bid will be rejected and their bid security forfeited.

19 COMMERCIAL COMPLIANCE STATEMENT

The bidder will furnish a compliance certificate with the bid as per enclosed format as per **Annex-F (duly signed along with company seal)**.

20 VARIATION ORDER

NTC reserves the right to place variation order i.e. increase or decrease or annul the quantities of BoQ. The bidder shall be bound to accept the variation order by NTC.

21 SPARE AVAILABILITY AND UPGRADATION

- 21.1 The bidder shall guarantee availability of hardware spares for a period of at least ten (10) years from the date of FAC and shall ensure that the system can be upgraded to any number of channels during this period. The production line, for the quoted model, shall remain in operation for the same period.
- 21.2 In the event any spare part becomes discontinued, obsolete or unavailable in the original form during this period, an equivalent spare part, fully compatible with the previous type and giving the same or superior performance, shall be made available with no additional cost to NTC.

22 AWARD CRITERIA & NTC'S RIGHT

- 22.1 The contract will be awarded to **Most Advantageous Bidder on as-a-whole basis**.
- 22.2 The NTC reserves the right to accept or reject any bid, and to annul the tendering process and reject all bids, at any time prior to award of order, without thereby incurring any liability to the affected bidders or any obligation to inform the affected bidders of the grounds for the NTC's action.

23 NOTIFICATION OF AWARD & SIGNING OF CONTRACT AGREEMENT

- 23.1 Prior to expiration of the period of tender validity prescribed by NTC, the NTC will notify the successful bidder in writing "Letter of Intent" through EPADS that their bid has been accepted. The bidder shall accept the LOI through EPADS.
- 23.2 The contract shall be signed with the successful bidder upon furnishing of acceptable performance security.
- 23.3 If the successful bidder does not accept the LOI on EPADS, NTC may cancel the award and proceed to 2nd Ranked Bid for award of work.

SECTION-II

TERMS & CONDITIONS OF CONTRACT

1 PERFORMANCE SECURITY

- 1.1 The successful bidder shall furnish to the NTC a performance security equivalent **10% of contract value (Excluding SLA quoted Price)** in the shape of Pay order or CDR or bank guarantee valid for a period of 24 months **(as per Annex-H)** at the time of signing of contract. This Performance security shall be released by NTC upon issuance of all Final Acceptance Certificates for all three Rings by NTC.
- 1.2 The successful bidder shall also furnish to the NTC a performance security equivalent **10% of the SLA quoted value** in the shape of Pay order or CDR or bank guarantee valid for a period of 144 months **(as per Annex-H)** at the time of signing of contract. This SLA Performance security shall be released by NTC upon issuance of SLA Completion Certificate by Director NOC NTC HQs.
- 1.3 The performance security shall be further extended if the completion is delayed. Furthermore, the contractor shall extend the performance security to cover the warranty period.
- 1.4 Failure of the successful bidder to furnish performance security shall constitute sufficient grounds for the annulment of the award and forfeiture of the tender security.
- 1.5 All the correspondence regarding release of performance guarantee shall be made with Director (Procurement) NTC HQ subject to issuance of FAC by Project Director.

2 CONTRACTORS RESPONSIBILITIES

- 2.1 The Contractor shall be responsible for supply, Installation, Testing and Commissioning of the equipment in accordance with contractual Bill of Quantity.
- 2.2 The Contractor shall be responsible for supply, Installation, Testing and Commissioning of the WDM/OTN equipment.
- 2.3 The Contractor shall be responsible for supply, Installation, Testing and Commissioning of the Rectifiers, Battery Banks, DC Cabling, Main Circuit Breakers (MCBs) and PDUs.
- 2.4 The Contractor shall be responsible for supply, Installation, Testing and Commissioning of the DWDM equipment Network Management System hardware and Software including Licenses.
- 2.5 The Contractor shall be responsible for Uninterruptable Migration of Services including cutover and Traffic shifting.
- 2.6 The Contractor shall be responsible for Link Budgeting and designing of all the rings and spur links designing and propose a viable solution.
- 2.7 The contractor shall ensure that the quoted equipment is of the latest models and its OEM Support shall continue till completion of ten-year post FAC period.
- 2.8 The contractor shall ensure that the quoted equipment is brand new, unused and incorporate latest improvement in design and material and is of good quality.

- 2.9 Supply all active and passive components, accessories, cables, and hardware as per the approved Bill of Quantities (BoQ) and technical specifications, ensuring compatibility with the existing NTC infrastructure and fiber Network topology.
- 2.10 Provide full connectivity of client/tributary interfaces (E1, FE/GE/10GE/100GE) to the termination points of NTC's exchanges, NGN, and data network equipment using suitable fiber/PCM/Ethernet cables and accessories.
- 2.11 Ensure complete operational readiness and integration of the system on a turnkey basis.
- 2.12 Execute seamless migration and cutover of existing traffic (including but not limited to E1s, Ethernet, and IP-based circuits) from the legacy DWDM /SDH equipment to the newly installed DWDM/OTN platform.
- 2.13 A detailed cutover and rollback plan shall be submitted for NTC approval prior to execution.
- 2.14 All optical tributaries shall be terminated on Optical Distribution Frames (ODFs) as per site/design requirements.
- 2.15 The Contractor shall not subcontract any part of the work without prior written approval of NTC.
- 2.16 All PCM, Ethernet, and power cabling shall be properly terminated as per standard industry practice.
- 2.17 The contractor shall guarantee the performance of the OTN/WDM system as per latest ITU-T and IEEE standards applicable on the Contract Effective Date, ensuring compliance with parameters such as OSNR, BER, latency, and protection switching times.
- 2.18 The contractor shall provide comprehensive installation, operation, and maintenance manuals, as-built drawings, and network topology diagrams in both hard and soft copies as per contractual deliverables.
- 2.19 The contractor shall submit the quoted products including its software detailed features, configuration, management, scalability options, and migration path for future capacity expansion (e.g. from 100G to 400G/800G per channel).
- 2.20 The contractor shall carryout detailed site surveys and submit site preparation reports specifying standard site readiness requirements prior to installation.
- 2.21 The contractor shall supply and install complete AC/DC power equipment, including DBs, cabling, and circuit breakers, in accordance with technical specifications.
- 2.22 The contractor shall supply and install cable runways for power and Optical cables as per site requirement and industry standards.
- 2.23 The contractor shall provide necessary DDF tools and accessories at each site to support future cabling and maintenance work as per BoQ.
- 2.24 The contractor shall ensure provision of all requisite software and licenses required for system's full quoted capacity on lifetime validity basis.
- 2.25 The contractor shall ensure that all software updates shall be performed without service interruption and allow remote and local upgrades with automatic rollback in case of failure.
- 2.26 The contractor shall ensure Power and Environmental alarms integration and configuration on Network Management System.

- 2.27 The contractor shall provide comprehensive technical assistance during installation, integration, migration, and throughout the warranty period, including on-site and remote troubleshooting support.
- 2.28 The contractor shall provide a power system equipped with remote monitoring functionality.
- 2.29 The contractor shall provide wall-mounted DCDBs in accordance with the equipment power requirements, including spare parts.
- 2.30 The contractor shall ensure that the DCDBs shall replicate the rectifier breaker configurations and be installed at all sites.
- 2.31 The contractor shall provide battery banks as per technical specifications and site BoQ requirements
- 2.32 The contractor shall lay underground AC cables from generator room to rectifier using PVC conduits and protection as per NTC standards if required as per site survey and Bill of Quantity.
- 2.33 The contractor shall Provide detailed technical literature, operation manuals, configuration and maintenance recovery procedures.
- 2.34 The contractor shall ensure that all third-party components supplied are of industry standard quality.
- 2.35 The contractor shall arrange to provide OEM standard PAT documents that test the functionality as per Technical Specifications and Bill of Quantity within 05 x weeks of contract signing. NTC shall review and approve within one month of submission.
- 2.36 The contractor shall ensure to quote the equipment that is ready for upgradation to Full ROADM throughout the 10-years SLA Period.
- 2.37 The contractual items price shall remain the same in Pak Rupees throughout ten years post warranty Service level Agreement Period.
- 2.38 NTC may issue network upgradation purchase order during the SLA period and the contractor shall be bound to upgrade the network unconditionally.
- 2.39 The contractor shall do all arrangements for execution of the Provisional Acceptance Testing at all sites.

3 NTC RESPONSIBILITIES

- 3.1 Project Director NTC shall ensure accomplishment of contractor responsibilities.
- 3.2 Project Director NTC shall ensure that the provided equipment is functional, brand new, unused and incorporate latest improvement in design and material and is of good quality.
- 3.3 NTC shall nominate authorized technical and coordination staff to facilitate smooth implementation, testing, and commissioning of the DWDM/OTN equipment.
- 3.4 NTC's project coordination team shall work jointly with the Contractor's project implementation team to ensure adherence to the approved schedule and compliance with safety and operational protocols.
- 3.5 NTC shall provide Designated rack space at each site for installation of equipment, including supporting components such as rectifiers and power distribution units.
- 3.6 NTC shall provide Optical Fiber Cable (OFC) pairs for connectivity between Add-Drop, OLA, and spur sites as per approved topology.
- 3.7 NTC shall provide environmental infrastructure, including:
 - a) Adequate air-conditioning, fire suppression, and fire alarm systems.

- b) Engine generator backup and commercial AC power supply up to the main circuit breaker (MCCB) point.
 - c) Secure equipment rooms with restricted access to ensure system integrity.
- 3.8 NTC shall provide the existing traffic demand matrix, fiber route details, and network layout diagrams of the legacy system to the contractor for planning of migration and bandwidth provisioning.
- 3.9 This information shall serve as input for the detailed engineering and cut-over plan.
- 3.10 During the migration from the legacy SDH/DWDM system to the new NG OTN/WDM network, NTC shall ensure coordination of live service windows and traffic re-routing schedules.
- 3.11 In the event that the newly installed system encounters functional anomalies during or after cutover, the contractor shall be responsible for restoring connectivity to the old system, while NTC shall ensure the operational continuity of existing configurations.
- 3.12 NTC shall facilitate necessary site access and security clearances for the contractor's authorized personnel, subject to the standard operational and security protocols applicable at NTC facilities.

4 TIME FOR COMPLETION

The contractor shall supply, install, test, configure the hardware and software and successfully migrate services within **85 x Weeks** from the date of signing of contract; however incumbent bidder must also specify the timelines in which they can execute the whole work.

5 PRE-SHIPMENT FACTORY INSPECTION

- 5.1 Prior to dispatch of the equipment, the contractor shall arrange pre-shipment Factory Inspection Testing (after signing of this contract) of 05 x NTC officers for Ten (10) working days as per equipment factory in their country of origin. All the testing / inspection tools, test equipment and preparation of test bed shall be arranged by the contractor at his own expenses. Boarding / lodging, breakfast, air-fare of round trip, pick & drop at Country of Origin and subsistence (in advance and as per Government of Pakistan Foreign office rates for sponsored trip) shall be arranged by the contractor at his own expenses.
- 5.2 NTC shall have the right to inspect and / or test the goods to confirm their conformity to the contract's technical specifications. If the inspected or tested equipment / goods fail to conform technical specifications, NTC may reject them and the contractor shall replace the reject equipment / goods 'or' make alterations necessary to meet technical specification as per contract.
- 5.3 Project Director NTC shall propose nominations to Director (Procurement) NTC for perusal and recommendation of CTO and approval of MD NTC.
- 5.4 NTC authorized representatives shall have the right to inspect and test the goods, hardware, and software to verify conformity with the contractual specifications, BoQ, and technical standards.
- 5.5 The detailed FAT procedures, inspection criteria, and testing requirements shall be defined in the approved FAT Test Plan which shall be submitted to PD NTC for approval of CTO NTC prior to the Commencement of testing.

- 5.6 The Contractor shall, at no additional cost to NTC, rectify the non-conformance, replace the defective items, and re-present the equipment for re-inspection.
- 5.7 Only after successful completion and sign-off of the FAT report by NTC's authorized representatives shall the equipment be cleared for shipment.

6 EQUIPMENT DELIVERY VERIFICATION

- 6.1 Upon delivery of equipment at Contractor's designated warehouse in Pakistan, the contractor shall inform Project Director and Director Procurement NTC.
- 6.2 Within one week of such intimation, Director (Procurement) NTC shall nominate a committee of at least five relevant officers in consultation with Project Director NTC for approval of CTO for verification of the delivered equipment.
- 6.3 The equipment delivery verification committee shall verify the delivered equipment against Contractual Bill of Quantity equipment. The committee shall sign the delivery challans upon verification of the equipment. Shortage of any quantity shall be reported to Project Director NTC and Director Procurement NTC.
- 6.4 Upon successful delivery and verification of contractual BOQ by the committee, Project Director NTC shall issue **Successful Delivery Certificate** within one week of inspection.
- 6.5 After issuance of successful delivery certificate, the contractor shall deliver equipment at respective sites as per requirement at their own risk and cost under intimation to Project Director NTC.
- 6.6 The contractor shall be responsible for safety, security and custody of the delivered equipment till issuance of Provisional Acceptance Certificates by NTC.

7 WARRANTY / SERVICES

- 7.1 The contractor will warrant that the equipment supplied under the contract is brand new, un-used, and incorporates all recent improvements in design and materials and of good quality. (The contractor shall also furnish an undertaking that the store supplied is not stolen, used, refurbished, from old stock or smuggled).
- 7.2 The warranty shall remain valid for a period of 01 (One) Year starting from the date of acceptance of Network Optimization and Performance Validation Report by Project Director.
- 7.3 NTC shall promptly notify the Contractor in writing of any claims arising under this warranty and the contractor will resolve/ repair / fix the defective items/equipment/Software within reasonable time, ensuring minimal impact on services, without any cost to NTC.
- 7.4 If the Contractor, having been notified, fails to remedy the defect(s) within a reasonable period, NTC may proceed to take such remedial actions as may be necessary, at the Contractor's risk and expense and without prejudice to any other rights which NTC may have against the Contractor under the contract.
- 7.5 Without prejudice to any other clauses of this contract, the Contractor shall promptly correct at no cost to NTC, any defect in any work of correction executed previously, upon receipt of written notice of defect within twelve months' warranty period from the acceptance of the corrected defect.
- 7.6 The contractor shall maintain pool of spares for the duration of complete warranty for immediate replacement of faulty component(s).

8 PROVISIONAL ACCEPTANCE CERTIFICATES

- 8.1 The contractor shall provide Provisional Acceptance Testing (PAT) documents of the equipment part to the Project Director for vetting and approval of CTO NTC HQs within 05 x weeks of signing of the contract.
- 8.2 The PAT documents shall be comprehensive to test the functionality and conformance to the bill of quantity and Technical Specifications of the project.
- 8.3 Upon completing the supply, installation and commissioning of all the Ring wise equipment, the contractor shall notify the Project Director NTC, in writing to initiate the Provisional Acceptance Test (PAT) of the equipment part.
- 8.4 Project Director NTC shall suggest Ring wise PAT Committees for approval of CTO NTC.
- 8.5 The approved PAT Team shall carry out PAT in accordance with the approved PAT protocols, verifying the installed equipment against the contractual clauses, specifications and Bill of Quantity.
- 8.6 The contractor shall do all necessary arrangements for the PAT testing as per approved PAT protocols. Upon successful completion of the PAT, the nominated team will sign the PAT report, confirming compliance to the contractual BOQ and Technical Specifications.
- 8.7 The PAT committee will carry out BoQ verification, measurements and quality assurance of the works as per contract.
- 8.8 After the successful conduct of the Provisional Acceptance Testing, Bill of Quantity verification and work inspection by the approved PAT Team, the Project Director NTC shall recommend the case to CTO NTC for accord of approval of Provisional Acceptance Certificates (PAC) issuance, based on the PAT results and work verification/inspection.
- 8.9 Upon accord of approval by CTO NTC, Project Director NTC shall issue Ring wise Provisional Acceptance Certificates.
- 8.10 If the PAC is not issued within one (1) week of the PAT and work inspection, the Project Director shall provide reasons of the delay within one week after receiving a formal request from the contractor.
- 8.11 Any discrepancies or deficiencies identified during the PAT or work inspection will be communicated to the contractor, who shall address them promptly, but no later than fourteen (14) working days from the date of notification. In such cases, the PAC will only be issued upon successful rectification of the discrepancies and completion of the required tests to the satisfaction of the PAT team.
- 8.12 Delays in issuing the Provisional Acceptance Certificate (PAC) will be attributed to the contractor only if discrepancies identified during the PAT remain unresolved by the contractor.
- 8.13 The PAC(s) shall be issued on **Ring wise basis** and payment of the same can be processed accordingly.
- 8.14 Any Minor / Non-service affecting discrepancies shall be appended with PAC(s) as Annexure.

9 NIL DISCREPANCY CERTIFICATES

- 9.1 Upon successful issuance of Ring wise Provisional Acceptance Certificate (PAC), and subsequent resolution of pending Minor / Non-service affecting discrepancies,

duly verified by the PAT Teams, the Project Director shall issue Ring wise Nil Discrepancy Certificates (NDC) in favor of the contractor.

- 9.2 Issuance of the NDC shall not absolve the contractor of their contractual obligations during the warranty and Service Level Agreement period.

10 NETWORK OPTIMIZATION & PERFORMANCE VALIDATION

- 10.1 After issuance of Nil Discrepancy Certificate (NDC) against all rings, the complete network will undergo a stabilization period of three months. During stabilization period, NTC and the contractor will jointly monitor and optimize the network for smooth operations.
- 10.2 At the end of this period, contractor shall submit Network Optimization and Performance Validation report to Project Director.
- 10.3 The warranty of the whole network shall commence upon successful acceptance of Network Optimization and Performance Validation Report by The Project Director.

11 TRAINING

- 11.1 The contractor shall arrange foreign training for 12 x NTC officers in two batches (06 x Officers in each batch) for a period of 15 x working days in OEM training center. The training must be comprehensive and must be on equipment which shall be of such level that the NTC personal trained should be able to install, configure, commission manage, maintain and operate all the components of the system/network ordered. Boarding / lodging, breakfast, air-fare of round trip, pick & drop at Country of Origin and subsistence (in advance and as per Government of Pakistan Foreign office rates for sponsored trip) shall be arranged by the contractor at his own expenses.
- 11.2 The onsite job training shall also be arranged by contractor on equipment during commissioning of equipment at NTC sites.
- 11.3 Local training for 30 x NTC officers/officials shall be arranged by the contractor for a period of 15 working days. The training must be comprehensive and must be on equipment which shall be of such level that the NTC personal trained should be able to install, configure, commission, manage, maintain and operate all the components of the system/network ordered.
- 11.4 The objective of the training program is to enable the personnel require the expertise concerning system installation, operation maintenance, troubleshooting, repair and detail concept of all equipment. The training program shall enable the personnel to acquire:
- Independence in maintenance of system.
 - Specialist Level maintenance of system.
 - System installation capability that allows personnel to undertake future expansion of the network independently.
- 11.5 Complete proposal of the training courses and their duration covering Operation, Maintenance, and Diagnostic Testing, Measurements, Repairs and Management Information Reporting procedures shall be submitted.
- 11.6 All the instructors shall possess high technical ability to impart training. They shall have as high command on English language.

- 11.7 The efficiency of the training program conducted by the contractor/OEM will be under close scrutiny and it will have to be repeated by contractor without extra cost to NTC if the training given is found to be ineffective, deficient and un-satisfactory. However, NTC has to communicate its dissatisfaction (if any) during the training period for improvement and not afterwards.
- 11.8 Project Director NTC shall propose nominations to Director (Procurement) NTC for perusal and recommendation of CTO and approval of MD NTC.

12 LIQUIDITY DAMAGES

- 12.1 Unless the failure to complete the work is caused by force majeure or delay is not on part of NTC, the contractor shall pay to NTC Headquarters as liquidated damages a sum up equivalent to @ 0.5% per week of the delayed portion up to maximum of 10% of total contract value (excluding SLA services) and the same will be recovered from the Contractor at the time of payment.
- 12.2 In case of force majeure the LD charges may be waived off by NTC on receipt of request from contractor with documentary evidences. If the delay is on the part of NTC, and agreed by NTC, then for that time no liquidated damages will be paid to NTC. NTC shall have discretion to impose/waive off LD Charges based on the performance of contractor.

13 PAYMENT TERMS

Payments to the contractor shall be made in the following manner:

- 13.1 **Ten Percent (10%)** payment of the total contractual equipment value (Excluding SLA Services) shall be payable as mobilization advance to the contractor in **Financial year 2025-26** upon submission of following by the contractor:
- Approved Site Survey Reports
 - Detailed Design & Network Architecture documents
 - Project Implementation Plan
 - Commercial Invoice
 - Guarantee of equivalent amount issued by any scheduled bank of Pakistan valid for six (06) months from the date of signing of contract.
- The invoice will be processed for payment after confirmation of genuineness of submitted guarantee by the issuing Bank.
- 13.2 In case the contractor does not take the advance payment at clause no 13.1, the same shall be payable with delivery payment at clause no. 13.3 subject to provision of 13.1 (a), (b) and (c).
- 13.3 **Thirty-Five Percent (35%)** of the total contractual equipment value (Excluding SLA Services) shall be payable to the contractor in **Financial year 2026-27** upon delivery and verification of contractual equipment at NTC's acceptable contractor warehouse in Pakistan subject to successful inspection and issuance of Successful Delivery Certificate by Project Director NTC. The contractor shall furnish invoice of (45%) of total contractual equipment value (Excluding SLA Services) including adjustment of 10% mobilization advance.
- 13.4 **Fifteen Percent (15%)** payment (Excluding SLA Services) of the contract value shall be payable to the contractor in **Financial year 2027-28** upon issuance of **Provisional**

- Acceptance Certificate (PAC) for Ring-1** on successful delivery, installation, commissioning, testing of equipment and migration of services of Ring-1.
- 13.5 **Five Percent (05%)** payment (Excluding SLA Services) of the contract value shall be payable to the contractor in **Financial year 2027-28** upon issuance of **Provisional Acceptance Certificate (PAC) for Ring-2** on successful delivery, installation, commissioning, testing of equipment and migration of services of Ring-2.
- 13.6 **Ten Percent (10%)** payment of the contract (Excluding SLA Services) value shall be payable to the contractor in **Financial year 2027-28** upon issuance of **Provisional Acceptance Certificate (PAC) for Ring-3** on successful delivery, installation, commissioning, testing of equipment and migration of services of Ring-3.
- 13.7 **Fifteen Percent (15%)** payment of contract value (Excluding SLA Services) shall be payable **Financial year 2028-29** upon successful completion of stabilization period of whole network subject to acceptance of Network Optimization & Performance Validation Report by Project Director.
- 13.8 **Ten Percent (10%)** payment of contract value (Excluding SLA Services) shall be payable in **Financial year 2029-30** upon successful completion warranty subject to issuance of Final Acceptance Certificate (FAC) against complete project by Project Director NTC.
- 13.9 **Hundred Percent (100%)** payment against post warranty Service Level Agreement (SLA) shall be made on Annual Basis subject to issuance of SLA Service Acceptance Certificate by Director (NOC) NTC HQs.
- 13.10 The GST number of NTC & contractor shall be clearly mentioned on invoices (NTC NTN#1218153-6, NTC GST # 07-01-9802-013-64).
- 13.11 All the payments except Service Level Agreement (SLA) shall be made by Finance Wing NTC HQs through Director (Procurement) NTC HQs.
- 13.12 Payments against SLA services shall be made by Finance Wing NTC HQs through Director (NOC) NTC HQs.
- 13.13 The contractor shall ensure provision of duly verified invoices by the Project Director for claiming payment.
- 13.14 Taxes will be deducted as per government rules at the time of payment.

14 FINAL ACCEPTANCE CERTIFICATES

The contractor may notify the NTC concerned officer at-least 15 days before the expiry of warranty period for the issuance of final acceptance certificate. Upon such notification from contractor, the Project Director will issue Final Acceptance Certificates, in favor of contractor subject to satisfactory completion of warranty period as per requirement of contract. Alternatively, the NTC concerned officer will notify the contractor for the discrepancies that still remain un-resolved and contractor will rectify the discrepancies.

15 AMENDMENTS IN CONTRACT

- 15.1 No variation in or modification of the terms of the contract shall be made except by written amendments signed by the parties.
- 15.2 NTC may at any time but at least sixty (60) days prior to the delivery of the Equipment or service, intimate by written order given to the contractor, change

within the general scope of the contract while remaining within the products quoted in BoQ, in any one or more of the following: Drawings, designs or specifications, where Goods or service to be furnished under this contract. If any such change causes and increase in the cost of or the time required for the contractor's performance of any part of the work under the contract, whether changed or not changed by the order, an equitable adjustment shall be made in the contract price or delivery schedule, or both, after approval from competent authority of NTC and the contract shall accordingly be amended. Any claims by the contractor for adjustment under this paragraph must be asserted within thirty (30) days from the date of contractor's receipt of NTC changed order.

16 WAIVER

No delay, neglect or forbearance on the part of either party in enforcing against the other party any term or condition of the contract shall either be or be deemed to be a waiver or in any way prejudice any rights of that party under the contract nor shall any waiver by either party of any breach of contract operate as a waiver of any subsequent or continuing breach of contract. Any waiver of a party's rights, powers or remedies under the contract must be in writing and must be dated and signed by an authorized representative - with approval of competent authority- of the party granting such waiver and must specify the right and the extent to which it is being waived.

17 SEVERABILITY

If any one or more of the provisions of this contract should be ruled wholly or partly invalid or unenforceable by a court or other government body of competent jurisdiction, then:

- (a) The validity and enforceability of all provisions of this contract not ruled to be invalid or unenforceable shall be unaffected;
- (b) The effect of the ruling shall be limited to the jurisdiction of the court or other government body making the ruling;
- (c) the provision(s) held wholly or partly invalid or unenforceable shall be deemed amended, and the court or other government body is authorized to reform provision(s), to the minimum extent necessary to render them valid and enforceable in conformity with the Parties intent as manifested herein; and
- (d) if the ruling and/or the controlling principle of law or equity leading to the ruling is subsequently overruled, modified, or amended by legislative, judicial, or administrative action, then the provision(s) in question as originally set forth in this contract shall be deemed valid and enforceable to the maximum extent permitted by the new controlling principle of law or equity.

18 INDEPENDENT CONTRACTORS

- 18.1 Each of the party is and shall remain at all times an independent contractor fully responsible for its own acts or defaults (including those of its employees or agents). None of the parties or its employees, agents or representatives shall engage in any acts which may lead any person to believe that such party is an employee, agent or representative of any other party.

18.2 Nothing in this contract shall be deemed to constitute a partnership or other profit-sharing arrangement between the parties.

19 SURVIVAL

All accrued rights of the party shall survive the expiry or termination of this contract as shall all Clauses that by their nature are intended to do so, including, without limitation, obligations of indemnity, Intellectual Property Rights, Confidentiality and Dispute Resolution.

20 INTERPRETATION

This contract consists of the main body and Annexes, which constitute an integral part of this Contract.

21 COUNTERPARTS

This contract may be executed in two counterparts, each of which shall be deemed as original, but all of which together shall constitute one and the same instrument.

22 DEFAULT BY CONTRACTOR

- 22.1 If the contractor fails to provide the store and/or services, refuses or fails to comply with a valid instruction of the NTC, the NTC may give notice and stating the default.
- 22.2 If the contractor has not taken all practicable steps to remedy the default within 14 working days after receipt of NTC notice, the NTC may by a second notice cancel the contract and performance security will be confiscated.

23 ARBITRATION AND GOVERNING LAW

- 23.1 This Agreement shall be governed under Pakistani law and the Courts at Islamabad shall have exclusive jurisdiction over any matter that may be referred to a Court under this Agreement.
- 23.2 In the event that any dispute arises between the Parties under this Agreement, one Party shall issue notice to the other Party to mutually negotiate a resolution to the dispute. If the negotiations fail to resolve the dispute within seven (7) days of receipt of the notice, the dispute shall be referred to the Managing Director, National Telecommunication Corporation (“MD”) or his nominee who shall provide a personal hearing to Contractor and render a decision thereon within a period of thirty (30) days. In the personal hearing conducted pursuant to this clause, the Contractor shall not be represented by a legal practitioner within the meaning of the Legal Practitioners and Bar Councils Act, 1973.
- 23.3 If the Contractor is aggrieved of the decision of the MD or his nominee rendered under clause (23.2) hereof, the Contractor may refer the dispute to arbitration within thirty (30) days of the date of the decision of the MD or his nominee under the Arbitration Act, 1940 or any law that the Arbitration Act, 1940 is repealed, amended, or modified by at the time of referral of the dispute to arbitration. The arbitration shall be conducted before a Sole Arbitrator to be appointed by the consent of the Parties. The seat and venue of arbitration shall be at the National

Telecommunication Corporation Headquarters, Sector G-5/2, Islamabad. The arbitration and the award thereof shall be conducted in the English language.

- 23.4 The costs and fees of the Sole Arbitrator shall be shared by the Parties equally. A Party shall bear the costs and fees of its legal practitioners and other personnel that a Party engages for the arbitration unless otherwise awarded by the Sole Arbitrator.

24 FORCE MAJEURE

- 24.1 The Contractor shall not be liable for forfeiture of its performance security, liquidated damages or termination for default, if and to the extent that, its delay in performance or other failure to perform its obligations under the contract is the result of an event of Force Majeure.
- 24.2 If either party is temporarily rendered unable, wholly or in part by Force Majeure to perform its duties or accept performance by the other party under the Contract it is agreed that on such party, giving notice with full particulars in writing of such Force majeure to the other party within 14 (fourteen) days after the occurrence of the cause relied on, then the duties, of such party as far as they are affected by such Force Majeure shall be suspended during the continuance of any inability so caused but for no longer period and such cause shall as far as possible be removed with all reasonable speed. Neither party shall be responsible for delay caused by Force Majeure.
- 24.3 The terms "Force Majeure" as used herein shall mean Acts of God, strikes, lockouts or other industrial disturbance, act of public enemy, war, blockages, insurrections, riots, epidemics, landslides, earthquakes, fires, storms, lightning, flood, washouts, civil disturbances, explosion, Governmental Export/Import Restrictions (to be supported by a letter from the relevant Authority and verified by the Diplomatic Mission in Pakistan), Government actions/restrictions due to economic and financial hardships, change of priorities and any other cause similar to the kind herein enumerated or of equivalent effect, not within the control of either party and which by the exercise of due care and diligence either party is unable to overcome.
- 24.4 The term of this Contract shall be extended for such period of time as may be necessary to complete the work which might have been accomplished but for such suspension. If either party is permanently prevented wholly or in part by Force Majeure for period exceeding 12 (twelve) months from performing or accepting performance, the party concerned shall have the right to terminate this contract immediately giving notice with full particulars for such Force Majeure in writing to the other party, and in such event, the other party shall be entitled to compensation for an amount to be fixed by negotiations and mutual agreement.
- 24.5 If a Force Majeure situation arises, the Contractor shall promptly notify NTC in writing of such conditions and the cause thereof. Unless otherwise directed by NTC in writing, the supplier shall continue to perform its obligations under the contract as far as is reasonably practicable, and shall seek all reasonable alternative means for performance not prevented by the Force Majeure event.

25 TERMINATION FOR INSOLVENCY

The NTC may at any time terminate the contract by giving written notice to the contractor, without any compensation to contractor. If the contractor becomes

bankrupt or otherwise insolvent, provided that such termination will not prejudice or affect any right of action or remedy which has accrued or will accrue thereafter to action to the NTC.

26 TERMINATION FOR CONVENIENCE

Without prejudice to the contractor, the NTC may send a written notice to the contractor, terminate the contract in whole or in part any time for its convenience. The notice of termination shall specify that the termination is for the NTC's convenience, the extent to which performance or work under the contract is terminated and the date upon which such termination becomes effective.

27 PROJECT DIRECTOR

Director (Network Operation Center) NTC HQs Islamabad

28 ULTIMATE CONSIGNEE

Director (Network Operation Center) NTC HQs Islamabad

29 DEBARMENT / BLACKLISTING OF FIRM

29.1 As per clause-19 of the PPRA rules 2004, NTC reserves the right of debarment 'or' blacklisting of a firm, association, corporation, joint venture, company, partnership or any other legal entity subject to any of the following acts: -

- a. Consistent failure to provide satisfactory performance.
- b. Contractor becomes insolvent.
- c. Existence of judicial decision against a contractor in respect of a corrupt or collusive practice.
- d. Submission of false and spurious documents, making false statements and allegations to gain undue advantage.
- e. Commission of fraud.
- f. Contractor abandons the contract.
- g. Contractor without reasonable excuse fails to commence the work 'or' suspends the progress of work for 14 days.
- h. Contractor is not executing the work in accordance with the contract or is persistently or flagrantly neglecting to carry out his obligations under the contract.
- i. Commission of embezzlement, criminal breach of trust, theft, cheating, forgery, bribery, falsification or destruction of records, receiving stolen property, false use of trademark, securing fraudulent registration with sales tax authorities, Pakistan Engineering council etc, giving false evidence, furnishing of false information of serious nature.

29.2 NTC reserve the right to blacklist and debar the contractor and its OEM in case of breach of undertaking provided against RFT Section-I Clause no 4.10.

29.3 Managing Director NTC will constitute a committee comprising of three NTC officers and they will investigate the matter in connection with allegation of corrupt, fraudulent, coercive or collusive practices or illegally harassment or threat. Moreover, the committee shall also accord adequate opportunity of being heard to

the contractor who is to be debarred / blacklisted. The said committee will forward its clear recommendations for the approval of Managing Director NTC.

- 29.4 The debarment shall be for a reasonable specified period of time, commensurate with the seriousness of the cause. However, the debarment period shall not exceed from three years. Moreover, NTC also reserves the right of permanent blacklisting of a contractor subject to severity of the corrupt or fraudulent practices.

30 INTEGRITY

- 30.1 The Contractor hereby declares that it has not obtained or induced the procurement of this Contract or a right, interest, privilege or other obligation or benefit under this Contract from Government of Pakistan or any administrative subdivision or agency thereof or any other owned or controlled by it (GoP) through any corrupt business practice.
- 30.2 Without limiting the generality of the foregoing the Contractor represents and warrants that it has fully declared the brokerage, commission, fees etc, paid or payable to anyone and not given or agreed to give and shall not give or agree to give to anyone within or outside Pakistan either directly or indirectly through any natural or juridical person, any commission, gratification, bribe, finder's fee or kickback, whether described as consultation fee or otherwise, with the object of obtaining or including the procurement of this Contract or a right, interest, privilege or other obligation or benefit under this Contract in whatsoever form from GoP, except that which has been expressly declared pursuant hereto.
- 30.3 The Contractor accepts full responsibility and strict liability for making any false declaration, not making full disclosure, misrepresenting facts or taking any action likely to defeat the purpose of this Clause.

31 DECLARATION OF BENEFICIAL OWNERS' INFORMATION

The "Declaration of Beneficial Owners' Information of Public Procurement Contract Awarded Regulations, 2022" require that the contractor shall be bound to provide beneficial ownership information as per Performa attached as [Annex-I](#).

32 LANGUAGE

The official language of this contract shall be English Language.

ANNEX-A: SCOPE OF WORK

1 INTRODUCTION

- 1.1 National Telecommunication Corporation (NTC) intends to replace its existing Long Haul DWDM/SDH Transmission Network with a modernized, Next Generation OTN (Optical Transport Network) platform on a turnkey basis. The project encompasses survey, design, supply, installation, testing, commissioning, service migration, and handover of a fully functional next-generation optical transmission network capable of meeting current and future bandwidth requirements of NTC.
- 1.2 The contractor shall be responsible for delivering a fully functional, resilient, scalable, secure and centrally manageable optical transmission infrastructure, in accordance with technical and operational requirements defined herein.
- 1.3 This project aims to strengthen NTC's backbone infrastructure in order to conveniently entertain bandwidth intensive applications, bulk service requirements from different public sector departments and connectivity for designated subscribers utilizing NTC's National Data Centre (NDC) services, long haul media/DPLCs. In addition to this, maximizes physical layer protection by splitting Ring-1 & Ring 3 into smaller rings to reduce the risk of network outages and ensure high service availability, in line with the sectoral objective that is "to provide reliable telecommunication facilities to the designated subscribers of Govt. of Pakistan".
- 1.4 Replacement of Long-haul network with NG WDM/OTN network will be carried out as per detail below:
 - 1.4.1 Legacy DWDM/SDH system is proposed to be replaced with NG DWDM/OTN platform, with an equipped capacity of 600G on the main backbone routes and 10 Gbps on spur/smaller routes.
 - 1.4.2 Main Ring 1 & Ring 3 are proposed to be split into smaller rings to enhance overall network availability and mitigate service disruption currently caused by dual OFC cuts. ([Annex-D8](#)).
 - 1.4.3 Three smaller rings are proposed in spur routes to minimize the outages observed due to unavailability of protection in spur alignments.

2 CAPACITY DESIGN BASELINE (FOR ALL SECTIONS)

- 2.1 Total Backbone Capacity: 600 Gbps (protected).
- 2.2 Per-Site Bandwidth Allocation:
 - a) **100 Gbps** at all sites
 - b) **Additional 100 Gbps** per node at Islamabad, Taxila, Peshawar, Lahore, Gujranwala, Faisalabad, Sargodha, Multan, Sukkur, Hyderabad, Karachi.
 - c) **Additional 400 Gbps** per node at Peshawar, Islamabad, Lahore, Multan, Karachi (core aggregation sites).

3 DESIGN AND SUPPLY

3.1 General Overview

- 3.1.1 The contractor shall execute the complete scope of work on a turnkey basis, in accordance with the approved Bill of Quantities (BoQ), Network Topology Plan, and Implementation & Migration Schedules provided in the annexures.

- 3.1.2 The work primarily includes the design, supply, installation, testing, commissioning, integration, and migration of the existing legacy SDH/DWDM transmission infrastructure to a next-generation OTN-based platform across NTC's long-haul backbone and associated spur routes.
- 3.1.3 The upgraded system shall deliver a minimum capacity of 600 Gbps on the main rings and 10 Gbps protected capacity on smaller rings and spur routes, ensuring full interoperability and seamless integration with NTC's Internet, NGN, and Data Center networks.
- 3.1.4 The contractor shall submit a detailed Implementation and Cut-over Plan within thirty (30) days of contract signing for NTC's approval, outlining network roll-out, protection topology, and traffic migration sequence to ensure continuity of live services during cutover.
- 3.1.5 Contractor must ensure upgradation from 6 lambdas to 10 lambdas without changes in network architecture.
- 3.1.6 Contractor must provide future roadmap of quoted equipment.
- 3.1.7 The Price quoted by the contractor shall remain valid during the 10 years post warranty / Final Acceptance Certificate (FAC) for the SLA period, the contractor shall be bound to provide Spares (Equipment including licenses) at the same contractual rates for upgradation of nodes / Network.

3.2 Scope of Supply and Execution

- 3.2.1 The contractor shall be responsible for the design, engineering, manufacturing, supply, installation, testing, and commissioning of all hardware, software, and accessories required for the complete and successful operation of the OTN/WDM system.
- 3.2.2 The Scope of Supply and Execution shall include, but not be limited to, the following:
- OTN/WDM terminal equipment, tributary, OTU/ transponders, ROADMs nodes, optical amplifiers, filters, and line systems.
 - Network Management System (NMS) with centralized monitoring, configuration, and alarm management capabilities.
 - Optical Distribution Frames (ODFs), patch panels, fiber patch cords, power distribution units (AC/DC DBs).
 - Equipment racks, cable trays, PCM and power cables (segregated as per standard practice), and all required installation accessories.
 - Site materials for installation, grounding, labeling, and route management to ensure neat, reliable, and maintainable deployments.
 - Any ancillary fittings, accessories, or components not explicitly listed in the BoQ but required to meet design specifications, site conditions, or to ensure the complete functionality of the system and connectivity between nodes shall be provided by the contractor without additional cost.

4 ENGINEERING SURVEY AND SYSTEM DESIGN

4.1 Site Survey and Engineering Responsibilities

- 4.1.1 The contractor shall perform a comprehensive engineering site survey at all designated NTC locations, at its own cost, to ensure the accurate preparation of the network design, site readiness plan, and implementation layout.

- 4.1.2 The survey shall cover all physical, electrical, optical, and environmental parameters necessary for the installation of OTN/WDM transmission equipment and its supporting infrastructure. Proposed equipment shall have minimum footprint including dimensioning, power and space.
- 4.1.3 The survey activities shall include, but not be limited to, the following:
- Assessment of rack space, power availability, grounding, and cooling adequacy at each site.
 - Determination of exact cable routing, runway segregation (power/fiber), ODF placement, and fiber patching layout up to the exchange and Data Center interfaces.
 - Identification of the locations for rectifiers, battery banks, DC/AC distribution boards, ODFs, and racks.
 - Verification of available optical fiber pairs and physical protection paths for main and secondary rings.
 - Recording of fiber loss budgets, span lengths, and connector types to finalize link engineering.
 - Assessment of site suitability for required capacity drops (100G or 400G, depending on the designated node function).
- 4.1.4 The contractor shall prepare detailed site survey reports and submit them to NTC for review and approval prior to initiating equipment installation.
- 4.2 System Design and Documentation
- 4.2.1 Based on the approved survey reports, the contractor shall develop a detailed system design encompassing the following:
- Network topology diagram showing all main rings, smaller rings, and spur routes.
 - Optical link design including power budget and amplifier placement.
 - Site configuration matrix indicating Add/Drop, OLA, and Spur routes.
 - Bandwidth allocation plan reflecting the capacity targets mentioned in clause 2 above.
 - Integration plan for interconnection with NTC Internet, NGN, and Data Center Networks and interfaces.
 - Plan for Migration of services from existing DWDM/SDH network to newly installed OTN/WDM equipment.

5 RESPONSIBILITIES OF NTC

5.1 Coordination and Support

- 5.1.1 NTC shall nominate authorized technical and coordination staff at each project site to facilitate smooth implementation, testing, and commissioning of the DWDM/OTN equipment.
- 5.1.2 NTC's project coordination team shall work jointly with the contractor's project implementation team to ensure adherence to the approved schedule and compliance with safety and operational protocols.

5.2 Space, Power, and Infrastructure

- 5.2.1 NTC shall provide Designated rack space at each site for installation of WDM/OTN equipment, including supporting components such as rectifiers and power distribution units.

- 5.2.2 NTC shall provide Optical Fiber Cable (OFC) pairs for connectivity between Add-Drop, OLA, and spur sites as per approved topology.
- 5.2.3 NTC shall provide environmental infrastructure, including:
- d) Adequate air-conditioning, fire suppression, and fire alarm systems.
 - e) Engine generator backup and commercial AC power supply up to the main circuit breaker (MCCB) point.
 - f) Secure equipment rooms with restricted access to ensure system integrity.
- 5.3 **Traffic Data and Existing Network Information**
- 5.3.1 NTC shall provide the existing traffic demand matrix, fiber route details, and network layout diagrams of the legacy system to the contractor for planning of migration and bandwidth provisioning.
- 5.3.2 This information shall serve as input for the detailed engineering and cut-over plan.
- 5.4 **Cutover Coordination and Rollback Provision**
- 5.4.1 During the migration from the legacy SDH/DWDM system to the new NG OTN/WDM network, NTC shall ensure coordination of live service windows and traffic re-routing schedules.
- 5.4.2 In the event that the newly installed system encounters functional anomalies during or after cutover, the contractor shall be responsible for restoring connectivity to the old system, while NTC shall ensure the operational continuity of existing configurations.
- 5.5 **Site Access and Security Compliance:** NTC shall facilitate necessary site access and security clearances for the contractor's authorized personnel, subject to the standard operational and security protocols applicable at NTC facilities.

6 RESPONSIBILITIES OF THE CONTRACTOR

- 6.1 **General Responsibilities:** The contractor shall be responsible to undertake and complete all works on a turnkey basis, ensuring the end-to-end functionality of the OTN/WDM system, including supply, installation, configuration, integration, testing, migration, and commissioning of all components and services.
- 6.2 **Installation, Testing, and Commissioning:** Install, configure, test, commission, and place into service the complete NG-OTN/WDM system including hardware, software, network management system (NMS), and all associated accessories in accordance with the approved project plan.
- 6.3 **Supply of Equipment:** Supply all active and passive components, accessories, cables, and hardware as per the approved Bill of Quantities (BoQ) and technical specifications, ensuring compatibility with the existing NTC infrastructure and fiber Network topology.
- 6.4 Connectivity and Integration
- 6.4.1 Provide full connectivity of client/tributary interfaces (E1, FE/GE/10GE/100GE) to the termination points of NTC's exchanges, NGN, and data network equipment using suitable fiber/PCM/ethernet cables and accessories.
- 6.4.2 Ensure complete operational readiness and integration of the system on a turnkey basis.
- 6.5 Traffic Migration and Cutover

- 6.5.1 Execute seamless migration and cutover of existing traffic (including but not limited to E1s, Ethernet, and IP-based circuits) from the old transmission system to the new DWDM/OTN platform.
- 6.5.2 A detailed cutover and rollback plan shall be submitted for NTC approval prior to execution.
- 6.6 **Optical Termination:** All optical tributaries shall be terminated on FC-PC type Optical Distribution Frames (ODFs) with a minimum of 48 termination points per site, expandable as per design requirements.
- 6.7 **Subcontracting:** The contractor shall not subcontract any part of the work without prior written approval of NTC.
- 6.8 **Termination and Cabling Standards:** All PCM, Ethernet, and power cabling shall be properly terminated on existing DDFs and extended up to exchanges/data centers as per NTC's standards.
- 6.9 **Performance Guarantee:** Guarantee the performance of the OTN/WDM system as per latest ITU-T and IEEE standards applicable on the Contract Effective Date, ensuring compliance with parameters such as OSNR, BER, latency, and protection switching times.
- 6.10 **Documentation:** Provide comprehensive installation, operation, and maintenance manuals, as-built drawings, and network topology diagrams in both hard and soft copies as per contractual deliverables.
- 6.11 **Product Roadmap:** Submit the product and software roadmap for the proposed NG-DWDM/OTN and NMS platform, detailing upcoming features, scalability options, and migration path for future capacity expansion (e.g., from 100G to 400G/800G per channel).
- 6.12 **Site Preparation Survey:** Conduct detailed site surveys and submit site preparation reports specifying any infrastructure requirements prior to installation.
- 6.13 **Electrical Power and Cabling:** Supply and install complete AC/DC power equipment, including DBs, cabling, and circuit breakers, in accordance with technical specifications and site survey outcomes.
- 6.14 **Cable Runways:** Erect separate cable runways for power and signal (PCM/optical) cables as per site design and safety standards.
- 6.15 **DDF Tools:** Provide necessary DDF tools and accessories at each site to support future cabling and maintenance work as per BoQ.
- 6.16 **Software and Licensing:** All licenses shall be perpetual while contractor shall supply all system software, licenses of system full quoted capacity.
- 6.17 **Software Upgrade Management:** Ensure that all software updates can be performed without service interruption and allow remote and local upgrade capabilities with automatic rollback in case of failure.
- 6.18 **Power and Environmental Alarm Integration:** Power and Environment alarms shall be integrated with NMS.
- 6.19 **Technical Support:** Provide comprehensive technical assistance during installation, integration, migration, and throughout the warranty period, including on-site and remote troubleshooting support.
- 6.20 **Rectifier System:** Provided power system shall be able to monitor remotely. Supply and installation of rectifier systems shall be as per OEM provided OTN/WDM system power requirements and technical specifications.

- 6.21 **DC Distribution Boards (DCDBs):** Provide wall-mounted DCDBs in accordance with the contractor's equipment power requirements, including spare modules. The DCDBs shall replicate the rectifier breaker configurations and be installed at all OADM sites as specified in the BOQ.
- 6.22 **Battery Backup:** Provide battery banks in configuration as per technical specifications and site requirements.
- 6.23 **AC Power Cabling:** Lay 4-core armored underground AC cables or better from generator room to rectifier using PVC conduits and protection as per NTC standards if required as per survey.
- 6.24 **Technical Documentation:** Provide detailed technical literature, operation manuals and recovery procedures (both hard and soft copies).
- 6.25 **Quality Assurance:** Ensure that all third-party components supplied are of certified quality, with sample approval by NTC before mass procurement.
- 6.26 **PAT Documentation:** Prepare and submit detailed Provisional Acceptance Test (PAT) protocols and documentation conforming to international standards within one month of contract signing. NTC shall review and approve within one month of submission.

7 NETWORK MANAGEMENT SYSTEM (NMS)

7.1 General Requirements

- 7.1.1 The proposed NG-DWDM/OTN solution shall be accomplished with a comprehensive, centralized, Network Management System (NMS) to enable end-to-end management, supervision, and optimization of the NG-DWDM/OTN transport network.
- 7.1.2 The NMS shall support open interfaces and industry-standard protocols to ensure interoperability future OSS/NMS systems of NTC.

7.2 Functional Capabilities: The NMS shall provide, at minimum, the following functionalities:

7.2.1 Fault Management:

- a) Real-time fault detection, isolation, and correlation with root cause analysis.
- b) Alarm prioritization and automatic escalation features.
- c) Visual topology view showing active alarms and affected network.

7.2.2 Configuration Management:

- a) End-to-end provisioning of services, including automated wavelength and path setup.
- b) Zero-touch configuration templates for common services and protection schemes.
- c) Role-based access control and audit trail for all configuration changes.

7.2.3 Performance Management:

- a) Continuous monitoring of network KPIs such as OTDR, OSNR, BER, Q-factor, power levels, latency, and throughput.
- b) Historical trend analysis and threshold-based alerts.
- c) Performance reports on per-link, per-node, and per-service basis.

7.2.4 Security and User Management:

- a) Integration with NTC's central authentication server or syslog server

- b) Encrypted communication between NMS and network elements.
 - c) Event logging, user activity records, and compliance to NTC's cybersecurity policies.
- 7.2.5 AI and Predictive Analytics:
- a) Embedded AI/ML engine to predict failures, fiber degradation, or performance anomalies.
 - b) Automated root-cause analysis and self-healing recommendations for network optimization.
 - c) Intelligent resource utilization forecasts and capacity planning.
- 7.2.6 Automation and Orchestration:
- a) Support for SDN-based control and open APIs (RESTCONF/NETCONF/YANG SNMPv3) for future integration.
 - b) Automated provisioning and service restoration based on defined policies.
 - c) Compatibility with multi-vendor and multi-technology environments.
- 7.2.7 Reporting and Visualization:
- a) Customizable dashboards for operations, performance, and SLA reporting.
 - b) Automated report generation (daily, weekly, monthly).
 - c) Geographical and logical topology maps with real-time status visualization.
- 7.2.8 Integration and Scalability:
- a) Open northbound interfaces for integration with OSS/BSS platforms.
 - b) Scalable architecture capable of supporting network growth for 10 years.
 - c) Virtualized/cloud-based deployment option for improved resilience and redundancy.
- 7.3 Hardware and Software Requirements
- 7.3.1 The NMS shall be deployed on high-availability redundant servers (physical or virtualized), with disaster recovery capability.
- 7.3.2 Licenses shall be perpetual, with unlimited node expansion up to the full network capacity defined in this project and for future expansions.
- 7.4 Documentation and Training
- 7.4.1 The contractor shall provide complete NMS documentation, including system architecture, configuration manuals, and integration guides.
- 7.4.2 Comprehensive operational training shall be provided to NTC engineers, covering fault, configuration, performance, and AI analytics modules.

ANNEX-B: BILL OF QUANTITY

Sr. No.	Description	Equipment Cost without GST	Equipment Cost with GST	Services Cost without Tax	Services Cost with Tax	Total Amount without Taxes	Total Amount with Taxes
1.	Site wise BoQ as per Annex-B1						
2.	OTN/WDM NMS as per Annex-B2			-	-		
3.	Power NMS as per Annex-B3			-	-		
4.	Licenses as per Annex-B4			-	-		
5.	Spares @ 10% of OTN & Power Equipment along with licenses			-	-		
6.	Terminals as per Annex-B5			-	-		
7.	Upgradation of FOADAM Sites as per Annex-B6						
8.	Network Planning Tool as per Annex-B7			-	-		
9.	Trainings as per Annex-B8	-	-				
10.	Service Level Agreement as per Annex-B9	-	-				
	Grand Total						

ANNEX-B1: SITEWISE BOQ

Sr	NE Name	Planned NE Type	Cost of Equipment					Cost of Engineering Services				Total amount of Equipment & Services	
			Price without GST (PKR)			Total Price without GST (PKR)	Total Price with GST (PKR)	Price without Services Tax (PKR)		Total Price without Services Tax (PKR)	Total Price with Services Tax (PKR)	Total Price without Taxes (PKR)	Total Price with Taxes (PKR)
			OTN/WDM	Rectifier	Battery Banks			Installation, Testing & Commissioning	Migration of Services				
1	Islamabad	ADD/DROP											
2	Abbottabad	ADD/DROP											
3	Rawalpindi	ADD/DROP											
4	Attock	ADD/DROP											
5	Haripur	ADD/DROP											
6	Havelian	ADD/DROP											
7	KamraExch	ADD/DROP											
8	Kamra	ADD/DROP											
9	Taxila	ADD/DROP											

Sr	NE Name	Planned NE Type	Cost of Equipment					Cost of Engineering Services				Total amount of Equipment & Services	
			Price without GST (PKR)			Total Price without GST (PKR)	Total Price with GST (PKR)	Price without Services Tax (PKR)		Total Price without Services Tax (PKR)	Total Price with Services Tax (PKR)	Total Price without Taxes (PKR)	Total Price with Taxes (PKR)
			OTN/WDM	Rectifier	Battery Banks			Installation, Testing & Commissioning	Migration of Services				
10	Mandra	OLA											
11	Peshawar	ADD/DROP											
12	Nowshera	ADD/DROP											
13	Mardan	ADD/DROP											
14	Kohat	ADD/DROP											
15	Bannu	ADD/DROP											
16	DIKhan	ADD/DROP											
17	BDS Shah	OLA											
18	Pizzu	OLA											
19	Lahore	ADD/DROP											
20	Gujranwala	ADD/DROP											

Sr	NE Name	Planned NE Type	Cost of Equipment					Cost of Engineering Services				Total amount of Equipment & Services	
			Price without GST (PKR)			Total Price without GST (PKR)	Total Price with GST (PKR)	Price without Services Tax (PKR)		Total Price without Services Tax (PKR)	Total Price with Services Tax (PKR)	Total Price without Taxes (PKR)	Total Price with Taxes (PKR)
			OTN/WDM	Rectifier	Battery Banks			Installation, Testing & Commissioning	Migration of Services				
21	Gujrat	ADD/DROP											
22	Kharian	ADD/DROP											
23	Daska	ADD/DROP											
24	Sialkot	ADD/DROP											
25	Bhalwal	ADD/DROP											
26	Chiniot	ADD/DROP											
27	Sargodha	ADD/DROP											
28	IqbalTown	ADD/DROP											
29	Johrabad	ADD/DROP											
30	KCP	ADD/DROP											
31	Gojra	OLA											

Sr	NE Name	Planned NE Type	Cost of Equipment					Cost of Engineering Services				Total amount of Equipment & Services	
			Price without GST (PKR)			Total Price without GST (PKR)	Total Price with GST (PKR)	Price without Services Tax (PKR)		Total Price without Services Tax (PKR)	Total Price with Services Tax (PKR)	Total Price without Taxes (PKR)	Total Price with Taxes (PKR)
			OTN/WDM	Rectifier	Battery Banks			Installation, Testing & Commissioning	Migration of Services				
32	Jehlum	ADD/DROP											
33	Shaikhupura	ADD/DROP											
34	Faisalabad	ADD/DROP											
35	Multan Central	ADD/DROP											
36	NewMultan	ADD/DROP											
37	MGarh	ADD/DROP											
38	Okara	ADD/DROP											
39	Sahiwal	ADD/DROP											
40	Khanewal	ADD/DROP											
41	Arifwala	ADD/DROP											
42	Lodhran	ADD/DROP											

Sr	NE Name	Planned NE Type	Cost of Equipment					Cost of Engineering Services				Total amount of Equipment & Services	
			Price without GST (PKR)			Total Price without GST (PKR)	Total Price with GST (PKR)	Price without Services Tax (PKR)		Total Price without Services Tax (PKR)	Total Price with Services Tax (PKR)	Total Price without Taxes (PKR)	Total Price with Taxes (PKR)
			OTN/WDM	Rectifier	Battery Banks			Installation, Testing & Commissioning	Migration of Services				
43	Bahawalpur	ADD/DROP											
44	RYK	ADD/DROP											
45	Bhakkar	ADD/DROP											
46	Layyah	ADD/DROP											
47	QCK	ADD/DROP											
48	DGKhan	ADD/DROP											
49	Rojhan	OLA											
50	Rajanpur	ADD/DROP											
51	KotAddu	OLA											
52	Mian Channu	OLA											
53	Fazilpur	OLA											

Sr	NE Name	Planned NE Type	Cost of Equipment					Cost of Engineering Services				Total amount of Equipment & Services	
			Price without GST (PKR)			Total Price without GST (PKR)	Total Price with GST (PKR)	Price without Services Tax (PKR)		Total Price without Services Tax (PKR)	Total Price with Services Tax (PKR)	Total Price without Taxes (PKR)	Total Price with Taxes (PKR)
			OTN/WDM	Rectifier	Battery Banks			Installation, Testing & Commissioning	Migration of Services				
54	InayatPur	OLA											
55	SardarGarh	OLA											
56	Karachi	ADD/DROP											
57	Hyderabad	ADD/DROP											
58	Hyderabad City	ADD/DROP											
59	Hyderabad Central	ADD/DROP											
60	LoniKot	ADD/DROP											
61	Sukkur	ADD/DROP											
62	PannuAqil	ADD/DROP											
63	Khairpur	ADD/DROP											
64	QaziAhmed	ADD/DROP											



Procurement of Long Haul Core Transmission Network Equipment for
NTC on Turnkey DDP Site Basis



Sr	NE Name	Planned NE Type	Cost of Equipment					Cost of Engineering Services				Total amount of Equipment & Services	
			Price without GST (PKR)			Total Price without GST (PKR)	Total Price with GST (PKR)	Price without Services Tax (PKR)		Total Price without Services Tax (PKR)	Total Price with Services Tax (PKR)	Total Price without Taxes (PKR)	Total Price with Taxes (PKR)
			OTN/WDM	Rectifier	Battery Banks			Installation, Testing & Commissioning	Migration of Services				
65	Shikarpur	ADD/DROP											
66	Larkana	ADD/DROP											
67	Dadu	ADD/DROP											
68	Thatta	ADD/DROP											
69	Kotri	ADD/DROP											
70	Nooriabad	OLA											
71	Saeedabad	OLA											
72	Amirabad	OLA											
73	KNShah	OLA											
74	Kalari	OLA											
75	GHadeed	OLA											



Sr	NE Name	Planned NE Type	Cost of Equipment					Cost of Engineering Services				Total amount of Equipment & Services	
			Price without GST (PKR)			Total Price without GST (PKR)	Total Price with GST (PKR)	Price without Services Tax (PKR)		Total Price without Services Tax (PKR)	Total Price with Services Tax (PKR)	Total Price without Taxes (PKR)	Total Price with Taxes (PKR)
			OTN/WDM	Rectifier	Battery Banks			Installation, Testing & Commissioning	Migration of Services				
76	Kandhkot	OLA											
77	Dherki	OLA											
78	Muridkay	ADD/DROP											
79	Quaidabad	OLA proposed *											
80	Harnoli	OLA proposed *											
81	Dullahwala	OLA proposed *											
82	Bhai Peru	OLA proposed *											
83	Mianwali	ADD/DROP proposed *											
84	Charsadda	ADD/DROP proposed *											
85	Narowal	ADD/DROP proposed *											
86	Murree	ADD/DROP proposed *											

Sr	NE Name	Planned NE Type	Cost of Equipment					Cost of Engineering Services				Total amount of Equipment & Services	
			Price without GST (PKR)			Total Price without GST (PKR)	Total Price with GST (PKR)	Price without Services Tax (PKR)		Total Price without Services Tax (PKR)	Total Price with Services Tax (PKR)	Total Price without Taxes (PKR)	Total Price with Taxes (PKR)
			OTN/WDM	Rectifier	Battery Banks			Installation, Testing & Commissioning	Migration of Services				
Grand Total													

- Note:** 1) Sites marked with * are subject to change based on finalization of OFC feasibility on new alignments.
 2) Bidder may add OLA sites in the above table in case of requirement as per proposed design.
 3) Bidder must provide itemized BoQ against each site with uniformity of item rates across all sites.
 4) Bidder must quote rates in the above BoQ in compliance of provided Technical Specification ([Annex-C](#)) and Network Design Requirements ([Annex-D](#)).
 5) Bidder must quote rates on DDP Site & Turnkey Basis.

ANNEX-B2: OTN/WDM NMS BOQ

Sr. No.	Description	A/U	Qty	Unit Price without Tax	Unit Price with Tax	Total Price with Tax
1.	Network Management System (NMS) with dual homing feature	Package	01			
2.	Server for NMS with four (04) hour power backup	No.	02			
	Grand Total					

Note: 1) NMS shall be deployed at Islamabad and Karachi in 1+1 configuration.

2) Bidder must quote rates in the above BoQ in compliance of provided Technical Specification ([Annex-C](#)) and Network Design Requirements ([Annex-D](#)).

ANNEX-B3: POWER NMS BOQ

Sr. No.	Description	A/U	Qty	Unit Price without Tax	Unit Price with Tax	Total Price with Tax
1.	Network Management System (NMS) with dual homing feature	Package	01			
2.	Server for NMS with four (04) hour power backup	No.	02			
	Grand Total					

Note: 1) Power NMS shall be deployed at Islamabad and Karachi in 1+1 configuration.
2) Bidder must quote rates in the above BoQ in compliance of provided Technical Specification ([Annex-C](#)) and Network Design Requirements ([Annex-D](#)).

ANNEX-B4: LICENSES BOQ

Sr. No.	Description	A/U	Qty	Unit Price without Tax	Unit Price with Tax	Total Price with Tax
1.	OTN/WDM Equipment Licenses	No.				
2.	Power Equipment Licenses	No.				
3.	NMS related Licenses	No.				
Grand Total						

Note: 1) Bidder may add line items in above table as per their licensing regime and shall fill quantities as per proposed design.

2) Bidder must quote rates in the above BoQ in compliance of provided Technical Specification ([Annex-C](#)) and Network Design Requirements ([Annex-D](#)).

ANNEX-B5: TERMINALS BOQ

Sr. No.	Description	A/U	Qty	Unit Price without Tax	Unit Price with Tax	Total Price with Tax
1.	NMS Clients (Desktop)	No.	07			
2.	Local Client Terminals (Laptops)	No.	15			
	Grand Total					

Note: Bidder must quote rates in the above BoQ in compliance of provided Technical Specification ([Annex-C](#)).

ANNEX-B6: UPGRADATION OF FOADM SITES TO CF-ROADM

Sr. No.	Description	A/U	Qty	Unit Price without Tax	Unit Price with Tax	Total Price with Tax
UPGRADATION OF FOADM SITES TO CFROADM						
1.	Equipment	No.				
2.	Installation, Testing & Commissioning	Job				
3.	Migration of Services	Job				
Grand Total						

Note: 1) In case bidder quotes FOADM against the sites where planned ADM Type is FOADM/ROADM (refer [Annex-D4](#)), the bidder must quote quantity of such sites in above table and quote rates for upgradation of those sites to ROADM in future.

2) Bidder must quote rates in the above BoQ in compliance of provided Technical Specification ([Annex-C](#)) and Network Design Requirements ([Annex-D](#)).

3) The rates shall remain valid for a period of ten (10) years after issuance of FAC.

ANNEX-B7: NETWORK PLANNING TOOL BOQ

Sr. No.	Description	A/U	Qty	Unit Price without Tax	Unit Price with Tax	Total Price with Tax
1.	Network Planning Tool	Package	01			
2.	Server for NPT with four (04) hour power backup (if applicable)	No.	01			
3.	License (if applicable)	No.	01			
	Grand Total					

Note: Bidder must quote rates in the above BoQ in compliance of provided Technical Specification ([Annex-C](#)).

ANNEX-B8: TRAININGS BOQ

Sr. No.	Description	A/U	Qty	Unit Price without Tax	Unit Price with Tax	Total Price with Tax
1.	Foreign Training	No.	12			
2.	Local Training	No.	30			
	Grand Total					

Note: Bidder must quote rates in the above BoQ in compliance of [Clause 11 of Section-II](#).

ANNEX-B9: SERVICE LEVEL AGREEMENT BOQ

Sr. No.	Description	A/U	Qty	Unit Price without Tax	Unit Price with Tax	Total Price with Tax
1.	Provision of Maintenance Services (SLA) for a period of Ten (10) Years: a) Repair & Return Faulty Parts b) Software and Patch Upgrade c) Emergency Recovery Services d) On-Site and Remote Support e) Backing/On-line/Telephonic Support services	Annual	10			

Note: 1) Bidder must quote rates in the above BoQ in compliance of Service Level Agreement defined in [Annex-E](#).

2) The SLA will be effective for a period of Ten (10) years from issuance of FAC.

ANNEX-C: QUALITY EVALUATION CRITERIA
ANNEX-C1: QUALITY EVALUATION

S#	Criterion	Description	Documentary Evidence required and Tables to be filled by bidders					Bid reference page No	Marks	Bidder's obtained Marks (to be assigned by NTC)									
a	b	c	d					e	f	g									
01	Experience in Pakistan	Total Experience of bidder or OEM YEARS in Pakistan DWDM Projects	Contracts /Purchase Orders in DWDM Pakistan	of	in	<table border="1"> <thead> <tr> <th>Oldest Contract or PO No</th> <th>Operator's Name</th> <th>Contract Date</th> <th>DWDM Equipment Model</th> <th>Bidder or OEM Total Years since 1st DWDM contract in Pakistan</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>	Oldest Contract or PO No	Operator's Name	Contract Date	DWDM Equipment Model	Bidder or OEM Total Years since 1 st DWDM contract in Pakistan							20	
Oldest Contract or PO No	Operator's Name	Contract Date	DWDM Equipment Model	Bidder or OEM Total Years since 1 st DWDM contract in Pakistan															

02	Total deployed DWDM Nodes in Pakistan by OEM during Last Ten years	Contracts /Purchase Orders of DWDM installation in Pakistan along with contract wise DWDM Nodes lists specifying number of nodes.	S. No	Contract or PO No	Operator's Name	Contract Date	DWDM Equipment Model	No of DWDM Nodes installed	Total deployed DWDM Nodes in ten years Pakistan OEM	15	
			1								
			2								
			3								
			.								
			.								
			Total No. of DWDM Nodes by OEM in Pakistan								
03	Total Service Level Agreements (SLAs) of DWDM OEM in Pakistan	SLA Contracts with lists specifying number of SLAs	S. No	SLA Contract or PO No	Operator's Name	Contract Date	DWDM Equipment Model	No of DWDM SLA executed	10		
			1								
			2								
			3								
			.								
			.								
			Total No. of SLA's by OEM in Pakistan								

04	Financial Health	Average annual turnover in Last five calendar or financial years in Pakistan of bidder or OEM whichever is higher	Audited Reports of last five Calendar or Financial years.	<table border="1"> <thead> <tr> <th>S. No</th> <th>Calendar or Financial Year</th> <th>Bidder or OEM Turn over in PKR</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>FY 2024-25</td> <td></td> </tr> <tr> <td>2</td> <td>FY 2023-24</td> <td></td> </tr> <tr> <td>3</td> <td>FY 2022-23</td> <td></td> </tr> <tr> <td>4</td> <td>FY 2021-22</td> <td></td> </tr> <tr> <td>5</td> <td>FY 2020-21</td> <td></td> </tr> <tr> <td colspan="2">Average annual turnover (5 years) =</td> <td></td> </tr> </tbody> </table>	S. No	Calendar or Financial Year	Bidder or OEM Turn over in PKR	1	FY 2024-25		2	FY 2023-24		3	FY 2022-23		4	FY 2021-22		5	FY 2020-21		Average annual turnover (5 years) =			25	
		S. No	Calendar or Financial Year	Bidder or OEM Turn over in PKR																							
1	FY 2024-25																										
2	FY 2023-24																										
3	FY 2022-23																										
4	FY 2021-22																										
5	FY 2020-21																										
Average annual turnover (5 years) =																											
05	Total net financial worth (Net Worth = Total Assets minus Total Liabilities) of bidder or OEM in Pakistan in Last Calendar or Financial year which ever is higher.	Audited Reports of last year.	<table border="1"> <thead> <tr> <th>S. No</th> <th>Financial or Calendar Year</th> <th>Financial Net worth in PKR of Bidder or OEM</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>FY 2024-25</td> <td></td> </tr> </tbody> </table>	S. No	Financial or Calendar Year	Financial Net worth in PKR of Bidder or OEM	1	FY 2024-25		20																	
S. No	Financial or Calendar Year	Financial Net worth in PKR of Bidder or OEM																									
1	FY 2024-25																										

06	Expertise	Total employed qualified / certified Transmission Engineers of the bidder or OEM in Pakistan.	BE with Transmission Experience	Bidder or OEM Employed Engineers			10		
				S. No	Employed Engineer's name	PEC Registration No			Engineer's Expertise field
				1					
				2					
				3					
				.					
				.					
				Bidder or OEM Total No. of Transmission Engineers					
						Total Marks	100		
Passing Criteria in Table C1		<p>1. Bidder has to obtain minimum 75% Passing Marks in above Table- ANNEX-C1. Marks shall be awarded on proportionate basis i.e. the bidder with highest score will be awarded highest marks and other bidders shall be awarded marks on their relative rankings.</p> <p>Marks obtained = $\frac{\text{Bidder's Score (column g)}}{\text{Highest Score (amongst the bidder in column g)}} \times \text{Maximum Marks (column f)}$</p> <p>Total weightage of Table ANNEX-C1 Score is 70% as Technical Score in Bid Score Formula at Clause 17.8.</p> <p>2. To qualify quality evaluation, besides qualification in ANNEX-C1, the bidders are also required to qualify Technical Specification at ANNEX-C2 to ANNEX-C6 by Complying to all mandatory clauses and obtaining requisite passing marks specified against each Annex.</p>							

ANNEX-C2: OTN/WDM SPECIFICATION

Clause	Category	Sub-Category	Description / Requirements	Marks	Bidder's Statement						
					FC	PC	NC	Bidder's Quoted Feature	Reference in Datasheets/ Manual		
1	General Requirements	Project Overview	Scope & Overview	M							
1.1			NTC intends to replace its existing Long Haul DWDM/SDH Transmission Network with a modernized NG OTN/WDM platform on a turnkey basis. Fully protected 600G OTN/WDM network with following features:	M							
1.2			Multiplexing and Grooming Capabilities	M							
1.3			Maximum Optical Bypass opportunities to avoid O-E-O	M							
1.4			Scalable Platform	M							
1.5			Low latency and high reliability	M							
1.6			Smooth integration with existing NTC network.	M							
1.7			End to end transparency	M							
2				Standards	Standards Compliance	M					
2.1					The proposed solution shall comply with all relevant international standards, including the following:	M					
2.2	ITU-T recommendations for OTN and WDM systems (G.709, G.709.1, G.709.2, G.709.20, G.872, G.873.1, G.798, G.7703, G.694.1) and for performance and synchronization (G.825, G.826, G.828).	M									
2.3	The proposed solution shall support service adaptation and Ethernet transport in accordance with ITU-T G.7041 (GFP), G.7044 (Hitless Adjustment of ODUflex) and IEEE standards 802.3, 802.1Q/Q-in-Q, 802.1ah and 802.3ah.	M									

Clause	Category	Sub-Category	Description / Requirements	Marks	Bidder's Statement				
					FC	PC	NC	Bidder's Quoted Feature	Reference in Datasheets/ Manual
2.4			The solution shall also adhere to safety and environmental standards including IEC 60825 for optical safety, ETSI EN 300-386 for EMC compliance and ETSI EN 300-753 for acoustic noise requirements.	M					
2.5			For any items not explicitly covered, the latest ITU-T Recommendations shall be deemed incorporated herein by reference.	M					
3			Network Architecture	M					
3.1		Architecture	OTN/WDM-based architecture supporting centralized cross-connects. 1+1 protection for service-affecting cards.	M					
3.2			The offered equipment shall fully support the concept of East-West separation using separate line cards for each direction	M					
3.3			Hot-swappable insertion/removal of cards.	M					
3.4			The solution shall support OTN/PDH/SDH/Ethernet convergence and multi-layer traffic aggregation for unified transport, grooming and optimization of TDM and packet services over a common optical platform.	M					
4				Licenses	M				
4.1		Licenses	The bidder shall include all licenses (perpetual) for all features, modules, software, interfaces, protocols and cards required for the full operation of the quoted system. No additional, recurring, usage-based, activation or optional license fees shall apply. Any licenses required to realize the system's full quoted capacity – now or in the future – shall be provided at no extra cost. Hidden or conditional licensing shall not be permitted.	M					

Clause	Category	Sub-Category	Description / Requirements	Marks	Bidder's Statement				
					FC	PC	NC	Bidder's Quoted Feature	Reference in Datasheets/ Manual
4.2			All licenses related to features, modules, interfaces, software, protocols and cards etc as per technical specifications shall be explicitly quoted on unit basis separately.	M					
5	Optical Layer	Capacity	Optical Channels & Capacity	M					
5.1			Supports 48 channels per fiber, upgradable to 96 or more, carrying line rates from 10G to 600G.	M					
5.2			Compatible with both fixed 50/100 GHz grids and flexible (flex-grid) operation.	M					
5.3			Provides optical bypass functionality to avoid unnecessary OEO conversion.	M					
5.4			Wavelength assignment fully compliant with ITU-T G.694.1 frequency plan.	M					
5.5			The system shall support coexistence of 10G/100G/200G/400G channels over a common WDM/OTN infrastructure.	M					
6			Components	FOADM	M				
6.1	The FOADM shall provide fixed-wavelength add/drop and optical bypass functions, avoiding O/E/O conversion. It shall support single or multi-degree configurations with integrated power/OSNR monitoring and SNMP/EMS/NMS alarm reporting. The vendor shall provide a technical and commercial proposal for FOADM-to-ROADM upgrade. The bidder may quote ROADM instead of FOADM as per BOQ Sites.	M							
6.2	In case of Hybrid Solution (ROADM and FOADM), FOADM sites must be ROADM Ready and the same shall be upgradable to ROADM without replacing Chassis/Cabinet.	M							

Clause	Category	Sub-Category	Description / Requirements	Marks	Bidder's Statement				
					FC	PC	NC	Bidder's Quoted Feature	Reference in Datasheets/ Manual
7			ROADM	M					
7.1			The ROADM shall feature Colorless, Directionless and Gridless (CDG) architecture based on Wavelength Selective Switch (WSS) technology.	M					
7.2			Enabling flexible optical add/drop, pass-through and optical bypass operations.	M					
7.3			It shall support optical power equalization, hitless wavelength reconfiguration and flexible grid operation in compliance with ITU-T G.694.1.	M					
7.4			The ROADM shall incorporate dynamic ASON, GMPLS-controlled automated wavelength routing and re-routing.	M					
8			Amplifier Unit	M					
8.1			The equipment should support high performance, low noise optical amplifier unit optimized for coherent system.	M					
8.2			Optical amplifiers shall feature Gain Flatness, Automatic Gain and Power Control with a fast transient response, integrated per-channel monitoring and ITU-T G.664 Auto Laser Shutdown compliance.	M					
9			Optical Performance	M					
9.1		Performance	The platform must provide comprehensive optical performance monitoring and management. This includes real-time OSNR per channel monitoring, automatic power equalization and integrated spectrum analysis.	M					

Clause	Category	Sub-Category	Description / Requirements	Marks	Bidder's Statement					
					F	C	P	C	N	Bidder's Quoted Feature
9.2			For physical layer management, it requires built-in OTDR for fault location and span loss compensation.	M						
9.3			The system must handle optical impairments like ASE noise and dispersion.	M						
9.4			It must support various fiber types including G.652D & G.655 and operate effectively in both single-span and mixed fiber network environments.	M						
10			Digital Layer Switching	M						
10.1			Supports ODUk (ODU0/1/2/2e/3/4 and ODUflex) and OPUk containers compliant with ITU-T G.709, enabling dynamic bandwidth allocation and efficient sub-lambda grooming.	M						
10.2			The solution shall support a flexible OTN architecture for efficient bandwidth allocation down to the 2 Mbps level.	M						
10.3	Electrical Domain/Layer	Switching & Multiplexing	It shall enable hitless bandwidth adjustment, dynamic resource management and universal service aggregation for both Ethernet and TDM clients, ensuring timing transparency and seamless mapping within the ODUCn hierarchy.	M						
10.4			Employs a high-capacity, non-blocking cross-connect fabric ensuring any-to-any connectivity (any line to any client / line), full throughput and low latency.	M						
10.5			Supports centralized switching architectures and transparent client mapping.	M						

Clause	Category	Sub-Category	Description / Requirements	Marks	Bidder's Statement				
					FC	PC	NC	Bidder's Quoted Feature	Reference in Datasheets/ Manual
10.6			The solution shall integrate an ASON/GMPLS-based control plane to support intelligent switching and multiplexing, enabling dynamic service provisioning, automated restoration and efficient network resource optimization.	M					
10.7			The cross-connect capacity at each node shall accommodate the aggregate traffic load under multiple-cut scenario.	M					
11			Ethernet Switching	M					
11.1			The system shall support integrated Layer-2 Ethernet switching based on MAC address and VLAN with service types EPL, EVPL, EPLAN and EVPLAN.	M					
11.2			It shall support Flexible QinQ (4K×4K VLAN expansion), Jumbo Frames up to 9600 Bytes and end-to-end QoS mechanisms (CAR, CoS) for differentiated traffic handling.	M					
11.3			The platform shall comply with IEEE 802.1Q/802.1ad VLAN, 802.1ag/802.3ah Ethernet OAM and support service aggregation (FE/GE to GE/10GE).	M					
11.4			System shall support integration with MPLS-TP or EVPN shall be available for advanced carrier Ethernet and multi-service transport applications.	M					
12			Client Interface	M					
12.1	Interfaces	Client Interface	The system shall support, but not be limited to, the following standard client interfaces:	M					
12.2			Ethernet: 1GE (SX/LX/ZX), 10GE (LR/ER/ZR), 40GE (LR4/ER4), 100GE (LR4/ER4), 400GE (FR4/LR4/DR4) – IEEE 802.3 compliant.	M					

Clause	Category	Sub-Category	Description / Requirements	Marks	Bidder's Statement				
					FC	PC	NC	Bidder's Quoted Feature	Reference in Datasheets/ Manual
12.3			OTN: OTU2/OTU2e, OTU3, OTU4, OTUCn - compliant with ITU-T G.709 and G.959.1.	M					
12.4			SAN: Fibre Channel 8G/16G/32G.	M					
12.5			Legacy TDM: STM-1/4/16/64, OC-3/12/48/192 (SDH/SONET).	M					
12.6			Supports E1 either through specific card or separate solution	M					
12.7			The proposed system shall ensure jitter/ wander compliance as per G.825, G.8251 and G.8262 with transparent client mapping (GFP-F, CBR, AMP/BMP, ODUflex). The equipment shall support SyncE and PTP/1588v2 for precise synchronization.	M					
13			Transponders / Muxponders	M					
13.1			The transponder/muxponder shall be coherent Digital Signal Processor (DSP)-based.	M					
13.2			The proposed equipment shall support line rates from 100 Gbps up to 400 Gbps or higher, with multi-rate client signal aggregation on each module. Furthermore, proposed solution shall also support line rate of 10Gbps.	M					
13.3	Transponders	Transponders	The proposed system shall include Forward Error Correction (FEC) and provide full Chromatic Dispersion (CD) and Polarization Mode Dispersion (PMD) compensation for ultra-long-haul optical performance.	M					
13.4			Each transponder/muxponder shall support software-controlled wavelength tunability as per vendor design, compatible with fixed and flex-grid operation.	M					
13.5			The proposed system shall support adaptive modulation formats to optimize reach and spectral efficiency. Bidder should mention the modulation scheme supported.	M					

Clause	Category	Sub-Category	Description / Requirements	Marks	Bidder's Statement				
					FC	PC	NC	Bidder's Quoted Feature	Reference in Datasheets/ Manual
13.6			Bidders shall specify the maximum unregenerated transmission reach (in km) achievable over standard fiber under nominal conditions.	M					
14	Protection & Resilience	Protection & Restoration	General Requirement	M					
14.1			The proposed OTN solution must provide carrier-class reliability with a multi-layered protection architecture.	M					
14.2			The system shall guarantee a service restoration time of less than 50 milliseconds for all single-fault scenarios with no single point of failure. Bidder shall specify the restoration time in case of multiple fiber cuts.	M					
14.3			The system shall ensure survivability against multiple failures by supporting OCh/ODUk layer restoration and Cross/Multi layer protection strategy, orchestrated by an ASON/GMPLS control plane dynamically.	M					
14.4			The system shall support Dynamic ASON-based restoration, automatically re-routing traffic in the event of a failure. The platform shall restore affected services up to the last available path between the source and destination sites, ensuring uninterrupted service continuity without manual intervention.	M					
15			Optical Layer Protection	M					
15.1			Supports Dynamic ASON, 1+1 Optical Line Protection, Optical Multiplex Section Protection (OMSP)	M					
16			Electrical Layer Protection	M					
16.1			Supports ODUk SNC (Sub Network Connection) Protection & Restoration, Shared Ring Protection	M					
17			Client Layer Protection	M					

Clause	Category	Sub-Category	Description / Requirements	Marks	Bidder's Statement				
					FC	PC	NC	Bidder's Quoted Feature	Reference in Datasheets/ Manual
17.1			Supports Client 1+1 Protection, Ethernet Link Aggregation (LAG/LACP)	M					
18	Management Systems	NMS	Network Management	M					
18.1			The proposed OTN/WDM solution shall include a centralized Network Management System (NMS) providing end-to-end management of network elements, services and resources across optical, OTN, and Ethernet layers.	M					
18.2			The NMS shall support comprehensive FCAPS functionality (Fault, Configuration, Accounting, Performance, and Security Management) in compliance with ITU-T M.3010 and M.3200. It shall offer topology-based visualization, real-time performance monitoring, alarm correlation, fault localization and graphical circuit/service provisioning with drag-and-drop capability.	M					
18.3			The NMS shall support multi-layer service restoration, ASON/GMPLS control plane integration and SDN control interfaces based on OpenFlow and NETCONF/YANG models.	M					
18.4			The proposed system shall provide open northbound interfaces (NBIs) via SNMP, NETCONF/YANG and RESTful APIs for seamless OSS/BSS and SDN controller integration. Role-based access control, database backup and recovery and redundant server architecture shall be provided to ensure high reliability, scalability and secure operation.	M					
19					Equipment Monitoring	M			
19.1		Monitoring	The Network Management System (NMS) shall provide comprehensive real-time Equipment Monitoring for all network elements. This includes the operational status and hardware health	M					

Clause	Category	Sub-Category	Description / Requirements	Marks	Bidder's Statement					
					F	C	P	C	N	C
			of shelves, subracks, cards (e.g., transponders, amplifiers), ports, power supplies and fans.							
19.2			The system shall continuously track critical internal parameters such as temperature, voltage and laser bias currents. To aid in fault isolation, it shall support remote diagnostic functions like loopback testing on both client and line-side ports.	M						
19.3			All equipment-related faults and state changes shall generate time-stamped alarms. The NMS shall maintain a detailed inventory database and utilize historical monitoring data for trend analysis and predictive maintenance, enabling a proactive approach to network hardware management and ensuring high service reliability.	M						
20			Performance Monitoring	M						
20.1			The platform shall support comprehensive performance monitoring for all transponders and muxponders (from 10G to 400G).	M						
20.2			Optical Layer Monitoring: Real-time analog parameters including per-channel frequency, transmit/receive optical power and OSNR.	M						
20.3			Digital Layer Monitoring: At the OTUk/ODUk layer, the system shall provide error monitoring with Pre-FEC and Post-FEC Bit Error Rate (BER) metrics. This shall support the generation of Degraded BER and Excessive BER alarms.	M						
20.4			Tandem Connection Monitoring (TCM): The system shall support TCM for segment-based performance and fault isolation.	M						

Clause	Category	Sub-Category	Description / Requirements	Marks	Bidder's Statement				
					FC	PC	NC	Bidder's Quoted Feature	Reference in Datasheets/ Manual
20.5		Tools	All real-time metrics, alarms and threshold-crossing notifications shall be available and reportable via the NMS/EMS	M					
21			Network Planning Tool	M					
21.1			A commercial network planning tool is required featuring an intuitive GUI for end-to-end OTN/WDM network design. The tool must perform automated network planning including capacity design, wavelength assignment, regenerator placement and optical parameter validation (OSNR, power, dispersion).	M					
21.2			The proposed tool shall support diverse routing, protection schemes and failure impact analysis while enabling NMS integration for data exchange and commissioning. Output must include engineering diagrams, rack layouts and comprehensive network reports.	M					
22			Security & Encryption	M					
22.1	Security	Encryption	Optical module encryption: The system must support AES-256 encryption, compliant with FIPS. Bidder is required to mention the type/level of encryption supported by the offered equipment along with associated licenses. Bidder should specify/enlist the standards complied by the solution	M					
23	Physical Specifications	Hardware	Mechanical	M					
23.1			The solution shall be ETSI-compliant with modular shelves mounted on slide rails, supporting front-access maintenance. The bidder shall provide full mechanical specifications (size, weight, rack type) and ensure high-density integration of transponder, MUX/DEMUX, amplifier and OADM modules within the same shelf.	M					

Clause	Category	Sub-Category	Description / Requirements	Marks	Bidder's Statement				
					FC	PC	NC	Bidder's Quoted Feature	Reference in Datasheets/ Manual
24			Thermal & Environmental	M					
24.1		Environment	The proposed system shall comply with international standards including EN 300-386 (EMC), IEC 60950 (safety), and IEC 60825 (optical safety), IEC 60950/62368 operate reliably from 0°C to 45°C with up to 85% non-condensing humidity, meet ETSI 300-019 environmental requirements and adhere to ETSI 300-753 acoustic noise limits.	M					
25			Power & Redundancy	M					
25.1			Bidder should specify the following:	M					
25.2			Average and maximum power consumption under normal working conditions.	M					
25.3			Detailed power consumption for each individual component, element and card. Bidder shall provide documentary proof in this regard.	M					
25.4		Power	Electrical characteristics and supply voltages required for operation.	M					
25.5			Protection schemes supported by the power supply and its platform compatibility.	M					
25.6			Power management capabilities including dynamic power down control and dynamic power consumption query and statistics.	M					
25.7			The offered equipment shall operate on -48V DC. The bidder must ensure that redundant power supply configuration is implemented at every shelf, chassis and node. Protection shall be provided against overload, short circuits and individual module failures.	M					
26		Support	Maintenance Support and Spare Parts	M					

Clause	Category	Sub-Category	Description / Requirements	Marks	Bidder's Statement					
					FC	PC	NC	Bidder's Quoted Feature	Reference in Datasheets/ Manual	
26.1	Service Requirements		The bidder shall provide Ten (10) years Post FAC of comprehensive maintenance and support for all equipment (Hardware & Software) i.e. OTN/WDM Equipment, Power Equipment, NMS and any associated equipment proposed in the solution.	M						
26.2			Maintenance Support Services (SLA) must include Repair & Return Faulty Parts, Software version and Patch Upgrade, Emergency Recovery Services, On-Site and Remote Support, Backing services (consultancy).	M						
26.3			The bidder shall include 10% spare modules of all BoQ items.	M						
26.4			Free software/firmware upgrades shall be provided during the warranty/SLA Period	M						
26.5			The bidder must specify its Technical Support presence in Pakistan.	M						
27			Quality	Quality Assurance	M					
27.1				The bidder shall supply brand-new, latest-model equipment with no refurbished or near end-of-life components and ensure availability of full lifecycle support.	M					
27.2				All equipment must be certified for relevant international standards. The bidder shall provide a roadmap for software and hardware evolution of offered solution.	M					
27.3				Bidder is required to specify End of Manufacturing, End of Support and End of Life dates.	M					
27.4				The vendor shall mention when the next software version will be released and why it is necessary to upgrade, what are the pros and cons of this upgrade and how will the upgrade effects the services.	M					

Clause	Category	Sub-Category	Description / Requirements	Marks	Bidder's Statement					
					FC	PC	NC	Bidder's Quoted Feature	Reference in Datasheets/ Manual	
28		Integration	Integration with Existing Network	M						
28.1			The proposed system must demonstrate full interoperability with NTC's infrastructure including Data Center, Local Junction and IP Core equipment.	M						
28.2			The bidder is required to furnish a formal Compatibility and Interoperability Statement guaranteeing seamless integration with no disruptive changes to the existing core network.	M						
29		Availability	System Availability	M						
29.1			The solution must ensure 99.999% availability, subject to physical media limitations.	M						
29.2			The bidder shall provide the system's availability figures with supporting justification	M						
29.3			Specify the Mean Time Between Failures (MTBF)	M						
29.4			Specify Mean Time To Repair (MTTR)	M						
30		Documentation	Documentation	Documentation	M					
30.1				The bidder shall provide comprehensive instruction manuals, documentation and CBT to guide operating and maintenance personnel, including detailed information on equipment construction, components, operation, fault diagnosis and routine or preventive maintenance procedures.	M					
30.2	The vendor shall provide fiber connectivity diagrams of each node for maintenance purposes			M						
30.3	Both hard and soft copies must be supplied.			M						
30.4	Bidder shall ensure provision of user accounts to access the knowledge based resources, data sheets etc.			M						

Clause	Category	Sub-Category	Description / Requirements	Marks	Bidder's Statement				
					FC	PC	NC	Bidder's Quoted Feature	Reference in Datasheets/ Manual
31	Cabling	Cabling (Electrical Power, Patch Cords and others)	Cabling	M					
31.1			The bidder shall provide high-quality cables, cable trays and runways compliant with industry standards. All cabling shall be neatly routed, tagged, secured and concealed from ground-level view to maintain safety and aesthetics. Cable installation shall ensure easy access for maintenance and proper labeling.	M					
Evaluation Criteria	Bidder must clearly state which features are subject to software license and also quote their price in the bid document. All features mentioned in the above clauses shall be made part of BoQ. NTC cannot guarantee that any of the requirements, standard regulations and conditions of this specification are not covered or protected by copyright or patent of a third party.								
	Bidder's Statement column must be properly filled to clearly state the available feature/compliance as fully complied (FC), partially complied (PC) or not complied (NC) or better feature is available, Tick the relevant box. The bidder must Fully comply to all Mandatory clauses (Denoted as "M" in Marks column) failing to do so will technically disqualify the bidder. The compliance of above specification must be supported by data sheet of product to certify the Compliance.								

ANNEX-C3: RECTIFIER SPECIFICATION

S.No	Title	Description	Marks	Bidder's Statement				
				FC	PC	NC	Marks	Bidder's quoted feature
1	Supported Input Parameters							
1.1	Brand	Vertive, APC or Equivalent Brand	M					
1.2	Nominal Input Voltage	AC Input Voltage: 400V AC, 3-Phase, 4-Wire (±15%); 220V AC, Single Phase (±15%)	M					
1.3	Input Voltage Range	± 20%	M					
1.4	Input Frequency	50 Hz	M					
1.5	Supported Input Frequency Range	50 Hz ± 2.5%	20					
1.6	Input Power Factor	0.9 or better	10					
1.7	THD	5%	10					
1.8	Input Protection	Transience Protection	M					
1.9		MCBs	M					
1.10	Main Circuit Breakers	The Rectifier shall be full loaded with Main Circuit Breakers and Battery Banks Circuit Breakers	M					
2	Output							
2.1	Nominal Output Voltage	53 V DC	M					
2.2	DC Output Capacity	≥ As per BOQ Capacity	M					
2.3	Float Voltage Range	48 ~ 58 V DC	30					

S.No	Title	Description	Marks	Bidder's Statement				
				FC	PC	NC	Marks	Bidder's quoted feature
2.4	Charging Modes	Boost Charging	M					
2.5		Float Charging	M					
3	Design and Capacity							
3.1	Design and Capacity	Modular	M					
3.2		The Rectifier Capacity must be adequate to provide the quoted equipment full load power and Simultaneously provide Maximum Battery Bank Charging Current. Bidder to specify Equipment Full Load and Battery Bank Full Charging Current requirement	M					
3.3		Modules works in Load sharing mode	M					
3.4		No of Module/ Redundancy	(N+1) Modules ; N=1,2,3....	M				
3.5	Modules working	Uninterruptable Swapping	M					
3.6	Redundancy	The rectifier modules shall operate independently and continue to supply the load in the event of failure of the supervisory control module	M					
3.7	Design Life	≥ 15 Years	M					
3.8	Protection	Over Voltage	M					
3.9		Short Circuit	M					
3.10		High Temperature	10					

S.No	Title	Description	Marks	Bidder's Statement				
				FC	PC	NC	Marks	Bidder's quoted feature
4	Alarms, Display & Maintenance							
4.1	Overall Efficiency	91% or better	20					
4.2	Management Features / Alarms	AC Fail /Mains Fail	M					
4.3		Battery Mode	M					
4.4		Low input voltage Alarm	10					
4.5		Low Battery voltage Alarm	10					
4.6		High Temperature Alarm	10					
4.7		LLVD / BLVD	M					
4.8		Remote Monitoring: Support real-time supervision of input/output voltage and current, rectifier module status, battery parameters, alarms, and thermal sensors. It shall provide remote configuration, fault/event logging, and threshold-based alarm reporting	M					
4.9		Module Failure	M					
4.10	Display	Input Voltage	10					
4.11		Total Load Current	10					
4.12		Battery Charging status	10					
4.13		Supervisory Module: Built-in with backlit LCD, menu-driven interface. Functions: Battery monitoring, history logging, configuration.	M					

S.No	Title	Description	Marks	Bidder's Statement				
				FC	PC	NC	Marks	Bidder's quoted feature
5	Physical & Environmental							
5.1	Physical	Cabinet dimensions: Standard ETSI 19" rack mountable	M					
5.2		Ingress Protection: IP-55 rating	30					
5.3		Safety & Access: All high-voltage points and busbars must be covered; front-access design preferred.	M					
5.4		Cooling: Natural convection or temperature-controlled variable speed fans.	M					
5.5		Acoustic Noise: ≤ 60 dBA.	10					
5.6		Ambient Temperature: 0°C to +55°C; Humidity: Up to 95% (non-condensing)	10					
5.7		The bidder shall guarantee availability of spares for at least 10 years	M					
5.8	Temperature Range	(0 °C to +50 °C)	20					
5.9	Humidity (non condensing)	(5% to 95%)	20					
TOTAL			250					

Evaluation Criteria: Bidder must clearly state which features are subject to software license and also quote their price in the bid document. Bidder's Statement column must be properly filled to clearly state the available feature/ compliance as fully complied (FC), partially complied (PC) or not complied (NC) or better feature is available, Tick the relevant box. The bidder must Fully comply to all Mandatory clauses (Denoted as "M" in Marks column) failing to do so will Technically disqualify the bidder, Moreover, the bidder should score 75 % or more of the total marks given in "Marks" column. The compliance of above specification must be supported by data sheet of product to certify the Compliance.

ANNEX-C4: BATTERY BANKS SPECIFICATION

S.No	Title	Description	Marks	Bidder's Statement				
				FC	PC	NC	Marks	Bidder's quoted feature
1	General Requirements	Chemistry: Lithium Iron Phosphate (LiFePO4)	M					
2		Capacity: The bidder should quoted adequate Capacity to provide Bttery Backup requirement as per Bill of Quantity	M					
3		19-inch rack/cabinet mountable	M					
4		Design Life: Minimum 12 years	M					
5		Service Life: Minimum 10 years	M					
6		Battery/ Battery Bank shall be compatible with offered rectifier system	M					
7		Housing: Flame Retardant (FR) ABS material, resistant to shock and vibration	M					
8	Performance Specifications	Nominal Voltage: -48V DC	M					
9		Capacity: As per Bill of Quantity	M					
10		Backup Time: As per Site-wise BoQ	M					
11		Cycle Life: ≥ 3500 cycles at 80% Depth of Discharge (DOD)	M					
12		Self-Discharge: < 5% over 90 days.	M					
13	Nominal Charging Voltage: 43.2V to 57.5V.	50						
14	BMS & Monitoring	Integrated BMS: For real-time monitoring and protection	M					
15		Monitoring Functions: State of Charge (SOC), State of Health (SOH), fault status alarms	50					
16		Communication Protocols: RS485/CAN/SNMP/ Modbus/ RS232 or specify	M					
17		Dry Contact Alarms: Minimum 2 outputs	20					
18		Anti-theft design	20					

S.No	Title	Description	Marks	Bidder's Statement				
				FC	PC	NC	Marks	Bidder's quoted feature
19		Remote Monitoring Capability required	M					
20	Alarms	Over temperature, overcurrent, short circuit, overcharge, over discharge	50					
21	Physical & Environmental	Ingress Protection: IP40	20					
22		Operating Temperature: -5°C to +55°C	10					
23		Storage Temperature: -5°C to +50°C	10					
24		Relative Humidity: 5% to 95% (non-condensing)	10					
25		Dimensions & Weight: To be specified by the bidder	M					
Total			240					
Technical Evaluation Criteria		<p>Bidder's Statement column must be properly filled to clearly state the available feature/compliance as fully complied (FC), partially complied (PC) or not complied (NC) or better feature is available, Tick the relevant box. The bidder must Fully comply to all Mandatory clauses (Denoted as "M" in Marks column) failing to do so will Technically disqualify the bidder, Moreover, the bidder should score 75 % or more of the total marks given in "Marks" column. The compliance of above specification must be supported by data sheet of product to certify the Compliance.</p> <p>The bidder may quote combination of Banks to fulfill the requisite capacity.</p>						

ANNEX-C5: NMS CLIENT (DESKTOP) SPECIFICATION

Serial #	Title	Description	Marks	Bidder's Statement				
				FC	PC	NC	Bidder's Quoted Feature	Ref in Bid
1	Brand	HP (Pro Desktop) Lenovo (ThinkCentre) Dell (OptiPlex) Or Equivalent	M					
2	System Processor	Intel Core i7 14th Generation (Equivalent or above) With Built-in TPM 2.0 Security Chip	M					
3	Graphics	Integrated Graphics	M					
4.1	Ports/Interface	Front: USB 3.1 above or latest	M					
4.2		Rear: USB 3.1 above or latest	M					
4.3		Rear: Display Port/HDMI (Latest Gen)	M					
4.5		Ethernet LAN 100/1000 Built in	M					
5	Processor Computing	64-bit Computing	M					
6	Memory	16 GB DDR5 or with latest bus speed (expandable upto 32 GB)	M					

Serial #	Title	Description	Marks	Bidder's Statement				
				FC	PC	NC	Bidder's Quoted Feature	Ref in Bid
7	Hard Drive	1 TB SSD NVMe latest Gen or Above (Expandable)	M					
8	Sound	Built in Stereo speakers	M					
9	Display	Anti-glare 32-inch Monitor (DP/HDMI port same as CPU)	M					
10	Display Resolution	Full HD 1920 X 1080 or Above	M					
11	Operating System	Window 11 Pro or Above	M					
12	Power Supply	180 - 300W power supply	M					
13	Warranty	1 Year Local Warranty	M					
14	Accessories	Display & Power Cables	M					
		Mouse and keyboard (A4 Tech/ Logitech / Dell / HP)	M					
15	Casing Type	Tower	M					
Note	<p>Bidder's Statement column must be properly filled to clearly state the available feature/compliance as fully complied (FC), partially complied (PC) or not complied (NC) or better feature is available, Tick the relevant box. The bidder must Fully comply to all Mandatory clauses (Denoted as "M" in Marks column) failing to do so will Technically disqualify the bidder. The compliance of above specification must be supported by data sheet of product to certify the Compliance.</p>							

ANNEX-C6: LOCAL CLIENT TERMINAL (LAPTOP) SPECIFICATION

Serial #	Title	Description	Marks	Bidder's Statement				
				FC	PC	NC	Bidder's Quoted Feature	Reference in Datasheets/Manual
1	Brand	HP (Probook), Dell (Latitude) Lenovo (Thinkpad), Or Equivalent	M					
2	System Processor	Intel Core i7 14th Generation (Equivalent or above) With Built-in TPM 2.0 Security Chip	M					
3	Graphics	Integrated Graphics	M					
4.1	Ports/Interface	USB 3.1 above or latest	M					
4.2		Type-C (Latest Gen)	M					
4.3		HDMI (Latest Gen)	M					
4.4		Ethernet LAN 100/1000 Built in	M					
5	Wireless Communications	802.11a/b/g/n/ac /6 , Bluetooth 5 and Above	M					
6	Memory	16 GB DDR5 or with latest bus speed (expandable upto 32 GB)	M					
7	Hard Drive	1 TB SSD (NVMe) Latest Gen or above (expandable)	M					
8	Keypad	Standard keypad with Backlight	M					

Serial #	Title	Description	Marks	Bidder's Statement				
				FC	PC	NC	Bidder's Quoted Feature	Reference in Datasheets/Manual
9	Camera	HD Built-in	M					
10	Display	Anti-glare 15/15.6" FHD or Above	M					
11	Display Resolution	Full HD 1920 X 1080 or Above	M					
12	Sound	Built in Stereo speakers, microphone	M					
13	Operating System	Windows 11 Pro or above	M					
14	Batteries	Internal Battery with minimum 4 hours backup (Min. 3 Cell Li-ion/Li-Po battery)	M					
15	Power Adaptor	As per Product	M					
16	Carrying Bag	Standard	M					
17	Warranty	One Year warranty from Supplier	M					
Note	<p>Bidder's Statement column must be properly filled to clearly state the available feature/compliance as fully complied (FC), partially complied (PC) or not complied (NC) or better feature is available, Tick the relevant box. The bidder must Fully comply to all Mandatory clauses (Denoted as "M" in Marks column) failing to do so will Technically disqualify the bidder. The compliance of above specification must be supported by data sheet of product to certify the Compliance.</p>							

ANNEX-D: NETWORK DESIGN REQUIREMENTS

ANNEX-D1-1: SERVICES - OPERATIONAL E1s

S#	Ring	Origination	Origination Port	Destination	Destination Port
1	Ring -1	Rawalpindi	2-PQ1-45	Kharian	2-PQ1-6
2	Ring -1	Islamabad	6-PQ1-9	Taxila	2-PQ1-9
3	Ring -1	Islamabad	6-PQ1-10	Taxila	2-PQ1-10
4	Ring -1	Peshawar	2-PQ1-1	Kohat	2-PQ1-12
5	Ring -1	Islamabad	6-PQ1-24	Kamra	2-PQ1-1
6	Ring -1	Islamabad	6-PQ1-26	Kamra	2-PQ1-7
7	Ring -1	Islamabad	6-PQ1-28	Kamra	2-PQ1-5
8	Ring -1	Islamabad	12-PQ1-47	KamraExch	6-PQ1-18
9	Ring -1	Islamabad	12-PQ1-7	Kamra	2-PQ1-9
10	Ring -1	Islamabad	12-PQ1-10	KamraExch	6-PQ1-3
11	Ring -1	Peshawar	2-PQ1-3	Nowshera	2-PQ1-8
12	Ring -1	Faisalabad	18-PQ1-3	Bhakkar	2-PQ1-1
13	Ring -1	Faisalabad	18-PQ1-4	Bhakkar	2-PQ1-2
14	Ring -1	Sahiwal	2-PQ1-8	Okara	2-PQ1-1
15	Ring -1	Sahiwal	2-PQ1-9	Okara	2-PQ1-2
16	Ring -1	Islamabad	12-PQ1-8	Attock	6-PQ1-17
17	Ring -1	Islamabad	12-PQ1-9	Attock	6-PQ1-18
18	Ring -1	Rawalpindi	2-PQ1-01	Attock	6-PQ1-19
19	Ring -1	Peshawar	2-PQ1-4	Kohat	2-PQ1-6
20	Ring -1	Peshawar	2-PQ1-5	Kohat	2-PQ1-5
21	Ring -1	Islamabad	6-PQ1-2	Peshawar	2-PQ1-2
22	Ring -1	Gujranwala	2-PQ1-1	Gujrat	2-PQ1-1
23	Ring -1	Gujranwala	2-PQ1-2	Gujrat	2-PQ1-2

S#	Ring	Origination	Origination Port	Destination	Destination Port
24	Ring -1	Gujranwala	2-PQ1-6	Gujrat	2-PQ1-6
25	Ring -1	Gujranwala	2-PQ1-7	Gujrat	2-PQ1-7
26	Ring -1	Gujranwala	2-PQ1-8	Gujrat	2-PQ1-8
27	Ring -1	Gujranwala	2-PQ1-9	Gujrat	2-PQ1-9
28	Ring -1	Islamabad	6-PQ1-6	Lahore	2-PQ1-6
29	Ring -1	Islamabad	12-PQ1-24	Rawalpindi	2-PQ1-5
30	Ring -1	Islamabad	12-PQ1-25	Rawalpindi	2-PQ1-6
31	Ring -1	Islamabad	12-PQ1-30	Rawalpindi	2-PQ1-7
32	Ring -1	Islamabad	12-PQ1-27	Rawalpindi	2-PQ1-8
33	Ring -1	Islamabad	12-PQ1-39	Rawalpindi	2-PQ1-20
34	Ring -1	Faisalabad	18-PQ1-19	IqbalTown	6-PQ1-21
35	Ring -1	Faisalabad	18-PQ1-18	IqbalTown	6-PQ1-3
36	Ring -1	Faisalabad	18-PQ1-5	Johrabad	6-PQ1-1
37	Ring -1	Faisalabad	18-PQ1-17	Sargodha	2-PQ1-1
38	Ring -1	Faisalabad	18-PQ1-12	IqbalTown	6-PQ1-7
39	Ring -1	Faisalabad	18-PQ1-15	IqbalTown	6-PQ1-6
40	Ring -1	Faisalabad	18-PQ1-16	IqbalTown	6-PQ1-10
41	Ring -1	Faisalabad	18-PQ1-14	IqbalTown	6-PQ1-11
42	Ring -1	Faisalabad	18-PQ1-21	IqbalTown	6-PQ1-12
43	Ring -1	Faisalabad	18-PQ1-24	IqbalTown	6-PQ1-16
44	Ring -1	Islamabad	6-PQ1-1	Lahore	2-PQ1-1
45	Ring -2	MultanC	2-PQ1-5	Bahawalpur	4-PQ1-1
46	Ring -2	MultanC	2-PQ1-6	Bahawalpur	4-PQ1-3
47	Ring -2	MultanC	2-PQ1-10	Bahawalpur	4-PQ1-10
48	Ring -2	MultanC	2-PQ1-11	Bahawalpur	4-PQ1-11
49	Ring -2	MultanC	2-PQ1-12	Bahawalpur	4-PQ1-14

S#	Ring	Origination	Origination Port	Destination	Destination Port
50	Ring -2	MultanC	2-PQ1-13	Bahawalpur	4-PQ1-16
51	Ring -2	MultanC	2-PQ1-35	NewMultan	2-PQ1-1
52	Ring -2	MultanC	2-PQ1-36	NewMultan	2-PQ1-2
53	Ring -2	MultanC	2-PQ1-37	NewMultan	2-PQ1-3
54	Ring -2	MultanC	2-PQ1-38	NewMultan	2-PQ1-4
55	Ring -2	MultanC	2-PQ1-42	NewMultan	2-PQ1-8
56	Ring -2	MultanC	2-PQ1-41	NewMultan	2-PQ1-7
57	Ring -2	MultanC	2-PQ1-34	MGarh	2-PQ1-2
58	Ring -2	MultanC	2-PQ1-17	DGKhan	2-PQ1-3
59	Ring -2	MultanC	2-PQ1-18	DGKhan	2-PQ1-4
60	Ring -2	MultanC	2-PQ1-20	DGKhan	2-PQ1-8
61	Ring -2	MultanC	2-PQ1-15	DGKhan	2-PQ1-1
62	Ring -2	MultanC	2-PQ1-16	DGKhan	2-PQ1-2
63	Ring -2	MultanC	2-PQ1-48	Shikarpur	2-PQ1-11
64	Ring -3	Shikarpur	2-PQ1-7	Sukkur	2-PQ1-1
65	Ring -3	Shikarpur	2-PQ1-10	Sukkur	2-PQ1-8
66	Ring -3	Hyderabad	6-PQ1-24	Thatta	2-PQ1-1
67	Ring -3	Hyderabad	6-PQ1-3	Thatta	2-PQ1-3
68	Outer 1-2-3	Islamabad	6-PQ1-48	Karachi	2-PQ1-9
69	Outer 1-2-3	Islamabad	6-PQ1-4	Karachi	2-PQ1-5
70	Outer 1-2-3	Islamabad	6-PQ1-5	Karachi	2-PQ1-6
71	Outer 1-2-3	Islamabad	6-PQ1-8	Karachi	2-PQ1-7
72	Outer 1-2	Islamabad	7-PQ1-49	MultanC	2-PQ1-49
73	Outer 1-2	MultanC	2-PQ1-3	Arifwala	6-PQ1-8
74	Outer 1-2	MultanC	2-PQ1-27	Khanewal	2-PQ1-1
75	Outer 1-2	MultanC	2-PQ1-28	Khanewal	2-PQ1-2

S#	Ring	Origination	Origination Port	Destination	Destination Port
76	Outer 1-2	MultanC	2-PQ1-4	Arifwala	6-PQ1-19
77	Outer 1-2	Islamabad	7-PQ1-45	MultanC	2-PQ1-24
78	Outer 2-3	MultanC	2-PQ1-26	Karachi	2-PQ1-3
79	Spur	Kamra	2-PQ1-6	KamraExch	6-PQ1-13
80	Spur	Gujranwala	2-PQ1-34	Daska	6-PQ1-1
81	Spur	Gujranwala	2-PQ1-35	Daska	6-PQ1-8
82	Spur	Johrabad	6-PQ1-27	KCP	6-PQ1-1
83	Spur	Johrabad	6-PQ1-28	KCP	6-PQ1-2
84	Spur	Johrabad	6-PQ1-29	KCP	6-PQ1-3
85	Spur	IqbalTown	6-PQ1-5	KCP	6-PQ1-4
86	Spur	Hyderabad	7-PQ1-49	HyderabadCentral	6-PQ1-19
87	Spur	Hyderabad	7-PQ1-50	HyderabadCentral	6-PQ1-20
88	Spur	Hyderabad	7-PQ1-51	HyderabadCentral	6-PQ1-21
89	Spur	Hyderabad	7-PQ1-52	HyderabadCentral	6-PQ1-22
90	Spur	Hyderabad	7-PQ1-53	HyderabadCentral	6-PQ1-23
91	Spur	Hyderabad	7-PQ1-47	HyderabadCentral	6-PQ1-17
92	Local	Gujranwala	2-PQ1-61	Gujranwala	12-SLD16-1
93	Local	Gujranwala	2-PQ1-62	Gujranwala	12-SLD16-1
94	Local	Gujranwala	2-PQ1-63	Gujranwala	12-SLD16-1

ANNEX-D1-2: SERVICES - OPERATIONAL FEs/GEs/LINEs

S#	Ring	Service Type	Configured Bandwidth (Mbps)	ORIGINATION				DESTINATION			
		FE/GE		SourceNE	Port	Interface	VCTrunk	SinkNE	Port	Interface	VCTrunk
1	Ring -1	GE	10	Islamabad	14-EGS4/1	Optical	VCTrunk/2	Johrabad	8-EGS4/1	Optical	VCTrunk/2
2	Ring -1	GE/Line	30	Islamabad	14-EGS4/4	Optical	VCTrunk/29	Taxila	5-SLQ4/3	Optical	-
3	Ring -1	FE/GE	36	Islamabad	26-EGS4/2	Optical	VCTrunk/3	Taxila	3-EFT8/1	Electrical	VCTrunk/1
4	Ring -1	GE/Line	96	Islamabad	14-EGS4/4	Optical	VCTrunk/34	Attock	11-SLQ4/1	Optical	-
5	Ring -1	FE	8	Bannu	3-EFT8/2	Electrical	VCTrunk/2	DIKhan	3-EFT8/2	Electrical	VCTrunk/2
6	Ring -1	FE	48	Faisalabad	2-EFT8/5	Electrical	VCTrunk/5	Sahiwal	3-EFT8/2	Electrical	VCTrunk/2
7	Ring -1	FE	8	Faisalabad	2-EFT8/4	Electrical	VCTrunk/4	IqbalTown	7-EFT8/8	Electrical	VCTrunk/8
8	Ring -1	FE	12	Gujranwala	4-EFT8/7	Electrical	VCTrunk/7	Jehlum	3-EFT8/3	Electrical	VCTrunk/3
9	Ring -1	FE	12	Gujrat	3-EFT8/6	Electrical	VCTrunk/6	Jehlum	3-EFT8/5	Electrical	VCTrunk/5
10	Ring -1	FE	8	Gujranwala	4-EFT8/2	Electrical	VCTrunk/2	Gujrat	3-EFT8/5	Electrical	VCTrunk/5
11	Ring -1	FE	8	Gujrat	3-EFT8/3	Electrical	VCTrunk/3	IqbalTown	7-EFT8/6	Electrical	VCTrunk/6
12	Ring -1	FE	8	Gujrat	3-EFT8/4	Electrical	VCTrunk/4	Sialkot	7-EFT8/5	Electrical	VCTrunk/5

S#	Ring	Service Type	Configured Bandwidth (Mbps)	ORIGINATION				DESTINATION			
		FE/GE		SourceNE	Port	Interface	VCTrunk	SinkNE	Port	Interface	VCTrunk
13	Ring -1	FE	2	Kharian	4-EFT8A/3	Electrical	VCTrunk/3	Jehlum	3-EFT8/4	Electrical	VCTrunk/4
14	Ring -1	FE/GE	2	Islamabad	15-EGS4/2	Optical	VCTrunk/6	DIKhan	3-EFT8/6	Electrical	VCTrunk/6
15	Ring -1	FE/GE	4	Lahore	5-EGS4/2	Optical	VCTrunk/47	Gujrat	3-EFT8/2	Electrical	VCTrunk/2
16	Ring -1	FE/GE	4	Lahore	5-EGS4/2	Optical	VCTrunk/50	Gujranwala	4-EFT8/6	Electrical	VCTrunk/6
17	Ring -1	FE/GE	4	Lahore	5-EGS4/2	Optical	VCTrunk/51	KCP	7-EFT8/3	Electrical	VCTrunk/3
18	Ring -1	FE/GE	4	Lahore	5-EGS4/2	Optical	VCTrunk/52	IqbalTown	7-EFT8/3	Electrical	VCTrunk/3
19	Ring -1	FE/GE	4	Lahore	5-EGS4/2	Optical	VCTrunk/55	Johrabad	7-EFT8/3	Electrical	VCTrunk/3
20	Ring -1	GE	240	Lahore	15-EGS4/2	Optical	VCTrunk/2	Sargodha	6-EGS4/1	Optical	VCTrunk/1
21	Ring -1	GE	6	Lahore	14-EGS4/2	Optical	VCTrunk/33	Islamabad	15-EGS4/2	Optical	VCTrunk/5
22	Ring -1	GE	10	Lahore	14-EGS4/2	Optical	VCTrunk/38	Islamabad	15-EGS4/2	Optical	VCTrunk/9
23	Ring -1	FE	12	Islamabad	1-EFT8/3	Electrical	VCTrunk/3	Abbottabad	7-EFT8/1	Electrical	VCTrunk/1
24	Ring -1	GE	30	Peshawar	6-EGS4/2	Optical	VCTrunk/2	Kohat	7-EGS4/1	Optical	VCTrunk/4
25	Ring -1	GE	8	Peshawar	6-EGS4/2	Optical	VCTrunk/12	Kohat	7-EGS4/1	Optical	VCTrunk/1

S#	Ring	Service Type	Configured Bandwidth (Mbps)	ORIGINATION				DESTINATION			
		FE/GE		SourceNE	Port	Interface	VCTrunk	SinkNE	Port	Interface	VCTrunk
26	Ring -1	GE	2	Peshawar	6-EGS4/2	Optical	VCTrunk/13	Kohat	7-EGS4/1	Optical	VCTrunk/2
27	Ring -1	GE/Line	2	Peshawar	6-EGS4/2	Optical	VCTrunk/8	Kohat	14-SLD4/1	Optical	-
28	Ring -1	GE/Line	28	Peshawar	6-EGS4/2	Optical	VCTrunk/7	Kohat	14-SLD4/1	Optical	-
29	Ring -1	GE	10	Peshawar	6-EGS4/2	Optical	VCTrunk/17	Kohat	7-EGS4/1	Optical	VCTrunk/6
30	Ring -1	FE	8	Peshawar	18-EFT8/1	Electrical	VCTrunk/1	Bannu	3-EFT8/3	Electrical	VCTrunk/3
31	Ring -1	FE	8	DIKhan	3-EFT8/1	Electrical	VCTrunk/1	Mardan	7-EFT8/1	Electrical	VCTrunk/1
32	Ring -1	FE	12	Peshawar	18-EFT8/3	Electrical	VCTrunk/3	Mardan	7-EFT8/2	Electrical	VCTrunk/3
33	Ring -1	FE	50	Peshawar	18-EFT8/4	Electrical	VCTrunk/4	Mardan	7-EFT8/3	Electrical	VCTrunk/3
34	Ring -1	GE	144	Peshawar	6-EGS4/2	Optical	VCTrunk/9	Bannu	7-EGS4/1	Optical	VCTrunk3
35	Ring -1	GE	6	Peshawar	6-EGS4/2	Optical	VCTrunk/6	Bannu	7-EGS4/1	Optical	VCTrunk/4
36	Ring -1	FE	10	Peshawar	18-EFT8/2	Electrical	VCTrunk/2	DIKhan	3-EFT8/4	Electrical	VCTrunk/4
37	Ring -1	FE	2	Rawalpindi	17-EFT8/1	Electrical	VCTrunk/1	Johrabad	7-EFT8/5	Electrical	VCTrunk/5
38	Ring -1	FE/GE	10	Islamabad	14-EGS4/4	Optical	VCTrunk/39	Rawalpindi	17-EFT8/2	Electrical	VCTrunk/2

S#	Ring	Service Type	Configured Bandwidth (Mbps)	ORIGINATION				DESTINATION			
		FE/GE		SourceNE	Port	Interface	VCTrunk	SinkNE	Port	Interface	VCTrunk
39	Ring -1	FE/GE	48	Islamabad	14-EGS4/4	Optical	VCTrunk/3	Rawalpindi	3-EFT8/6	Electrical	VCTrunk/6
40	Ring -1	FE/GE	2	Islamabad	14-EGS4/4	Optical	VCTrunk/5	Rawalpindi	3-EFT8/1	Electrical	VCTrunk/1
41	Ring -1	GE	930	Islamabad	27-EGS4/1	Optical	VCTrunk/1	Haripur	11-EGT2/1	Optical	VCTrunk/1
42	Ring -1	GE	620	Islamabad	14-EGS4/2	Optical	VCTrunk/46	Haripur	12-EGT2/1	Optical	VCTrunk/1
43	Ring -1	GE	775	Islamabad	26-EGS4/3	Optical	VCTrunk/4	Haripur	12-EGT2/2	Optical	VCTrunk/2
44	Ring -1	GE/Line	240	Islamabad	14-EGS4/1	Optical	VCTrunk/44	Kamra	6-SLQ4/3	Optical	-
45	Ring -1	FE	48	Faisalabad	2-EFT8/1	Electrical	VCTrunk/1	Bhalwal	4-EFS4/3	Electrical	VCTrunk/3
46	Ring -1	FE	96	Faisalabad	2-EFT8/2	Electrical	VCTrunk/2	Chiniot	3-EFT8/2	Electrical	VCTrunk/2
47	Ring -1	GE	96	Lahore	14-EGS4/4	Optical	VCTrunk/6	Faisalabad	5-EGS4/2	Optical	VCTrunk/2
48	Ring -1	GE	48	Lahore	14-EGS4/4	Optical	VCTrunk/5	Gujranwala	13-EGS4/2	Optical	VCTrunk/2
49	Ring -1	FE/Line	48	Islamabad	1-EFT8/7	Electrical	VCTrunk/7	Taxila	5-SLQ4/3	Optical	-
50	Ring -1	GE	310	Islamabad	14-EGS4/4	Optical	VCTrunk/37	Attock	8-EGS4/1	Optical	VCTrunk/1
51	Ring -1	GE	48	Islamabad	13-EGS4/2	Optical	VCTrunk/4	Gujranwala	13-EGS4/2	Optical	VCTrunk/3

S#	Ring	Service Type	Configured Bandwidth (Mbps)	ORIGINATION				DESTINATION			
		FE/GE		SourceNE	Port	Interface	VCTrunk	SinkNE	Port	Interface	VCTrunk
52	Ring -1	FE/GE	96	Lahore	14-EGS4/2	Optical	VCTrunk/16	Gujrat	3-EFT8/1	Electrical	VCTrunk/1
53	Ring -1	GE	775	Lahore	14-EGS4/1	Optical	VCTrunk/11	Gujranwala	13-EGS4/1	Optical	VCTrunk/5
54	Ring -1	GE	6	Lahore	14-EGS4/2	Optical	VCTrunk/4	Gujranwala	13-EGS4/1	Optical	VCTrunk/1
55	Ring -1	GE	192	Lahore	14-EGS4/3	Optical	VCTrunk/3	Islamabad	13-EGS4/1	Optical	VCTrunk/1
56	Ring -1	GE	155	Lahore	14-EGS4/2	Optical	VCTrunk/9	Jehlum	14-EGT2/1	Electrical	VCTrunk/1
57	Ring -1	FE/GE	48	Islamabad	14-EGS4/1	Optical	VCTrunk/1	Johrabad	7-EFT8/1	Electrical	VCTrunk/1
58	Ring -1	GE	48	Lahore	15-EGS4/2	Optical	VCTrunk/5	Sargodha	6-EGS4/1	Optical	VCTrunk/4
59	Ring -1	GE	240	Islamabad	13-EGS4/4	Optical	VCTrunk/6	Kamra	5-EGS4/2	Optical	VCTrunk/5
60	Ring -1	FE/GE	96	Islamabad	5-EGS4/4	Optical	VCTrunk/10	KamraExch	7-EFT8/9	Optical	VCTrunk/9
61	Ring -1	FE/GE	48	Islamabad	5-EGS4/4	Optical	VCTrunk/16	KamraExch	7-EFT8/3	Electrical	VCTrunk/3
62	Ring -1	FE/GE	96	Islamabad	5-EGS4/4	Optical	VCTrunk/11	KamraExch	7-EFT8/2	Electrical	VCTrunk/2
63	Ring -1	FE	96	Islamabad	1-EFT8/2	Electrical	VCTrunk/2	KamraExch	7-EFT8/1	Electrical	VCTrunk/1
64	Ring -1	FE/GE	48	Lahore	14-EGS4/1	Optical	VCTrunk/25	Kharian	4-EFT8/1	Electrical	VCTrunk/1

S#	Ring	Service Type	Configured Bandwidth (Mbps)	ORIGINATION				DESTINATION			
		FE/GE		SourceNE	Port	Interface	VCTrunk	SinkNE	Port	Interface	VCTrunk
65	Ring -1	GE	96	Faisalabad	5-EGS4/2	Optical	VCTrunk/4	Peshawar	6-EGS4/3	Optical	VCTrunk/3
66	Ring -1	GE	775	Peshawar	13-EGS4/1	Optical	VCTrunk/5	Mardan	8-EGS4/1	Optical	VCTrunk/2
67	Ring -1	GE	96	Islamabad	13-EGS4/1	Optical	VCTrunk/2	Peshawar	6-EGS4/4	Optical	VCTrunk/14
68	Ring -1	FE/GE	60	Islamabad	5-EGS4/4	Optical	VCTrunk/17	KamraExch	7-EFT8/4	Electrical	VCTrunk/4
69	Ring -1	FE/GE	2	Islamabad	15-EGS4/2	Optical	VCTrunk/12	KamraExch	7-EFT8/10	Optical	VCTrunk/10
70	Ring -1	FE/GE	16	Islamabad	5-EGS4/4	Optical	VCTrunk/12	KamraExch	7-EFT8/6	Electrical	VCTrunk/6
71	Ring -1	GE	48	Islamabad	14-EGS4/4	Optical	VCTrunk/4	Rawalpindi	6-EGS4/4	Optical	VCTrunk/4
72	Ring -1	GE	192	Peshawar	6-EGS4/2	Optical	VCTrunk/11	DIKhan	7-EGS4/1	Optical	VCTrunk/1
73	Ring -1	GE	20	Peshawar	6-EGS4/2	Optical	VCTrunk/18	DIKhan	7-EGS4/2	Optical	VCTrunk/2
74	Ring -1	FE/GE	36	Peshawar	6-EGS4/3	Optical	VCTrunk/15	Taxila	3-EFT8/2	Electrical	VCTrunk/2
75	Ring -1	GE	155	Lahore	5-EGS4/4	Optical	VCTrunk/6	Shaikhupura	5-EGT2/1	Optical	VCTrunk/1
76	Ring -1	GE	775	Lahore	5-EGS4/4	Optical	VCTrunk/5	Faisalabad	5-EGS4/1	Optical	VCTrunk/3
77	Ring -1	GE	620	Peshawar	13-EGS4/1	Optical	VCTrunk/3	Nowshera	12-EGS4/1	Optical	VCTrunk/3

S#	Ring	Service Type	Configured Bandwidth (Mbps)	ORIGINATION				DESTINATION			
		FE/GE		SourceNE	Port	Interface	VCTrunk	SinkNE	Port	Interface	VCTrunk
78	Ring -1	GE	1085	Islamabad	15-EGS4/1	Optical	VCTrunk/1	Peshawar	6-EGS4/1	Optical	VCTrunk/1
79	Ring -1	GE	930	Islamabad	26-EGS4/2	Optical	VCTrunk/2	Taxila	12-EGS4/1	Optical	VCTrunk/1
80	Ring -1	GE	930	Islamabad	13-EGS4/3	Optical	VCTrunk/5	Taxila	12-EGS4/2	Optical	VCTrunk/3
81	Ring -1	GE/Line	10	Islamabad	15-EGS4/2	Optical	VCTrunk/13	Taxila	5-SLQ4/3	Optical	-
82	Ring -1	GE	384	Islamabad	13-EGS4/4	Optical	VCTrunk/7	Kamra	5-EGS4/2	Optical	VCTrunk/11
83	Ring -1	GE/Line	155	Islamabad	14-EGS4/1	Optical	VCTrunk/45	Kamra	6-SLQ4/2	Optical	-
84	Ring -1	GE	4	Islamabad	15-EGS4/2	Optical	VCTrunk/8	Kamra	5-EGS4/1	Optical	VCTrunk/1
85	Ring -1	GE	48	Islamabad	5-EGS4/4	Optical	VCTrunk/2	Kamra	5-EGS4/2	Optical	VCTrunk/3
86	Outer 1-2-3	GE	1085	Islamabad	5-EGS4/1	Optical	VCTrunk/1	Karachi	5-EGS4/1	Optical	VCTrunk/1
87	Outer 1-2-3	GE	1085	Lahore	15-EGS4/1	Optical	VCTrunk/1	Karachi	14-EGS4/4	Optical	VCTrunk/4
88	Ring -1	GE	1085	Islamabad	15-EGS4/4	Optical	VCTrunk/4	Lahore	5-EGS4/3	Optical	VCTrunk/3
89	Ring -1	10G GE	9920	Islamabad	12-EAS2/1	Optical	VCTrunk/1	Lahore	12-EAS2/1	Optical	VCTrunk/1
90	Ring -1	FE/GE	8	Taxila	12-EGS4/1	Optical	VCTrunk/4	Attock	7-EFT8/3	Electrical	VCTrunk/3

S#	Ring	Service Type	Configured Bandwidth (Mbps)	ORIGINATION				DESTINATION			
		FE/GE		SourceNE	Port	Interface	VCTrunk	SinkNE	Port	Interface	VCTrunk
91	Ring -1	GE/Line	4	Taxila	12-EGS4/1	Optical	VCTrunk/2	Attock	11-SLQ4/1	Optical	-
92	Ring -1	FE/Line	48	Islamabad	17-EFT8/6	Electrical	VCTrunk/6	Attock	11-SLQ4/1	Optical	-
93	Ring -1	GE	528	Islamabad	5-EGS4/4	Optical	VCTrunk/4	Attock	8-EGS4/2	Optical	VCTrunk/3
94	Ring -1	FE	48	Islamabad	17-EFT8/11	Optical	VCTrunk/11	Peshawar	18-EFT8/6	Electrical	VCTrunk/6
95	Ring -1	GE	30	Peshawar	6-EGS4/2	Optical	VCTrunk/16	Kohat	7-EGS4/1	Optical	VCTrunk/3
96	Ring -1	GE	20	Peshawar	6-EGS4/2	Optical	VCTrunk/19	Kohat	7-EGS4/1	Optical	VCTrunk/5
97	Ring -1	GE	20	Peshawar	6-EGS4/2	Optical	VCTrunk/5	Kohat	7-EGS4/1	Optical	VCTrunk/7
98	Ring -1	GE	16	Peshawar	6-EGS4/2	Optical	VCTrunk/20	Kohat	7-EGS4/1	Optical	VCTrunk/8
99	Ring -1	GE	10	Peshawar	6-EGS4/2	Optical	VCTrunk/21	Kohat	7-EGS4/1	Optical	VCTrunk/9
100	Ring -1	GE	8	Peshawar	13-EGS4/1	Optical	VCTrunk/1	Kohat	7-EGS4/1	Optical	VCTrunk/10
101	Ring -1	GE/Line	4	Taxila	12-EGS4/1	Optical	VCTrunk/6	Kamra	6-SLQ4/3	Optical	-
102	Ring -1	GE	4	Taxila	12-EGS4/1	Optical	VCTrunk/7	Kamra	5-EGS4/2	Optical	VCTrunk/9
103	Ring -1	GE	384	Islamabad	13-EGS4/4	Optical	VCTrunk/7	Kamra	5-EGS4/2	Optical	VCTrunk/11

S#	Ring	Service Type	Configured Bandwidth (Mbps)	ORIGINATION				DESTINATION			
		FE/GE		SourceNE	Port	Interface	VCTrunk	SinkNE	Port	Interface	VCTrunk
104	Ring -1	GE/Line	4	Taxila	12-EGS4/1	Optical	VCTrunk/8	Kamra	6-SLQ4/2	Optical	-
105	Ring -1	GE	4	Taxila	12-EGS4/1	Optical	VCTrunk/9	Kamra	5-EGS4/2	Optical	VCTrunk/2
106	Ring -1	FE	48	Islamabad	17-EFT8/13	Optical	VCTrunk/13	Rawalpindi	3-EFT8/4	Electrical	VCTrunk/4
107	Ring -1	GE	48	Islamabad	15-EGS4/3	Optical	VCTrunk/10	Rawalpindi	6-EGS4/1	Optical	VCTrunk/1
108	Ring -1	FE/GE	48	Islamabad	14-EGS4/4	Optical	VCTrunk/6	Rawalpindi	17-EFT8/3	Electrical	VCTrunk/3
109	Ring -1	GE	155	Islamabad	5-EGS4/3	Optical	VCTrunk/3	Rawalpindi	6-EGS4/3	Optical	VCTrunk/3
110	Ring -1	GE	12	Peshawar	6-EGS4/2	Optical	VCTrunk/10	Bannu	7-EGS4/1	Optical	VCTrunk/5
111	Ring -2	FE	20	Sukkur	3-EFT8/11	Electrical	VCTrunk/11	PannuAqil	3-EFT8/1	Electrical	VCTrunk/1
112	Ring -2	FE	10	Sukkur	3-EFT8/1	Electrical	VCTrunk/1	PannuAqil	6-EFT8/2	Electrical	VCTrunk/2
113	Ring -2	GE	48	MultanC	14-EGS4/4	Optical	VCTrunk/25	NewMultan	13-EGT2/2	Optical	VCTrunk/2
114	Ring -2	GE/Line	2	MultanC	6-EGS4/3	Optical	VCTrunk/59	NewMultan	16-SLQ4/2	Optical	-
115	Ring -2	GE/Line	8	MultanC	6-EGS4/3	Optical	VCTrunk/60	NewMultan	16-SLQ4/2	Optical	-
116	Ring -2	GE/Line	2	MultanC	6-EGS4/3	Optical	VCTrunk/43	NewMultan	16-SLQ4/1	Optical	-

S#	Ring	Service Type	Configured Bandwidth (Mbps)	ORIGINATION				DESTINATION			
		FE/GE		SourceNE	Port	Interface	VCTrunk	SinkNE	Port	Interface	VCTrunk
117	Ring -2	GE/Line	10	MultanC	6-EGS4/3	Optical	VCTrunk/44	NewMultan	16-SLQ4/1	Optical	-
118	Ring -2	GE	6	MultanC	6-EGS4/3	Optical	VCTrunk/5	DGKhan	7-EGS4/1	Optical	VCTrunk/1
119	Ring -2	GE	12	MultanC	6-EGS4/3	Optical	VCTrunk/14	DGKhan	7-EGS4/1	Optical	VCTrunk/3
120	Ring -2	GE	20	MultanC	6-EGS4/3	Optical	VCTrunk/13	DGKhan	7-EGS4/1	Optical	VCTrunk/2
121	Ring -2	GE/Line	6	MultanC	6-EGS4/3	Optical	VCTrunk/12	Rajanpur	14-SLD4/1	Optical	-
122	Ring -2	FE	8	MultanC	3-EFT8/8	Electrical	VCTrunk/8	Bahawalpur	5-EFT8/4	Electrical	VCTrunk/4
123	Ring -2	GE	4	MultanC	6-EGS4/3	Optical	VCTrunk/16	Bahawalpur	7-EGS4/1	Optical	VCTrunk/1
124	Ring -2	FE	8	Bahawalpur	5-EFT8/6	Electrical	VCTrunk/6	RYKhan	3-EFT8/6	Electrical	VCTrunk/6
125	Ring -2	FE	8	MultanC	3-EFT8/6	Electrical	VCTrunk/6	RYKhan	3-EFT8/3	Electrical	VCTrunk/3
126	Ring -2	FE/GE	48	MultanC	6-EGS4/2	Optical	VCTrunk/28	DGKhan	3-EFT8/6	Electrical	VCTrunk/6
127	Ring -2	FE/GE	48	MultanC	6-EGS4/2	Optical	VCTrunk/30	DGKhan	3-EFT8/2	Electrical	VCTrunk/2
128	Ring -2	FE/GE	96	MultanC	6-EGS4/2	Optical	VCTrunk/32	MGarh	3-EFT8/1	Electrical	VCTrunk/1
129	Ring -2	FE/GE	6	MultanC	5-EGS4/1	Optical	VCTrunk/3	MGarh	3-EFT8/2	Electrical	VCTrunk/2

S#	Ring	Service Type	Configured Bandwidth (Mbps)	ORIGINATION				DESTINATION			
		FE/GE		SourceNE	Port	Interface	VCTrunk	SinkNE	Port	Interface	VCTrunk
130	Ring -2	FE/GE	10	MultanC	5-EGS4/1	Optical	VCTrunk/7	MGarh	3-EFT8/4	Electrical	VCTrunk/4
131	Ring -2	FE/GE	96	MultanC	6-EGS4/2	Optical	VCTrunk/48	DGKhan	3-EFT8/7	Electrical	VCTrunk/7
132	Ring -2	GE	6	MultanC	6-EGS4/3	Optical	VCTrunk/3	DGKhan	7-EGS4/1	Optical	VCTrunk/4
133	Ring -2	GE	6	MultanC	6-EGS4/3	Optical	VCTrunk/11	DGKhan	7-EGS4/1	Optical	VCTrunk/5
134	Ring -2	GE	6	MultanC	6-EGS4/3	Optical	VCTrunk/18	DGKhan	7-EGS4/1	Optical	VCTrunk/6
135	Ring -2	GE	8	MultanC	6-EGS4/3	Optical	VCTrunk/20	DGKhan	7-EGS4/1	Optical	VCTrunk/7
136	Ring -2	GE	6	MultanC	6-EGS4/3	Optical	VCTrunk/27	DGKhan	7-EGS4/1	Optical	VCTrunk/8
137	Ring -2	GE	18	MultanC	6-EGS4/3	Optical	VCTrunk/17	DGKhan	7-EGS4/1	Optical	VCTrunk/9
138	Ring -2	GE	4	MultanC	6-EGS4/3	Optical	VCTrunk/2	DGKhan	7-EGS4/1	Optical	VCTrunk/10
139	Ring -2	GE	6	MultanC	6-EGS4/3	Optical	VCTrunk/29	DGKhan	7-EGS4/1	Optical	VCTrunk/11
140	Ring -2	GE	155	MultanC	14-EGS4/4	Optical	VCTrunk/9	RYKhan	7-EGS4/2	Optical	VCTrunk/2
141	Ring -2	GE	240	MultanC	5-EGS4/1	Optical	VCTrunk/12	Lodhran	4-N2EGT2/1	Optical	VCTrunk/1
142	Ring -2	FE/GE	48	MultanC	6-EGS4/2	Optical	VCTrunk/25	Bahawalpur	5-EFT8/1	Electrical	VCTrunk/1

S#	Ring	Service Type	Configured Bandwidth (Mbps)	ORIGINATION				DESTINATION			
		FE/GE		SourceNE	Port	Interface	VCTrunk	SinkNE	Port	Interface	VCTrunk
143	Ring -2	FE/GE	48	MultanC	6-EGS4/2	Optical	VCTrunk/26	Bahawalpur	5-EFT8/5	Electrical	VCTrunk/5
144	Ring -2	FE/GE	96	MultanC	14-EGS4/4	Optical	VCTrunk/17	Lodhran	3-EFT8/1	Electrical	VCTrunk/1
145	Ring -2	FE/GE	48	MultanC	5-EGS4/1	Optical	VCTrunk/21	Lodhran	3-EFT8/4	Electrical	VCTrunk/4
146	Ring -2	FE/GE	96	MultanC	6-EGS4/3	Optical	VCTrunk/46	Bahawalpur	5-EFT8/7	Electrical	VCTrunk/7
147	Ring -2	FE/GE	24	MultanC	6-EGS4/1	Optical	VCTrunk/4	Bahawalpur	5-EFT8/3	Electrical	VCTrunk/3
148	Ring -2	GE	48	MultanC	5-EGS4/1	Optical	VCTrunk/25	Bahawalpur	7-N3EGS4/1	Optical	VCTrunk/2
149	Ring -2	GE/Line	48	MultanC	14-EGS4/4	Optical	VCTrunk/20	Rajanpur	14-SLD4/1	Optical	-
150	Ring -2	GE/Line	48	MultanC	14-EGS4/4	Optical	VCTrunk/21	Rajanpur	14-SLD4/1	Optical	-
151	Ring -2	GE/Line	310	MultanC	5-EGS4/1	Optical	VCTrunk/1	Rajanpur	14-SLD4/1	Optical	-
152	Ring -2	GE/Line	48	MultanC	14-EGS4/4	Optical	VCTrunk/31	Rajanpur	14-SLD4/1	Optical	-
153	Ring -2	GE	48	MultanC	14-EGS4/4	Optical	VCTrunk/35	Rajanpur	4EGT2/1	Optical	VCTrunk/1
154	Ring -2	FE/GE	4	MultanC	5-EGS4/1	Optical	VCTrunk/26	Rajanpur	3-EFT8/9	Optical	VCTrunk/9
155	Ring -2	GE	432	MultanC	14-EGS4/4	Optical	VCTrunk/16	RYKhan	7-EGS4/1	Optical	VCTrunk/3

S#	Ring	Service Type	Configured Bandwidth (Mbps)	ORIGINATION				DESTINATION			
		FE/GE		SourceNE	Port	Interface	VCTrunk	SinkNE	Port	Interface	VCTrunk
156	Ring -2	GE	144	MultanC	6-EGS4/4	Optical	VCTrunk/1	Sukkur	14-EGS4/1	Optical	VCTrunk/1
157	Ring -2	FE	32	MultanC	3-EFT8/9	Optical	VCTrunk/9	NewMultan	3-EFT8/9	Optical	VCTrunk/9
158	Ring -2	FE	48	MultanC	3-EFT8/4	Electrical	VCTrunk/4	NewMultan	3-EFT8/1	Electrical	VCTrunk/1
159	Ring -2	GE	310	MultanC	5-EGS4/1	Optical	VCTrunk/5	NewMultan	6-EGT2/2	Optical	VCTrunk/2
160	Ring -2	FE	2	MultanC	3-EFF8/10	Optical	VCTrunk/10	NewMultan	3-EFT8/2	Electrical	VCTrunk/2
161	Ring -3	FE	96	Hyderabad	14-EFT8A/4	Electrical	VCTrunk/4	Thatta	3-EFT8/2	Electrical	VCTrunk/2
162	Ring -3	FE	30	Karachi	3-ETF8/4	Electrical	VCTrunk/4	Dadu	3-EFT8/1	Electrical	VCTrunk/1
163	Ring -3	FE	20	Karachi	3-EFF8/11	Optical	VCTrunk/11	Dadu	3-EFT8/8	Electrical	VCTrunk/8
164	Ring -3	FE	10	Larkana	3-EFF8/11	Optical	VCTrunk/11	Dadu	3-EFT8/6	Electrical	VCTrunk/6
165	Ring -3	FE	20	Karachi	18-ETF8/13	Electrical	VCTrunk/13	Larkana	3-EFT8/7	Electrical	VCTrunk/7
166	Ring -3	GE	775	Karachi	5-EGS4/3	Optical	VCTrunk/3	Hyderabad	6-EGS4/1	Optical	VCTrunk/1
167	Ring -3	FE	2	Hyderabad	14-EFT8A/6	Electrical	VCTrunk/6	Shikarpur	3-EFT8/7	Electrical	VCTrunk/7
168	Ring -3	FE	20	Karachi	18-ETF8/10	Electrical	VCTrunk/10	Hyderabad	14-EFT8A/1	Electrical	VCTrunk/1

S#	Ring	Service Type	Configured Bandwidth (Mbps)	ORIGINATION				DESTINATION			
		FE/GE		SourceNE	Port	Interface	VCTrunk	SinkNE	Port	Interface	VCTrunk
169	Ring -3	FE	18	Shikarpur	3-ETF8/1	Electrical	VCTrunk/1	Sukkur	3-EFT8/4	Electrical	VCTrunk/4
170	Ring -3	FE	4	Sukkur	3-EFT8/8	Electrical	VCTrunk/8	Larkana	3-EFT8/5	Electrical	VCTrunk/5
171	Ring -3	FE	8	Hyderabad	14-EFT8A/5	Electrical	VCTrunk/5	Shikarpur	3-EFT8/6	Electrical	VCTrunk/6
172	Ring -3	FE	4	Hyderabad	14-EFT8A/7	Electrical	VCTrunk/7	Larkana	3-EFT8/2	Electrical	VCTrunk/2
173	Ring -3	FE	26	Karachi	18-ETF8/11	Electrical	VCTrunk/11	Hyderabad	14-EFT8A/3	Electrical	VCTrunk/3
174	Ring -3	FE	20	Karachi	18-ETF8/14	Electrical	VCTrunk/14	Hyderabad City	12-EFT8/8	Electrical	VCTrunk/8
175	Ring -3	FE	20	Karachi	3-ETF8/3	Electrical	VCTrunk/3	Hyderabad City	12-EFT8/6	Electrical	VCTrunk/6
176	Ring -3	FE/GE	72	Karachi	14-EGS4/1	Optical	VCTrunk/2	QaziAhmed	3-EFT8/1	Electrical	VCTrunk/1
177	Ring -3	FE	20	Karachi	3-EFF8/10	Optical	VCTrunk/10	QaziAhmed	3-EFT8/2	Electrical	VCTrunk/2
178	Ring -3	FE	20	Karachi	3-EFF8/9	Optical	VCTrunk/9	Khairpur	3-EFT8/1	Electrical	VCTrunk/1
179	Ring -3	FE	24	Karachi	18-ETF8/12	Electrical	VCTrunk/12	Sukkur	3-ETF8/9	Electrical	VCTrunk/9
180	Ring -3	GE	155	Hyderabad	6-EGS4/2	Optical	VCTrunk/6	LoniKot	13-EGS4/1	Optical	VCTrunk/1
181	Ring -3	FE	96	Karachi	3-EFT8/7	Electrical	VCTrunk/7	Thatta	3-EFT8/1	Electrical	VCTrunk/1

S#	Ring	Service Type	Configured Bandwidth (Mbps)	ORIGINATION				DESTINATION			
		FE/GE		SourceNE	Port	Interface	VCTrunk	SinkNE	Port	Interface	VCTrunk
18 2	Ring -3	FE	48	Dadu	3-EFT8/7	Electrical	VCTrunk/7	Larkana	3-EFT8/6	Electrical	VCTrunk/ 6
18 3	Ring -3	FE	34	Dadu	3-EFT8/4	Electrical	VCTrunk/4	Larkana	3-EFT8/3	Electrical	VCTrunk/ 3
18 4	Ring -3	FE	20	Dadu	3-EFT8/2	Electrical	VCTrunk/2	Larkana	3-EFT8/1	Electrical	VCTrunk/ 1
18 5	Ring -3	FE	10	Dadu	3-EFT8/3	Electrical	VCTrunk/3	Larkana	3-EFT8/8	Electrical	VCTrunk/ 8
18 6	Ring -3	FE	48	Shikarpur	3-ETF8/8	Electrical	VCTrunk/8	Sukkur	21-EFT8/4	Electrical	VCTrunk/ 12
18 7	Ring -3	GE	155	Hyderabad	6-EGS4/2	Optical	VCTrunk/3	Sukkur	14-EGS4/2	Optical	VCTrunk/ 6
18 8	Ring -3	GE	310	Karachi	14-EGS4/2	Optical	VCTrunk/9	Larkana	7-EGS4/1	Optical	VCTrunk/ 1
18 9	Ring -3	FE	96	Karachi	3-EFT8/1	Electrical	VCTrunk/1	Shikarpur	3-EFT8/2	Electrical	VCTrunk/ 2
19 0	Ring -3	GE	144	Karachi	5-EGS4/4	Optical	VCTrunk/6	Hyderabad	6-EGS4/4	Optical	VCTrunk/ 4
19 1	Ring -3	FE	96	Karachi	3-EFT8/2	Electrical	VCTrunk/2	Hyderabad Central	12-EFS4/3	Electrical	VCTrunk/ 5
19 2	Ring -3	GE	96	Karachi	5-EGS4/3	Optical	VCTrunk/4	Hyderabad	6-EGS4/1	Optical	VCTrunk/ 2
19 3	Ring -3	FE	96	Karachi	3-ETF8/5	Electrical	VCTrunk/5	Hyderabad City	12-EFT8/2	Electrical	VCTrunk/ 2
19 4	Ring -3	FE/GE	96	Sukkur	3-EFT8/7	Electrical	VCTrunk/7	Khairpur	6-EGS4/2	Optical	VCTrunk/ 1

S#	Ring	Service Type	Configured Bandwidth (Mbps)	ORIGINATION				DESTINATION			
		FE/GE		SourceNE	Port	Interface	VCTrunk	SinkNE	Port	Interface	VCTrunk
195	Ring -3	GE	288	Karachi	14-EGS4/2	Optical	VCTrunk/8	Sukkur	14-EGS4/3	Optical	VCTrunk/3
196	Ring -3	GE	48	Karachi	14-EGS4/2	Optical	VCTrunk/1	Sukkur	14-EGS4/3	Optical	VCTrunk/5
197	Ring -3	GE	155	Karachi	14-EGS4/3	Optical	VCTrunk/3	Sukkur	14-EGS4/1	Optical	VCTrunk/4
198	Outer 1-2	GE/Line	96	MultanC	14-EGS4/4	Optical	VCTrunk/22	Arifwala	8-SLD4/1	Optical	-
199	Outer 1-2	FE/GE	40	MultanC	6-EGS4/3	Optical	VCTrunk/15	Sahiwal	3-EFT8/7	Electrical	VCTrunk/7
200	Outer 1-2	FE/GE	48	MultanC	6-EGS4/4	Optical	VCTrunk/8	Sahiwal	3-EFT8/6	Electrical	VCTrunk/6
201	Outer 1-2	FE/GE	6	MultanC	6-EGS4/2	Optical	VCTrunk/49	Sahiwal	3-EFT8/9	Electrical	VCTrunk/9
202	Outer 1-2	FE	6	MultanC	3-EFT8/11	Optical	VCTrunk/11	Sahiwal	3-EFT8/8	Electrical	VCTrunk/8
203	Outer 1-2	GE/Line	4	MultanC	6-EGS4/3	Optical	VCTrunk/40	Arifwala	8-SLD4/1	Optical	-
204	Outer 1-2	GE/Line	96	MultanC	14-EGS4/4	Optical	VCTrunk/19	Arifwala	8-SLD4/1	Optical	-
205	Outer 1-2	GE	155	MultanC	5-EGS4/1	Optical	VCTrunk/13	Sahiwal	12-EGS4/1	Optical	VCTrunk/9
206	Outer 1-2	GE	16	MultanC	14-EGS4/4	Optical	VCTrunk/4	Sahiwal	12-EGS4/1	Optical	VCTrunk/8
207	Outer 1-2	GE/Line	4	MultanC	6-EGS4/3	Optical	VCTrunk/41	Arifwala	8-SLD4/1	Optical	-

S#	Ring	Service Type	Configured Bandwidth (Mbps)	ORIGINATION				DESTINATION			
		FE/GE		SourceNE	Port	Interface	VCTrunk	SinkNE	Port	Interface	VCTrunk
208	Outer 1-2	FE/GE	60	MultanC	6-EGS4/2	Optical	VCTrunk/33	Bhakkar	3-EFT8/1	Electrical	VCTrunk/1
209	Outer 1-2	FE/GE	2	Islamabad	15-EGS4/2	Optical	VCTrunk/2	Sukkur	3-EFT8/6	Electrical	VCTrunk/6
210	Outer 1-2	GE	2	Islamabad	15-EGS4/2	Optical	VCTrunk/3	MultanC	6-EGS4/1	Optical	VCTrunk/2
211	Outer 1-2	GE	155	Islamabad	14-EGS4/3	Optical	VCTrunk/40	MultanC	14-EGS4/3	Optical	VCTrunk/6
212	Outer 1-2	GE/Line	336	MultanC	14-EGS4/4	Optical	VCTrunk/8	Layyah	5-SLD4/1	Optical	-
213	Outer 1-2	GE/Line	6	MultanC	6-EGS4/3	Optical	VCTrunk/6	Layyah	5-SLD4/1	Optical	-
214	Outer 1-2	GE	30	MultanC	6-EGS4/3	Optical	VCTrunk/10	Layyah	14-EGS4/2	Optical	VCTrunk/3
215	Outer 1-2	GE	6	MultanC	6-EGS4/3	Optical	VCTrunk/9	Layyah	14-EGS4/2	Optical	VCTrunk/2
216	Outer 1-2	FE	2	Lahore	17-EFF8/9	Optical	VCTrunk/9	MultanC	3-EFT8/2	Electrical	VCTrunk/2
217	Outer 1-2	GE	8	MultanC	14-EGS4/4	Optical	VCTrunk/14	Layyah	14-EGS4/2	Optical	VCTrunk/1
218	Outer 1-2	GE	26	MultanC	5-EGS4/1	Optical	VCTrunk/2	Layyah	14-EGS4/2	Optical	VCTrunk/5
219	Outer 1-2	GE	4	MultanC	5-EGS4/1	Optical	VCTrunk/6	Layyah	14-EGS4/2	Optical	VCTrunk/6
220	Outer 1-2	GE	4	MultanC	5-EGS4/1	Optical	VCTrunk/10	Layyah	14-EGS4/2	Optical	VCTrunk/7

S#	Ring	Service Type	Configured Bandwidth (Mbps)	ORIGINATION				DESTINATION			
		FE/GE		SourceNE	Port	Interface	VCTrunk	SinkNE	Port	Interface	VCTrunk
22 1	Outer 1-2	GE	10	MultanC	5-EGS4/1	Optical	VCTrunk/11	Layyah	14-EGS4/2	Optical	VCTrunk/8
22 2	Outer 1-2	GE	12	MultanC	14-EGS4/4	Optical	VCTrunk/11	Layyah	14-EGS4/2	Optical	VCTrunk/4
22 3	Outer 1-2	GE	10	MultanC	5-EGS4/1	Optical	VCTrunk/14	Layyah	14-EGS4/2	Optical	VCTrunk/9
22 4	Outer 1-2	GE	8	MultanC	5-EGS4/1	Optical	VCTrunk/15	Layyah	14-EGS4/2	Optical	VCTrunk/10
22 5	Outer 1-2	GE	8	MultanC	5-EGS4/1	Optical	VCTrunk/17	Layyah	14-EGS4/2	Optical	VCTrunk/11
22 6	Outer 1-2	GE	8	MultanC	5-EGS4/1	Optical	VCTrunk/18	Layyah	4-EGS4/1	Optical	VCTrunk/1
22 7	Outer 1-2	GE	8	MultanC	5-EGS4/1	Optical	VCTrunk/22	Layyah	14-EGS4/2	Optical	VCTrunk/12
22 8	Outer 1-2	GE	4	MultanC	5-EGS4/1	Optical	VCTrunk/23	Layyah	14-EGS4/1	Optical	VCTrunk/13
22 9	Outer 1-2	GE	96	MultanC	6-EGS4/3	Optical	VCTrunk/7	Arifwala	7-EGT2/1	Optical	VCTrunk/1
23 0	Outer 1-2	FE/GE	96	MultanC	6-EGS4/3	Optical	VCTrunk/21	Arifwala	5-EFT8/1	Electrical	VCTrunk/1
23 1	Outer 1-2	GE	48	MultanC	6-EGS4/2	Optical	VCTrunk/22	Sahiwal	12-EGS4/1	Optical	VCTrunk/7
23 2	Outer 1-2	GE	4	MultanC	14-EGS4/4	Optical	VCTrunk/28	Sahiwal	12-EGS4/1	Optical	VCTrunk/10
23 3	Outer 1-2	GE	48	MultanC	6-EGS4/2	Optical	VCTrunk/23	Sahiwal	12-EGS4/1	Optical	VCTrunk/3

S#	Ring	Service Type	Configured Bandwidth (Mbps)	ORIGINATION				DESTINATION			
		FE/GE		SourceNE	Port	Interface	VCTrunk	SinkNE	Port	Interface	VCTrunk
234	Outer 1-2	GE	48	MultanC	6-EGS4/2	Optical	VCTrunk/24	Sahiwal	12-EGS4/1	Optical	VCTrunk/5
235	Outer 1-2	GE	4	MultanC	14-EGS4/4	Optical	VCTrunk/32	Sahiwal	12-EGS4/1	Optical	VCTrunk/1
236	Outer 1-2	GE	4	MultanC	14-EGS4/4	Optical	VCTrunk/3	Sahiwal	12-EGS4/1	Optical	VCTrunk/2
237	Outer 1-2	GE	30	MultanC	5-EGS4/1	Optical	VCTrunk/4	Sahiwal	12-EGS4/1	Optical	VCTrunk/4
238	Outer 1-2	GE	2	MultanC	14-EGS4/4	Optical	VCTrunk/34	Sahiwal	12-EGS4/1	Optical	VCTrunk/6
239	Outer 1-2	GE	28	MultanC	14-EGS4/4	Optical	VCTrunk/1	Sahiwal	12-EGS4/1	Optical	VCTrunk/11
240	Outer 1-2	GE/Line	96	MultanC	14-EGS4/4	Optical	VCTrunk/2	Arifwala	8-SLD4/1	Optical	-
241	Outer 1-2	GE/Line	48	MultanC	6-EGS4/3	Optical	VCTrunk/47	Arifwala	8-SLD4/1	Optical	-
242	Outer 1-2	GE	48	MultanC	6-EGS4/2	Optical	VCTrunk/37	Arifwala	7-EGT2/2	Optical	VCTrunk/3
243	Outer 1-2	GE/Line	48	MultanC	14-EGS4/4	Optical	VCTrunk/15	Arifwala	8-SLD4/1	Optical	-
244	Outer 1-2	GE/Line	28	MultanC	6-EGS4/3	Optical	VCTrunk/19	Arifwala	8-SLD4/1	Optical	-
245	Outer 1-2	FE/GE	4	MultanC	5-EGS4/1	Optical	VCTrunk/9	Arifwala	5-EFT8/2	Electrical	VCTrunk/2
246	Outer 1-2	FE/GE	12	MultanC	5-EGS4/1	Optical	VCTrunk/19	Arifwala	5-EFT8/3	Electrical	VCTrunk/3

S#	Ring	Service Type	Configured Bandwidth (Mbps)	ORIGINATION				DESTINATION			
		FE/GE		SourceNE	Port	Interface	VCTrunk	SinkNE	Port	Interface	VCTrunk
247	Outer 1-2	FE/GE	12	MultanC	5-EGS4/1	Optical	VCTrunk/20	Arifwala	5-EFT8/4	Electrical	VCTrunk/4
248	Outer 1-2	GE/Line	4	MultanC	6-EGS4/3	Optical	VCTrunk/61	Arifwala	8-SLD4/1	Optical	-
249	Outer 1-2	FE/GE	12	MultanC	5-EGS4/1	Optical	VCTrunk/24	Arifwala	5-EFT8/5	Electrical	VCTrunk/5
250	Outer 1-2	FE/GE	96	MultanC	6-EGS4/2	Optical	VCTrunk/31	Khanewal	3-EFT8/1	Electrical	VCTrunk/1
251	Outer 1-2	FE/GE	12	MultanC	14-EGS4/4	Optical	VCTrunk/27	Khanewal	3-EFT8/5	Electrical	VCTrunk/5
252	Outer 1-2	FE/GE	6	MultanC	5-EGS4/1	Optical	VCTrunk/8	Khanewal	3-EFT8/6	Electrical	VCTrunk/6
253	Outer 1-2	FE/GE	48	MultanC	5-EGS4/1	Optical	VCTrunk/16	Khanewal	3-EFT8/2	Electrical	VCTrunk/2
254	Outer 1-2	GE	96	Lahore	14-EGS4/1	Optical	VCTrunk/2	MultanC	14-EGS4/1	Optical	VCTrunk/5
255	Outer 1-2	GE	144	Lahore	14-EGS4/4	Optical	VCTrunk/10	MultanC	14-EGS4/2	Optical	VCTrunk/30
256	Outer 1-2	FE/GE	48	MultanC	6-EGS4/2	Optical	VCTrunk/35	Okara	3-EFT8/1	Electrical	VCTrunk/1
257	Outer 1-2	GE	96	MultanC	6-EGS4/4	Optical	VCTrunk/39	Peshawar	6-EGS4/3	Optical	VCTrunk/4
258	Outer 1-2-3	GE	96	Lahore	14-EGS4/3	Optical	VCTrunk/12	Karachi	5-EGS4/4	Optical	VCTrunk/7
259	Outer 1-2-3	FE	2	Islamabad	17-EFT8/1	Electrical	VCTrunk/1	Karachi	3-EFT8/6	Electrical	VCTrunk/6

S#	Ring	Service Type	Configured Bandwidth (Mbps)	ORIGINATION				DESTINATION			
		FE/GE		SourceNE	Port	Interface	VCTrunk	SinkNE	Port	Interface	VCTrunk
260	Outer 1-2-3	GE	48	Islamabad	15-EGS4/2	Optical	VCTrunk/7	Karachi	14-EGS4/1	Optical	VCTrunk/6
261	Outer 1-2-3	GE	144	Islamabad	13-EGS4/2	Optical	VCTrunk/3	Karachi	14-EGS4/3	Optical	VCTrunk/7
262	Spur	FE	8	Gujranwala	4-EFT8/5	Electrical	VCTrunk/5	Sialkot	7-EFT8/2	Electrical	VCTrunk/2
263	Spur	GE	310	Gujranwala	13-EGS4/3	Optical	VCTrunk/4	Sialkot	8-EGS4/2	Optical	VCTrunk/2
264	Spur	GE	240	IqbalTown	8-EGT2/1	Optical	VCTrunk/1	Sargodha	6-EGS4/2	Optical	VCTrunk/2
265	Spur	FE/GE	48	Gujranwala	4-EFT8/8	Electrical	VCTrunk/8	Daska	11-EGT2/2	Electrical	VCTrunk/2
266	Spur	FE/GE	48	Daska	11-EGT2/1	Electrical	VCTrunk/1	Sialkot	7-EFT8/1	Electrical	VCTrunk/1
267	Spur	GE	930	Haripur	11-EGT2/2	Optical	VCTrunk/2	Havelian	13-EGT2/1	Optical	VCTrunk/1
268	Spur	GE	930	Havelian	13-EGT2/2	Optical	VCTrunk/2	Abbottabad	11-EGT2/1	Optical	VCTrunk/1
269	Spur	GE	720	Johrabad	8-EGS4/3	Optical	VCTrunk/4	KCP	13-EGT2/1	Optical	VCTrunk/1
270	Spur	GE	48	Sargodha	6-EGS4/3	Optical	VCTrunk/6	Johrabad	8-EGS4/4	Optical	VCTrunk/5
271	Spur	FE	8	Hyderabad	2-EFT8/5	Electrical	VCTrunk/5	Hyderabad City	12-EFT8/4	Electrical	VCTrunk/4
272	Spur	FE	96	Hyderabad	2-EFT8/1	Electrical	VCTrunk/1	Hyderabad City	12-EFT8/1	Electrical	VCTrunk/1

S#	Ring	Service Type	Configured Bandwidth (Mbps)	ORIGINATION				DESTINATION			
		FE/GE		SourceNE	Port	Interface	VCTrunk	SinkNE	Port	Interface	VCTrunk
273	Spur	FE	40	Hyderabad	26-EFT8/7	Electrical	VCTrunk/7	Hyderabad Central	12-EFS4/2	Electrical	VCTrunk/2
274	Spur	FE	10	Hyderabad	2-EFT8/6	Electrical	VCTrunk/6	Hyderabad City	12-EFT8/5	Electrical	VCTrunk/5
275	Spur	FE	8	Hyderabad	2-EFT8/4	Electrical	VCTrunk/4	Hyderabad City	12-EFT8/3	Electrical	VCTrunk/3
276	Spur	FE	10	Hyderabad	14-EFT8/2	Electrical	VCTrunk/2	Hyderabad City	12-EFT8/7	Electrical	VCTrunk/7
277	Local	FE/Line	2	Gujranwala	4-EFT8/10	Optical	VCTrunk/10	Gujranwala	12-SLD16/1	Optical	-
278	Local	FE/Line	48	Gujranwala	4-EFT8/4	Electrical	VCTrunk/4	Gujranwala	12-SLD16/1	Optical	-
279	Local	FE/Line	48	Lahore	16-EFS4/1	Electrical	VCTrunk/1	Lahore	28-SLD4/2	Optical	-
280	Local	FE/Line	96	Lahore	16-EFS4/2	Electrical	VCTrunk/2	Lahore	31-SLQ4/1	Optical	-
281	Local	FE/Line	48	Peshawar	18-EFT8/5	Electrical	VCTrunk/5	Peshawar	12-SL4/1	Optical	-
282	Local	GE/Line	6	Taxila	12-EGS4/1	Optical	VCTrunk/5	Taxila	5-SLQ4/3	Optical	-
283	Local	FE/Line	2	Taxila	3-EFT-8/3	Electrical	VCTrunk/3	Taxila	5-SLQ4/3	Optical	-
284	Local	FE/Line	72	Sargodha	5-EFT8/4	Electrical	VCTrunk/4	Sargodha	7-SL4/1	Optical	-
285	Local	GE/Line	48	Lahore	14-EGS4/1	Optical	VCTrunk/1	Lahore	31-SLQ4/1	Optical	-



Procurement of Long Haul Core Transmission Network Equipment for
NTC on Turnkey DDP Site Basis



S#	Ring	Service Type	Configured Bandwidth (Mbps)	ORIGINATION				DESTINATION			
		FE/GE		SourceNE	Port	Interface	VCTrunk	SinkNE	Port	Interface	VCTrunk
286	Local	FE/Line	6	Sargodha	5-EFT8/5	Electrical	VCTrunk/5	Sargodha	7-SL4/1	Optical	-



ANNEX-D1-3: SERVICES - POWER EQUIPMENT DESIGN

S#	NE NAME	Planned Node type	Planned Equipment	Power Management systems	Rectifier Modules	Battery Bank	BackUp Time	Full load Capacity in Amp (To be Quoted by Bidder)	Battery bank Full Charging Current in Amp (To be Quoted by Bidder)
1	Islamabad	ADD/DROP	WDM / OTN	PMS & BMS	N+1	1	4		
2	Abbottabad	ADD/DROP	WDM / OTN	PMS & BMS	N+1	1	8		
3	Rawalpindi	ADD/DROP	WDM / OTN	PMS & BMS	N+1	1	6		
4	Attock	ADD/DROP	WDM / OTN	PMS & BMS	N+1	1	8		
5	Haripur	ADD/DROP	WDM / OTN	PMS & BMS	N+1	1	8		
6	Havelian	ADD/DROP	WDM / OTN	PMS & BMS	N+1	1	8		
7	KamraExch	ADD/DROP	WDM / OTN	PMS & BMS	N+1	1	8		
8	Kamra	ADD/DROP	WDM / OTN	PMS & BMS	N+1	1	8		
9	Taxila	ADD/DROP	WDM / OTN	PMS & BMS	N+1	1	6		
10	Mandra	OLA	WDM / OTN	PMS & BMS	N+1	1+1	24		
11	Peshawar	ADD/DROP	WDM / OTN	PMS & BMS	N+1	1	6		
12	Nowshera	ADD/DROP	WDM / OTN	PMS & BMS	N+1	1	6		
13	Mardan	ADD/DROP	WDM / OTN	PMS & BMS	N+1	1	8		
14	Kohat	ADD/DROP	WDM / OTN	PMS & BMS	N+1	1	8		
15	Bannu	ADD/DROP	WDM / OTN	PMS & BMS	N+1	1	8		
16	DIKhan	ADD/DROP	WDM / OTN	PMS & BMS	N+1	1	8		
17	BDS Shah	OLA	WDM / OTN	PMS & BMS	N+1	1+1	24		
18	Pizzu	OLA	WDM / OTN	PMS & BMS	N+1	1+1	24		
19	Lahore	ADD/DROP	WDM / OTN	PMS & BMS	N+1	1	6		
20	Gujranwala	ADD/DROP	WDM / OTN	PMS & BMS	N+1	1	8		

S#	NE NAME	Planned Node type	Planned Equipment	Power Management systems	Rectifier Modules	Battery Bank	BackUp Time	Full load Capacity in Amp (To be Quoted by Bidder)	Battery bank Full Charging Current in Amp (To be Quoted by Bidder)
21	Gujrat	ADD/DROP	WDM / OTN	PMS & BMS	N+1	1	8		
22	Kharian	ADD/DROP	WDM / OTN	PMS & BMS	N+1	1	6		
23	Daska	ADD/DROP	WDM / OTN	PMS & BMS	N+1	1	8		
24	Sialkot	ADD/DROP	WDM / OTN	PMS & BMS	N+1	1	8		
25	Bhalwal	ADD/DROP	WDM / OTN	PMS & BMS	N+1	1	8		
26	Chiniot	ADD/DROP	WDM / OTN	PMS & BMS	N+1	1	8		
27	Sargodha	ADD/DROP	WDM / OTN	PMS & BMS	N+1	1	6		
28	IqbalTown	ADD/DROP	WDM / OTN	PMS & BMS	N+1	1	8		
29	Johrabad	ADD/DROP	WDM / OTN	PMS & BMS	N+1	1	8		
30	KCP	ADD/DROP	WDM / OTN	PMS & BMS	N+1	1	8		
31	Gojra	OLA	WDM / OTN	PMS & BMS	N+1	1+1	24		
32	Jehlum	ADD/DROP	WDM / OTN	PMS & BMS	N+1	1	8		
33	Shaikhupura	ADD/DROP	WDM / OTN	PMS & BMS	N+1	1	8		
34	Faisalabad	ADD/DROP	WDM / OTN	PMS & BMS	N+1	1	6		
35	MultanCentral	ADD/DROP	WDM / OTN	PMS & BMS	N+1	1	4		
36	NewMultan	ADD/DROP	WDM / OTN	PMS & BMS	N+1	1	6		
37	MGarh	ADD/DROP	WDM / OTN	PMS & BMS	N+1	1	8		
38	Okara	ADD/DROP	WDM / OTN	PMS & BMS	N+1	1	6		
39	Sahiwal	ADD/DROP	WDM / OTN	PMS & BMS	N+1	1	8		
40	Khanewal	ADD/DROP	WDM / OTN	PMS & BMS	N+1	1	8		
41	Arifwala	ADD/DROP	WDM / OTN	PMS & BMS	N+1	1	8		
42	Lodhran	ADD/DROP	WDM / OTN	PMS & BMS	N+1	1	8		
43	Bahawalpur	ADD/DROP	WDM / OTN	PMS & BMS	N+1	1	8		
44	RYK	ADD/DROP	WDM / OTN	PMS & BMS	N+1	1	8		

S#	NE NAME	Planned Node type	Planned Equipment	Power Management systems	Rectifier Modules	Battery Bank	BackUp Time	Full load Capacity in Amp (To be Quoted by Bidder)	Battery bank Full Charging Current in Amp (To be Quoted by Bidder)
45	Bhakkar	ADD/DROP	WDM / OTN	PMS & BMS	N+1	1	6		
46	Layyah	ADD/DROP	WDM / OTN	PMS & BMS	N+1	1	8		
47	QCK	ADD/DROP	WDM / OTN	PMS & BMS	N+1	1	6		
48	DGKhan	ADD/DROP	WDM / OTN	PMS & BMS	N+1	1	8		
49	Rojhan	OLA	WDM / OTN	PMS & BMS	N+1	1+1	24		
50	Rajanpur	ADD/DROP	WDM / OTN	PMS & BMS	N+1	1	8		
51	KotAddu	OLA	WDM / OTN	PMS & BMS	N+1	1+1	24		
52	MianChannu	OLA	WDM / OTN	PMS & BMS	N+1	1+1	24		
53	Fazilpur	OLA	WDM / OTN	PMS & BMS	N+1	1+1	24		
54	InayatPur	OLA	WDM / OTN	PMS & BMS	N+1	1+1	24		
55	SardarGarh	OLA	WDM / OTN	PMS & BMS	N+1	1+1	24		
56	Karachi	ADD/DROP	WDM / OTN	PMS & BMS	N+1	1	4		
57	Hyderabad	ADD/DROP	WDM / OTN	PMS & BMS	N+1	1	6		
58	Hyderabad City	ADD/DROP	WDM / OTN	PMS & BMS	N+1	1	8		
59	Hyderabad Central	ADD/DROP	WDM / OTN	PMS & BMS	N+1	1	8		
60	LoniKot	ADD/DROP	WDM / OTN	PMS & BMS	N+1	1+1	12		
61	Sukkur	ADD/DROP	WDM / OTN	PMS & BMS	N+1	1	6		
62	PannuAqil	ADD/DROP	WDM / OTN	PMS & BMS	N+1	1	8		
63	Khairpur	ADD/DROP	WDM / OTN	PMS & BMS	N+1	1	8		
64	QaziAhmed	ADD/DROP	WDM / OTN	PMS & BMS	N+1	1+1	12		
65	Shikarpur	ADD/DROP	WDM / OTN	PMS & BMS	N+1	1	6		
66	Larkana	ADD/DROP	WDM / OTN	PMS & BMS	N+1	1	8		
67	Dadu	ADD/DROP	WDM / OTN	PMS & BMS	N+1	1	8		
68	Thatta	ADD/DROP	WDM / OTN	PMS & BMS	N+1	1	8		

S#	NE NAME	Planned Node type	Planned Equipment	Power Management systems	Rectifier Modules	Battery Bank	BackUp Time	Full load Capacity in Amp (To be Quoted by Bidder)	Battery bank Full Charging Current in Amp (To be Quoted by Bidder)
69	Kotri	ADD/DROP	WDM / OTN	PMS & BMS	N+1	1	6		
70	Nooriabad	OLA	WDM / OTN	NA	NA	NA	NA		
71	Saeedabad	OLA	WDM / OTN	PMS & BMS	N+1	1+1	24		
72	Amirabad	OLA	WDM / OTN	PMS & BMS	N+1	1+1	24		
73	KNSHah	OLA	WDM / OTN	PMS & BMS	N+1	1+1	24		
74	Kalari	OLA	WDM / OTN	PMS & BMS	N+1	1+1	24		
75	GHadeed	OLA	WDM / OTN	PMS & BMS	N+1	1+1	24		
76	Kandhkot	OLA	WDM / OTN	PMS & BMS	N+1	1+1	24		
77	Dherki	OLA	WDM / OTN	PMS & BMS	N+1	1+1	24		
78	Muridkay	ADD/DROP	WDM / OTN	PMS & BMS	N+1	1	8		
79	Quaidabad	OLA proposed *	WDM / OTN	PMS & BMS	N+1	1+1	24		
80	Harnoli	OLA proposed *	WDM / OTN	PMS & BMS	N+1	1+1	24		
81	Dullahwala	OLA proposed *	WDM / OTN	PMS & BMS	N+1	1+1	24		
82	Bhai Peru	OLA proposed *	WDM / OTN	PMS & BMS	N+1	1+1	24		
83	Mianwali	ADD/DROP Proposed *	WDM / OTN	PMS & BMS	N+1	1	8		
84	Charsadda	ADD/DROP Proposed *	WDM / OTN	PMS & BMS	N+1	1	8		
85	Narowal	ADD/DROP Proposed *	WDM / OTN	PMS & BMS	N+1	1	8		
86	Murree	ADD/DROP Proposed *	WDM / OTN	PMS & BMS	N+1	1	8		
87	New OLA sites **	New OLA sites **	WDM / OTN	PMS & BMS	N+1	1+1	24		

ANNEX-D2-1: EXISTING TRAFFIC MATRIX - STM16 SPURS

STM Level	Source NE	Interface Type	Sink NE	Interface Type	Protection scheme	V C1 2	V C 3	V C 4
STM-16	Taxila	1550nm L-16.1, LC 80km	Haripur	1550nm L-16.1, LC 80km	Nil	6	0	15
STM-16	Havelian	1310nm S-16.1, LC 40km	Abbotabad	1550nm L-16.2, LC 80km	Nil	6	0	6
STM-16	Haripur	1550nm L-16.1, LC 80km	Havelian	1310nm S-4.1, LC 40km	Nil	6	0	6
STM-16	Kamra	1550nm L-16.2, LC 80km	Attok	1550nm L-16.2, LC 80km	Nil	10	11	2
STM-16	Mardan	1310nm S-16.1, LC 40km	Nowshehra	1310nm S-16.1, LC 40km	Nil	35	0	5
STM-16	KCP	1550nm L-16.2, LC 80km	Joharabad	1550nm L-16.2, LC 80km	Nil	6	15	0
STM-16	Arifwala	1550nm L-16.2, LC 80km	Sahiwal	1550nm L-16.2, LC 80km	Nil	42	13	0
STM-16	Gujranwala	1310nm L-16.1, LC 40km	Daska	1550nm L-16.2, LC 80km	Nil	9	1	2
STM-16	Sialkot	1550nm L-16.2, LC 80km	Daska	1550nm L-16.2, LC 80km	Nil	8	1	2
STM-16	Sargodha	1550nm U-16.2, LC 120km	Joharabad	1490nm U-16.2, LC 120km	Nil	8	1	0

Note: Subject to change & will be finalized at the time of migration.

ANNEX-D2-2: EXISTING TRAFFIC MATRIX - STM4 SPURS

STM Level	Source NE	Interface Type	Sink NE	Interface Type	Protection scheme	V C1 2	V C 3	V C 4
STM-4	Hyderabad	1310nm L-4.1, LC 40km	HyderabadCentral	1310 L-4.1, LC 15km	Nil	64	6	0
STM-4	Kamra	1310nm S-4.1, LC 15km	Kamra Exch	1310nm S-4.1, LC 40km	Nil	43	7	0
STM-4	IqbalTown	1550nm L-4.2, LC 80km	Sargodha	1550nm L-4.2, LC 80km	Nil	19	5	0
STM-4	HyderabadCentral	1310nm S-4.1, LC 15km	HyderabadCity	1310nm S-4.1, LC 40km	Nil	38	4	0

Note: Subject to change & will be finalized at the time of migration.

ANNEX-D2-3: EXISTING TRAFFIC MATRIX - EXTENDED SUBRACKS

STM Level	Source NE	Interface Type	Sink NE	Interface Type	Protection scheme	V C1 2	V C 3	V C 4
STM-16	Islamabad	1310nm S-16.1, LC 15km	IslamabadExt	1310nm S-16.1, LC 15km	Nil	94	0	0
STM-16	Hyderabad	1310nm S-16.1, LC 15km	HyderabadExt	1310nm S-16.1, LC 15km	1+1 LMSP	8	0	0

Note: Subject to change & will be finalized at the time of migration.

ANNEX-D2-4: EXISTING TRAFFIC MATRIX - RING 1 LAMBDA 1 (192.1 THz)

STM Level	Source NE	Interface Type	Sink NE	Interface Type	Protection scheme	VC 12	VC 3	VC 4
STM-64	Bhalwal	1550nm V-64.2b, LC 40km	Gojra	1550nm V-64.2b, LC 40km	SNCP	450	87	21
STM-64	Bhalwal	1550nm Le-64.2, LC 80km	Sargodha	1550nm Le-64.2, LC 80km	SNCP	450	87	21
STM-64	Sargodha	1550nm V-64.2b, LC 40km	Chinot	1550nm V-64.2b, LC 40km	SNCP	450	87	21
STM-64	Gojra	1550nm V-64.2b, LC 40km	Kharian	1550 I-64.1, LC 40km	SNCP	450	87	21
STM-64	Faisalabad	1550nm V-64.2b, LC 40km	Chinot	1550nm V-64.2b, LC 40km	SNCP	450	87	21
STM-64	Sheikhupura	1310nm I-64.1, LC 10km	Faisalabad	1310nm I-64.1, LC 10km	SNCP	446	86	21
STM-64	Gujrat	1310nm I-64.1, LC 10km	Kharian	1310nm I-64.1, LC 10km	SNCP	446	86	21
STM-64	Gujrat	1310nm I-64.1, LC 10km	Gujranwala	1310nm I-64.1, LC 10km	SNCP	446	86	21
STM-64	Lahore	1310nm I-64.1, LC 10km	Gujranwala	1310nm I-64.1, LC 10km	SNCP	446	86	21
STM-64	Lahore	1310nm I-64.1, LC 10km	Sheikhupura	1310nm I-64.1, LC 10km	SNCP	446	86	21
STM-64	Layyah	1310nm I-64.1, LC 10km	QCK	1310nm I-64.1, LC 10km	SNCP	434	82	19
STM-64	Bhakkhar	1310nm I-64.1, LC 10km	Layyah	1310nm I-64.1, LC 10km	SNCP	434	82	19
STM-64	Nowshera	1310nm I-64.1, LC 10km	Peshawar	1310nm I-64.1, LC 10km	SNCP	434	82	19
STM-64	Kamra	1310nm I-64.1, LC 10km	Nowshera	1310nm I-64.1, LC 10km	SNCP	434	82	19
STM-64	Sahiwal	1310nm I-64.1, LC 10km	Khanel	1310nm I-64.1, LC 10km	SNCP	434	82	19
STM-64	Okara	1310nm I-64.1, LC 10km	Sahiwal	1310nm I-64.1, LC 10km	SNCP	434	82	19
STM-64	Taxila	1310nm I-64.1, LC 10km	Kamra	1310nm I-64.1, LC 10km	SNCP	434	82	19
STM-64	Khanel	1310nm I-64.1, LC 10km	NewMultan	1310nm I-64.1, LC 10km	SNCP	434	82	19

STM Level	Source NE	Interface Type	Sink NE	Interface Type	Protection scheme	VC 12	VC 3	VC 4
STM-64	Okara	1310nm I-64.1, LC 10km	Faisalabad	1310nm I-64.1, LC 10km	SNCP	434	82	19
STM-64	Peshawar	1310nm I-64.1, LC 10km	Kohat	1310nm I-64.1, LC 10km	SNCP	434	82	19
STM-64	Bannu	1310nm I-64.1, LC 10km	DIKhan	1310nm I-64.1, LC 10km	SNCP	434	82	19
STM-64	Bannu	1310nm I-64.1, LC 10km	Kohat	1310nm I-64.1, LC 10km	SNCP	434	82	19
STM-64	Bhakkhar	1310nm I-64.1, LC 10km	DIKhan	1310nm I-64.1, LC 10km	SNCP	434	82	19
STM-64	Jehlum	1310nm I-64.1, LC 10km	Kharian	1310nm I-64.1, LC 10km	SNCP	434	82	19
STM-64	Rawalpindi	1310nm I-64.1, LC 10km	Jehlum	1310nm I-64.1, LC 10km	SNCP	434	82	19
STM-64	Islamabad	1310nm I-64.1, LC 10km	Taxila	1310nm I-64.1, LC 10km	SNCP	434	82	19
STM-64	Islamabad	1310nm I-64.1, LC 10km	Rawalpindi	1310nm I-64.1, LC 10km	SNCP	434	82	19
STM-64	QCK	1310nm I-64.1, LC 10km	NewMultan	1310nm I-64.1, LC 10km	SNCP	368	70	19

Note: Subject to change & will be finalized at the time of migration.

ANNEX-D2-5: EXISTING TRAFFIC MATRIX - RING 1 LAMBDA 2 (192.2 THz)

STM Level	Source NE	Interface Type	Sink NE	Interface Type	Protection scheme	VC 12	V C 3	V C 4
STM-64	Islamabad	1310nm I-64.1, LC 10km	Taxila	1310nm I-64.1, LC 10km	MSP	0	1	29
STM-64	NewMultan	1310nm I-64.1, LC 10km	QCK	1310nm I-64.1, LC 10km	MSP	182	22	16
STM-64	Lahore	1310nm I-64.1, LC 10km	Gujranwala	1310nm I-64.1, LC 10km	MSP	0	0	24
STM-64	Nows her a	1310nm I-64.1, LC 10km	Pesha war	1310nm I-64.1, LC 10km	MSP	33	0	23
STM-64	Islamabad	1310nm I-64.1, LC 10km	Rawalpindi	1310nm I-64.1, LC 10km	MSP	5	2	22
STM-64	Gujranwala	1310nm I-64.1, LC 10km	Kharia n	1310nm I-64.1, LC 10km	MSP	0	0	21
STM-64	Rawalpindi	1310nm I-64.1, LC 10km	Kharia n	1310nm I-64.1, LC 10km	MSP	0	0	21
STM-64	Sahiwal	1310nm I-64.1, LC 10km	NewMultan	1310nm I-64.1, LC 10km	MSP	106	22	9
STM-64	Taxila	1310nm I-64.1, LC 10km	Nows her a	1310nm I-64.1, LC 10km	MSP	0	0	14
STM-64	Lahore	1310nm I-64.1, LC 10km	Faisala bad	1310nm I-64.1, LC 10km	MSP	0	5	11
STM-64	Layya h	1310nm I-64.1, LC 10km	QCK	1310nm I-64.1, LC 10km	MSP	76	9	7
STM-64	Faisala bad	1310nm I-64.1, LC 10km	Sahiwal	1310nm I-64.1, LC 10km	MSP	0	6	8
STM-64	Pesha war	1310nm I-64.1, LC 10km	Layya h	1310nm I-64.1, LC 10km	MSP	0	2	7

Note: Subject to change & will be finalized at the time of migration.

ANNEX-D2-6: EXISTING TRAFFIC MATRIX - RING 2 LAMBDA 1 (192.3 THz)

STM Level	Source NE	Interface Type	Sink NE	Interface Type	Protection scheme	VC 12	VC 3	VC 4
STM-64	NewMultan	1310nm I-64.1, LC 10km	Multan Central	1310nm I-64.1, LC 10km	MSP	175	23	4
STM-64	Multan Central	1310nm I-64.1, LC 10km	Lodhran	1310nm I-64.1, LC 10km	MSP	42	29	4
STM-64	MGarh	1310nm I-64.1, LC 10km	NewMultan	1310nm I-64.1, LC 10km	MSP	139	23	2
STM-64	Lodhran	1310nm I-64.1, LC 10km	Bahawalpur	1310nm I-64.1, LC 10km	MSP	39	21	4
STM-64	QCK	1310nm I-64.1, LC 10km	MGarh	1310nm I-64.1, LC 10km	MSP	129	21	2
STM-64	RYKhan	1310nm I-64.1, LC 10km	Bahawalpur	1310nm I-64.1, LC 10km	MSP	15	16	1
STM-64	DGKhan	1310nm I-64.1, LC 10km	QCK	1310nm I-64.1, LC 10km	MSP	65	10	2
STM-64	Rajanpur	1310nm I-64.1, LC 10km	DGKhan	1310nm I-64.1, LC 10km	MSP	8	6	2
STM-64	PannuAqil	1310nm I-64.1, LC 10km	Sukkur	1310nm I-64.1, LC 10km	MSP	22	7	0
STM-64	Shikarpur	1310nm I-64.1, LC 10km	Sukkur	1310nm I-64.1, LC 10km	MSP	32	6	0
STM-64	PannuAqil	1310nm I-64.1, LC 10km	RYKhan	1310nm I-64.1, LC 10km	MSP	7	7	0
STM-64	Rajanpur	1310nm I-64.1, LC 10km	Shikarpur	1310nm I-64.1, LC 10km	MSP	3	2	0

Note: Subject to change & will be finalized at the time of migration.

ANNEX-D2-7: EXISTING TRAFFIC MATRIX - RING 2 LAMBDA 2 (192.4 THz)

STM Level	Source NE	Interface Type	Sink NE	Interface Type	Protection scheme	VC 12	VC 3	VC 4
STM-64	QCK	1310nm I-64.1, LC 10km	MGarh	1310nm I-64.1, LC 10km	MSP	182	20	16
STM-64	NewMultan	1310nm I-64.1, LC 10km	MGarh	1310nm I-64.1, LC 10km	MSP	182	20	16
STM-64	NewMultan	1310nm I-64.1, LC 10km	Multan Central	1310nm I-64.1, LC 10km	MSP	182	28	9
STM-64	Shikarpur	1310nm I-64.1, LC 10km	Sukkur	1310nm I-64.1, LC 10km	MSP	0	1	14
STM-64	Shikarpur	1310nm I-64.1, LC 10km	QCK	1310nm I-64.1, LC 10km	MSP	0	1	7
STM-64	Sukkur	1310nm I-64.1, LC 10km	Multan Central	1310nm I-64.1, LC 10km	MSP	0	0	7

Note: Subject to change & will be finalized at the time of migration.

ANNEX-D2-8: EXISTING TRAFFIC MATRIX - RING 3 LAMBDA 1 (192.1 THz)

STM Level	Source NE	Interface Type	Sink NE	Interface Type	Protection scheme	VC 12	VC 3	VC 4
STM-64	LoniKot	1310nm I-64.1, LC 10km	Hyderabad	1310nm I-64.1, LC 10km	MSP	138	17	7
STM-64	Karachi	1310nm I-64.1, LC 10km	LoniKot	1310nm I-64.1, LC 10km	MSP	138	17	6
STM-64	Thatta	1310nm I-64.1, LC 10km	Karachi	1310nm I-64.1, LC 10km	MSP	24	13	2
STM-64	Dadu	1310nm I-64.1, LC 10km	Larkana	1310nm I-64.1, LC 10km	MSP	64	10	2
STM-64	Hyderabad	1310nm I-64.1, LC 10km	QaziAhmed	1310nm I-64.1, LC 10km	MSP	98	6	2
STM-64	Dadu	1310nm I-64.1, LC 10km	Thatta	1310nm I-64.1, LC 10km	MSP	22	9	2
STM-64	Sukkur	1310nm I-64.1, LC 10km	Khairpur	1310nm I-64.1, LC 10km	MSP	43	8	2
STM-64	Khairpur	1310nm I-64.1, LC 10km	QaziAhmed	1310nm I-64.1, LC 10km	MSP	51	6	2
STM-64	Shikarpur	1310nm I-64.1, LC 10km	Sukkur	1310nm I-64.1, LC 10km	MSP	42	12	0
STM-64	Larkana	1310nm I-64.1, LC 10km	Shikarpur	1310nm I-64.1, LC 10km	MSP	21	9	0

Note: Subject to change & will be finalized at the time of migration.

ANNEX-D2-9: EXISTING TRAFFIC MATRIX - RING 3 LAMBDA 2 (192.2 THz)

STM Level	Source NE	Interface Type	Sink NE	Interface Type	Protection scheme	VC 12	VC 3	VC 4
STM-64	Shikarpur	1310nm I-64.1, LC 10km	Sukkur	1310nm I-64.1, LC 10km	MSP	0	1	14
STM-64	Karachi	1310nm I-64.1, LC 10km	Shikarpur	1310nm I-64.1, LC 10km	MSP	0	1	7
STM-64	Sukkur	1310nm I-64.1, LC 10km	Hyderabad	1310nm I-64.1, LC 10km	MSP	0	0	7
STM-64	Karachi	1310nm I-64.1, LC 10km	Hyderabad	1310nm I-64.1, LC 10km	MSP	0	0	7

Note: Subject to change & will be finalized at the time of migration.

ANNEX-D3: FIBER LOSSES

A End	B End	Current Loss (dB)	Distance (km)	Design Margin (dB)	Attenuation-coefficient (dB/km)
Karachi	Nooriabad	37.6	75	3	0.50
Nooriabad	Karachi	34.1	75	3	0.45
Nooriabad	LoniKot	22.7	40	3	0.57
LoniKot	Nooriabad	21.6	40	3	0.54
LoniKot	Hyderabad	29	48	3	0.60
Hyderabad	LoniKot	31.4	48	3	0.65
Hyderabad	Saeedabad	40	74	3	0.54
Saeedabad	Hyderabad	40.4	74	3	0.55
Saeedabad	QaziAhmed	26.1	47	3	0.56
QaziAhmed	Saeedabad	22.6	47	3	0.48
QaziAhmed	Amirabad	31.4	92	3	0.34
Amirabad	QaziAhmed	29.8	92	3	0.32
Amirabad	Khairpur	31.2	94	3	0.33
Khairpur	Amirabad	31.9	94	3	0.34
Khairpur	Sukkur	18.9	27	3	0.70
Sukkur	Khairpur	18.5	27	3	0.69
Sukkur	Shikarpur	17.2	38	3	0.45
Shikarpur	Sukkur	20.9	38	3	0.55
Shikarpur	Larkana	38.3	77	3	0.50
Larkana	Shikarpur	38.9	77	3	0.51
Larkana	KNShah	39.6	81	3	0.49
KNShah	Larkana	43.5	81	3	0.54
KNShah	Dadu	27.2	49	3	0.56
Dadu	KNShah	21.8	49	3	0.44
Dadu	Kalari	48.1	91	3	0.53
Kalari	Dadu	49.6	91	3	0.55
Kalari	Kotri	44.8	96	3	0.47
Kotri	Kalari	48.7	96	3	0.51
Kotri	Thatta	36.7	95	3	0.39
Thatta	Kotri	38.5	95	3	0.41
Thatta	GHadeed	29.9	64	3	0.47
GHadeed	Thatta	30	64	3	0.47
GHadeed	Karachi	31.7	48	3	0.66
Karachi	GHadeed	33.8	48	3	0.70
Sukkur	PannuAqil	25.6	37	3	0.69
PannuAqil	Sukkur	29.2	37	3	0.79
PannuAqil	Dherki	26.9	68	3	0.40
Dherki	PannuAqil	30.8	68	3	0.45
Dherki	RYKhan	29.7	84	3	0.35
RYKhan	Dherki	26.8	84	3	0.32
RYKhan	SardarGarh	19.2	46	3	0.42
SardarGarh	RYKhan	15.3	46	3	0.33
SardarGarh	InayatPur	29.1	91	3	0.32
InayatPur	SardarGarh	30.3	91	3	0.33

A End	B End	Current Loss (dB)	Distance (km)	Design Margin (dB)	Attenuation-coefficient (dB/km)
InayatPur	Bahawalpur	23	65	3	0.35
Bahawalpur	InayatPur	24	65	3	0.37
Bahawalpur	Lodhran	13.9	23	3	0.60
Lodhran	Bahawalpur	11.4	23	3	0.50
Lodhran	MultanCentral	27.5	85	3	0.32
MultanCentral	Lodhran	32.4	85	3	0.38
NewMultan	MGarh	23.2	41	3	0.57
MGarh	NewMultan	22.6	41	3	0.55
QCK	DGKhan	14.8	39	3	0.38
DGKhan	QCK	13.9	39	3	0.36
DGKhan	Fazilpur	34.5	94	3	0.37
Fazilpur	DGKhan	37.3	94	3	0.40
Fazilpur	Rajanpur	18.5	26	3	0.71
Rajanpur	Fazilpur	20.9	26	3	0.80
Rajanpur	Rojhan	29.2	68	3	0.43
Rojhan	Rajanpur	33	68	3	0.49
Rojhan	Kandhkot	33.5	99	3	0.34
Kandhkot	Rojhan	33.7	99	3	0.34
Kandhkot	Shikarpur	24.1	67	3	0.36
Shikarpur	Kandhkot	24.8	67	3	0.37
NewMultan	Khanewal	25.5	47	3	0.54
Khanewal	NewMultan	26	47	3	0.55
Khanewal	MianChannu	17.4	47	3	0.37
MianChannu	Khanewal	19.1	47	3	0.41
MianChannu	Sahiwal	32.1	78	3	0.41
Sahiwal	MianChannu	28.8	78	3	0.37
Sahiwal	Okara	18.1	46	3	0.39
Okara	Sahiwal	13.3	46	3	0.29
Okara	Faisalabad	39.7	110	3	0.36
Faisalabad	Okara	38.8	110	3	0.35
Faisalabad	Shaikhupura	42.8	103	3	0.42
Shaikhupura	Faisalabad	42.2	103	3	0.41
Shaikhupura	Lahore	49.1	83	3	0.59
Lahore	Shaikhupura	44.2	83	3	0.53
Lahore	Muridkay	28.9	37	3	0.78
Muridkay	Lahore	27.7	37	3	0.75
Gujranwala	Muridkay	34.5	46	3	0.75
Muridkay	Gujranwala	29.2	46	3	0.63
Gujranwala	Gujrat	26.5	74	3	0.36
Gujrat	Gujranwala	25.3	74	3	0.34
Gujrat	Kharian	16.2	35	3	0.46

A End	B End	Current Loss (dB)	Distance (km)	Design Margin (dB)	Attenuation-coefficient (dB/km)
Kharian	Gujrat	17.2	35	3	0.49
Kharian	Jhelum	21.4	23	3	0.93
Jhelum	Kharian	21.2	23	3	0.92
Jhelum	Mandra	28.3	69	3	0.41
Mandra	Jhelum	25.5	69	3	0.37
Mandra	Rawalpindi	25.8	45	3	0.57
Rawalpindi	Mandra	26.5	45	3	0.59
Rawalpindi	Islamabad	16.7	25	3	0.67
Islamabad	Rawalpindi	21.9	25	3	0.88
Islamabad	Taxila	21.8	35	3	0.62
Taxila	Islamabad	24.5	35	3	0.70
Taxila	Kamra	26.5	45	3	0.59
Kamra	Taxila	24.9	45	3	0.55
Kamra	Nowshera	25.9	49	3	0.53
Nowshera	Kamra	22.5	49	3	0.46
Nowshera	Peshawar	24.9	42	3	0.59
Peshawar	Nowshera	22.7	42	3	0.54
Peshawar	Kohat	31.6	59	3	0.54
Kohat	Peshawar	32.6	59	3	0.55
Kohat	BDS Shah	23.1	52	3	0.44
BDS Shah	Kohat	26.5	52	3	0.51
BDS Shah	Bannu	34.5	80	3	0.43
Bannu	BDS Shah	32	80	3	0.40
Bannu	Pizzu	34.4	102	3	0.34
Pizzu	Bannu	35	102	3	0.34
Pizzu	DI Khan	27.3	82	3	0.33
DI Khan	Pizzu	32.6	82	3	0.40
DI Khan	Bhakkar	23.2	40	3	0.58
Bhakkar	DI Khan	18.9	40	3	0.47
Bhakkar	Layyah	25.9	78	3	0.33
Layyah	Bhakkar	25.6	78	3	0.33
Layyah	Kot Addu	21.9	57	3	0.38
Kot Addu	Layyah	23.1	57	3	0.41
Kot Addu	QCK	20	46	3	0.43
QCK	Kot Addu	23	46	3	0.50
QCK	M Garh	19.1	24	3	0.80
M Garh	QCK	14.6	24	3	0.61
Multan Central	New Multan	7	8	3	0.88
New Multan	Multan Central	9	8	3	1.13
Kharian	Gojra	28.70	82	3	0.35
Gojra	Kharian	34.60	82	3	0.42
Gojra	Bhalwal	20.10	48	3	0.42
Bhalwal	Gojra	19.80	48	3	0.41
Bhalwal	Sargodha	11.80	33	3	0.36

A End	B End	Current Loss (dB)	Distance (km)	Design Margin (dB)	Attenuation-coefficient (dB/km)
Sargodha	Bhalwal	11.90	33	3	0.36
Sargodha	Chinniot	30.20	58	3	0.52
Chinniot	Sargodha	20.70	58	3	0.36
Chinniot	Faisalabad	28.60	58	3	0.49
Faisalabad	Chinniot	22.60	58	3	0.39
Sahiwal	Arifwala	12.60	48	3	0.26
Arifwala	Sahiwal	13.00	48	3	0.27
Taxila	Haripur	22.90	35	3	0.65
Haripur	Taxila	21.80	35	3	0.62
Haripur	Havelian	26.30	23	3	1.14
Havelian	Haripur	24.90	23	3	1.08
Havelian	Abbottabad	12.70	17	3	0.75
Abbottabad	Havelian	13.50	17	3	0.79
Kamra	Kamra Each	4.10	1	3	4.10
Kamra Each	Kamra	0.80	1	3	0.80
Kamra	Attock	16.80	17	3	0.99
Attock	Kamra	17.80	17	3	1.05
Nowshera	Mardan	19.00	25	3	0.76
Mardan	Nowshera	18.10	25	3	0.72
Hyderabad Main	Hyderabad Central	1.00	5	3	0.20
Hyderabad Central	Hyderabad Main	0.80	5	3	0.16
Hyderabad Central	Hyderabad City	0.40	4	3	0.10
Hyderabad City	Hyderabad Central	13.40	4	3	3.35
Sargodha	Iqbal Town	3.00	5	3	0.60
Iqbal Town	Sargodha	3.40	5	3	0.68
Sargodha	Johrabad	24.00	55	3	0.44
Johrabad	Sargodha	23.20	55	3	0.42
Johrabad	KCP	14.50	30	3	0.48
KCP	Johrabad	20.40	30	3	0.68
Gujranwala	Daska	15.30	28	3	0.55
Daska	Gujranwala	13.50	28	3	0.48
Daska	Sialkot	18.40	36	3	0.51
Sialkot	Daska	20.70	36	3	0.58
<i>Mardan</i>	<i>Charsadda</i>	<i>New link</i>	32	3	0.5 approx
<i>Charsadda</i>	<i>Peshawar</i>	<i>New link</i>	35	3	0.5 approx
<i>Abbotabad</i>	<i>Murree</i>	<i>New link</i>	83	3	0.5 approx
<i>Murree</i>	<i>Rawalpindi</i>	<i>New link</i>	77	3	0.5 approx

A End	B End	Current Loss (dB)	Distance (km)	Design Margin (dB)	Attenuation-coefficient (dB/km)
<i>Sialkot</i>	<i>Narowal</i>	<i>New link</i>	66	3	0.5 approx
<i>Narowal</i>	<i>Gujranwala</i>	<i>New link</i>	95	3	0.5 approx
<i>Johrabad</i>	<i>Quaidabad</i>	<i>New link</i>	45	3	0.5 approx
<i>Quaidabad</i>	<i>Mianwali</i>	<i>New link</i>	50	3	0.5 approx
<i>Mianwali</i>	<i>Harnoli</i>	<i>New link</i>	40	3	0.5 approx
<i>Harnoli</i>	<i>Dullawala</i>	<i>New link</i>	80	3	0.5 approx
<i>Dullawala</i>	<i>Bhakkar</i>	<i>New link</i>	55	3	0.5 approx
<i>Lahore</i>	<i>BhaiPeru</i>	<i>New link</i>	85	3	0.5 approx
<i>BhaiPeru</i>	<i>Okara</i>	<i>New link</i>	85	3	0.5 approx
<i>Hyderabad</i>	<i>Kotri</i>	<i>New link</i>	13	3	0.5 approx

- Note:** 1) Losses are subject to change. New links losses are approximate. contractor will be responsible to get the link operationalized as per actual scenario at the time of migration.
- 2) Losses are system generated and local equipment end insertion / connector loss are included.
- 3) In case design margin cannot be met, contractor will propose ILA/OLA to meet design margin at pass through sites after consultation with NTC team. Any site added to meet design margin will be part of BoQ.

ANNEX-D4: EXISTING AND PLANNED EQUIPMENT

S #	NE Name	Ring	NE Type	Equipment	Planned NE type	Planned Equipment	Planned Ring	ADM Type	ROADM Configurati on (in case of ROADM)
1	Islamabad	1	Add/Drop	DWDM+ SDH	ADD/DROP	WDM/ OTN	1	ROADM	CDF
2	Abbottabad	Spur	Add/Drop	SDH	ADD/DROP	WDM/ OTN	SR1	ROADM/ FOADM	CF
3	Rawalpindi	1	Add/Drop	DWDM+ SDH	ADD/DROP	WDM/ OTN	1	ROADM	CDF
4	Attock	Spur	Add/Drop	SDH	ADD/DROP	WDM/ OTN	Spur	ROADM/ FOADM	CF
5	Haripur	Spur	Add/Drop	SDH	ADD/DROP	WDM/ OTN	SR1	ROADM/ FOADM	CF
6	Havelian	Spur	Add/Drop	SDH	ADD/DROP	WDM/ OTN	SR1	ROADM/ FOADM	CF
7	KamraExch	Spur	Add/Drop	SDH	ADD/DROP	WDM/ OTN	Spur	ROADM/ FOADM	CF
8	Kamra	1	Add/Drop	DWDM+ SDH	ADD/DROP	WDM/ OTN	1	ROADM	CDF
9	Taxila	1	Add/Drop	DWDM+ SDH	ADD/DROP	WDM/ OTN	1	ROADM	CDF
10	Mandra	1	OLA	DWDM	OLA	WDM/ OTN	1	-	-

S #	NE Name	Ring	NE Type	Equipment	Planned NE type	Planned Equipment	Planned Ring	ADM Type	ROADM Configuration (in case of ROADM)
11	Peshawar	1	Add/Drop	DWDM+ SDH	ADD/DROP	WDM/ OTN	1	ROADM	CDF
12	Nowshera	1	Add/Drop	DWDM+ SDH	ADD/DROP	WDM/ OTN	1	ROADM	CDF
13	Mardan	Spur	Add/Drop	SDH	ADD/DROP	WDM/ OTN	SR2	ROADM/ FOADM	CF
14	Kohat	1	Add/Drop	DWDM+ SDH	ADD/DROP	WDM/ OTN	1	ROADM/ FOADM	CF
15	Bannu	1	Add/Drop	DWDM+ SDH	ADD/DROP	WDM/ OTN	1	ROADM/ FOADM	CF
16	DIKhan	1	Add/Drop	DWDM+ SDH	ADD/DROP	WDM/ OTN	1	ROADM/ FOADM	CF
17	BDS Shah	1	OLA	DWDM	OLA	WDM/ OTN	1	-	-
18	Pizzu	1	OLA	DWDM	OLA	WDM/ OTN	1	-	-
19	Lahore	1	Add/Drop	DWDM+ SDH	ADD/DROP	WDM/ OTN	5&7	ROADM	CDF
20	Gujranwala	1	Add/Drop	DWDM+ SDH	ADD/DROP	WDM/ OTN	5	ROADM	CDF
21	Gujrat	1	Add/Drop	DWDM+ SDH	ADD/DROP	WDM/ OTN	5	ROADM/ FOADM	CF
22	Kharian	1	Add/Drop	DWDM+ SDH	ADD/DROP	WDM/ OTN	1&5	ROADM	CDF

S #	NE Name	Ring	NE Type	Equipment	Planned NE type	Planned Equipment	Planned Ring	ADM Type	ROADM Configuration (in case of ROADM)
23	Daska	Spur	Add/Drop	SDH	ADD/DROP	WDM/OTN	SR3	ROADM/FOADM	CF
24	Sialkot	Spur	Add/Drop	SDH	ADD/DROP	WDM/OTN	SR3	ROADM/FOADM	CF
25	Bhalwal	1	Add/Drop	SDH	ADD/DROP	WDM/OTN	1&5	ROADM/FOADM	CF
26	Chiniot	1	Add/Drop	SDH	ADD/DROP	WDM/OTN	4&5	ROADM/FOADM	CF
27	Sargodha	1	Add/Drop	SDH	ADD/DROP	WDM/OTN	1&4&5	ROADM	CDF
28	IqbalTown	Spur	Add/Drop	SDH	ADD/DROP	WDM/OTN	Spur	ROADM/FOADM	CF
29	Johrabad	Spur	Add/Drop	SDH	ADD/DROP	WDM/OTN	1&4	ROADM	CDF
30	KCP	Spur	Add/Drop	SDH	ADD/DROP	WDM/OTN	Spur	ROADM/FOADM	CF
31	Gojra	1	Reg	SDH	OLA	WDM/OTN	1&5	-	-
32	Jehlum	1	Add/Drop	DWDM+SDH	ADD/DROP	WDM/OTN	1	ROADM/FOADM	CF
33	Shaikhupura	1	Add/Drop	DWDM+SDH	ADD/DROP	WDM/OTN	5&7	ROADM/FOADM	CF
34	Faisalabad	1	Add/Drop	DWDM+SDH	ADD/DROP	WDM/OTN	4&5&7	ROADM	CDF

S #	NE Name	Ring	NE Type	Equipment	Planned NE type	Planned Equipment	Planned Ring	ADM Type	ROADM Configuration (in case of ROADM)
35	MultanCentral	2	Add/Drop	DWDM+SD H	ADD/DROP	WDM/OT N	2	ROADM	CDF
36	NewMultan	1&2	Add/Drop	DWDM+SD H	ADD/DROP	WDM/OT N	2&4	ROADM	CDF
37	MGarh	1&2	Add/Drop	DWDM+SD H	ADD/DROP	WDM/OT N	2&4	ROADM/FO ADM	CF
38	Okara	1	Add/Drop	DWDM+SD H	ADD/DROP	WDM/OT N	4&7	ROADM	CDF
39	Sahiwal	1	Add/Drop	DWDM+SD H	ADD/DROP	WDM/OT N	4	ROADM	CDF
40	Khanewal	1	Add/Drop	DWDM+SD H	ADD/DROP	WDM/OT N	4	ROADM/FO ADM	CF
41	Arifwala	Spur	Add/Drop	SDH	ADD/DROP	WDM/OT N	Spur	ROADM/FO ADM	CF
42	Lodhran	2	Add/Drop	DWDM+SD H	ADD/DROP	WDM/OT N	2	ROADM/FO ADM	CF
43	Bahawalpur	2	Add/Drop	DWDM+SD H	ADD/DROP	WDM/OT N	2	ROADM/FO ADM	CF
44	RYK	2	Add/Drop	DWDM+SD H	ADD/DROP	WDM/OT N	2	ROADM/FO ADM	CF
45	Bhakkar	1	Add/Drop	DWDM+SD H	ADD/DROP	WDM/OT N	1&4	ROADM	CDF
46	Layyah	1	Add/Drop	DWDM+SD H	ADD/DROP	WDM/OT N	4	ROADM/FO ADM	CF

S #	NE Name	Ring	NE Type	Equipment	Planned NE type	Planned Equipment	Planned Ring	ADM Type	ROADM Configuration (in case of ROADM)
47	QCK	1&2	Add/Drop	DWDM+SDH	ADD/DROP	WDM/OTN	2&4	ROADM	CDF
48	DGKhan	2	Add/Drop	DWDM+SDH	ADD/DROP	WDM/OTN	2	ROADM/FOADM	CF
49	Rojhan	2	OLA	DWDM	OLA	WDM/OTN	2	-	-
50	Rajanpur	2	Add/Drop	DWDM+SDH	ADD/DROP	WDM/OTN	2	ROADM/FOADM	CF
51	KotAddu	1	OLA	DWDM	OLA	WDM/OTN	4	-	-
52	MianChannu	1	OLA	DWDM	OLA	WDM/OTN	4	-	-
53	Fazilpur	2	OLA	DWDM	OLA	WDM/OTN	2	-	-
54	InayatPur	2	OLA	DWDM	OLA	WDM/OTN	2	-	-
55	SardarGarh	2	OLA	DWDM	OLA	WDM/OTN	2	-	-
56	Karachi	3	Add/Drop	DWDM+SDH	ADD/DROP	WDM/OTN	6	ROADM	CDF
57	Hyderabad	3	Add/Drop	DWDM+SDH	ADD/DROP	WDM/OTN	3&6	ROADM	CDF
58	HyderabadCity	Spur	Add/Drop	SDH	ADD/DROP	WDM/OTN	Spur	ROADM/FOADM	CF

S #	NE Name	Ring	NE Type	Equipment	Planned NE type	Planned Equipment	Planned Ring	ADM Type	ROADM Configuration (in case of ROADM)
59	HyderabadCentral	Spur	Add/Drop	SDH	ADD/DROP	WDM/OTN	Spur	ROADM/FOADM	CF
60	LoniKot	3	Add/Drop	DWDM+SDH	ADD/DROP	WDM/OTN	6	ROADM/FOADM	CF
61	Sukkur	2&3	Add/Drop	DWDM+SDH	ADD/DROP	WDM/OTN	2&3	ROADM	CDF
62	PannuAqil	2	Add/Drop	DWDM+SDH	ADD/DROP	WDM/OTN	2	ROADM/FOADM	CF
63	Khairpur	3	Add/Drop	DWDM+SDH	ADD/DROP	WDM/OTN	3	ROADM/FOADM	CF
64	QaziAhmed	3	Add/Drop	DWDM+SDH	ADD/DROP	WDM/OTN	3	ROADM/FOADM	CF
65	Shikarpur	2&3	Add/Drop	DWDM+SDH	ADD/DROP	WDM/OTN	2&3	ROADM	CDF
66	Larkana	3	Add/Drop	DWDM+SDH	ADD/DROP	WDM/OTN	3	ROADM/FOADM	CF
67	Dadu	3	Add/Drop	DWDM+SDH	ADD/DROP	WDM/OTN	3	ROADM/FOADM	CF
68	Thatta	3	Add/Drop	DWDM+SDH	ADD/DROP	WDM/OTN	6	ROADM/FOADM	CF
69	Kotri	3	OLA	DWDM	ADD/DROP	WDM/OTN	3&6	ROADM	CDF
70	Nooriabad	3	OLA	DWDM	OLA	WDM/OTN	6	-	-

S #	NE Name	Ring	NE Type	Equipment	Planned NE type	Planned Equipment	Planned Ring	ADM Type	ROADM Configuration (in case of ROADM)
71	Saeedabad	3	OLA	DWDM	OLA	WDM/OTN	3	-	-
72	Amirabad	3	OLA	DWDM	OLA	WDM/OTN	3	-	-
73	KNShah	3	OLA	DWDM	OLA	WDM/OTN	3	-	-
74	Kalari	3	OLA	DWDM	OLA	WDM/OTN	3	-	-
75	GHadeed	3	OLA	DWDM	OLA	WDM/OTN	3	-	-
76	Kandhkot	2	OLA	DWDM	OLA	WDM/OTN	2	-	-
77	Dherki	2	OLA	DWDM	OLA	WDM/OTN	2	-	-
78	Muridkay	1	OLA	DWDM	ADD/DROP	WDM/OTN	5	ROADM/FO ADM	CF
79	Quaidabad	NA	NA	NA	OLA proposed *	WDM/OTN	1&4	-	-
80	Harnoli	NA	NA	NA	OLA proposed *	WDM/OTN	1&4	-	-
81	Dullahwala	NA	NA	NA	OLA proposed *	WDM/OTN	1&4	-	-
82	Bhai Peru	NA	NA	NA	OLA proposed *	WDM/OTN	7	-	-

S #	NE Name	Ring	NE Type	Equipment	Planned NE type	Planned Equipment	Planned Ring	ADM Type	ROADM Configuration (in case of ROADM)
83	Mianwali	NA	NA	NA	ADD/DROP proposed *	WDM/OTN	1&4	ROADM/FOADM	CF
84	Charsadda	NA	NA	NA	ADD/DROP proposed *	WDM/OTN	SR2	ROADM/FOADM	CF
85	Narowal	NA	NA	NA	ADD/DROP proposed *	WDM/OTN	SR3	ROADM/FOADM	CF
86	Murree	NA	NA	NA	ADD/DROP proposed *	WDM/OTN	SR1	ROADM/FOADM	CF

- Note:** 1) Site marked * are subject to change.
2) Any new OLA site added to meet design margin will be considered part of BoQ

ANNEX-D5-1: PLANNED TRAFFIC MATRIX - RING 1 LAMBDA 1

S#	A-End	B-End	Lambda Capacity
1	Islamabad	Rawalpindi	100G Protected
2	Rawalpindi	Jehlum	100G Protected
3	Jehlum	Kharian	100G Protected
4	Kharian	Sargodha	100G Protected
5	Sargodha	Mianwali	100G Protected
6	Mianwali	Bhakkar	100G Protected
7	Bhakkar	DIKhan	100G Protected
8	DIKhan	Bannu	100G Protected
9	Bannu	Kohat	100G Protected
10	Kohat	Peshawar	100G Protected
11	Peshawar	Nowshera	100G Protected
12	Nowshera	Kamra	100G Protected
13	Kamra	Taxila	100G Protected
14	Taxila	Islamabad	100G Protected

Note: In addition to above mentioned sites, lambda should be droppable at other sites of ring with the addition of transponder / muxponder cards only.

ANNEX-D5-2: PLANNED TRAFFIC MATRIX - RING 1 LAMBDA 2

S#	A-End	B-End	Lambda Capacity
1	Islamabad	Rawalpindi	100G Protected
2	Rawalpindi	Kharian	100G Protected
3	Kharian	Sargodha	100G Protected
4	Sargodha	Bhakkar	100G Protected
5	Bhakkar	Peshawar	100G Protected
6	Peshawar	Nowshera	100G Protected
7	Nowshera	Taxila	100G Protected
8	Taxila	Islamabad	100G Protected

Note: In addition to above mentioned sites, lambda should be droppable at other sites of ring with the addition of transponder / muxponder cards only.

ANNEX-D5-3: PLANNED TRAFFIC MATRIX - RING 1 LAMBDA 3-6

S#	A-End	B-End	Lemda Capacity
1	Islamabad	Rawalpindi	4 x 100G Protected
2	Rawalpindi	Kharian	4 x 100G Protected
3	Kharian	Sargodha	4 x 100G Protected
4	Sargodha	Bhakkar	4 x 100G Protected
5	Bhakkar	Peshawar	4 x 100G Protected
6	Peshawar	Nowshera	4 x 100G Protected
7	Nowshera	Taxila	4 x 100G Protected
8	Taxila	Islamabad	4 x 100G Protected

Note: In addition to above mentioned sites, lambda should be droppable at other sites of ring with the addition of transponder / muxponder cards only.

ANNEX-D5-4: PLANNED TRAFFIC MATRIX - RING 2 LAMBDA 1

S#	A-End	B-End	Lemda Capacity
1	NewMultan	MultanCentral	100G Protected
2	MultanCentral	Lodhran	100G Protected
3	Lodhran	Bahawalpur	100G Protected
4	Bahawalpur	RYK	100G Protected
5	RYK	PannuAqil	100G Protected
6	PannuAqil	Sukkur	100G Protected
7	Sukkur	Shikarpur	100G Protected
8	Shikarpur	Rajanpur	100G Protected
9	Rajanpur	DGKhan	100G Protected
10	DGKhan	QCK	100G Protected
11	QCK	MGarh	100G Protected
12	MGarh	NewMultan	100G Protected

ANNEX-D5-5: PLANNED TRAFFIC MATRIX - RING 2 LAMBDA 2

S#	A-End	B-End	Lemda Capacity
1	NewMultan	MultanCentral	100G Protected
2	MultanCentral	Sukkur	100G Protected
3	Sukkur	Shikarpur	100G Protected
4	Shikarpur	QCK	100G Protected
5	QCK	NewMultan	100G Protected

Note: In addition to above mentioned sites, lambda should be droppable at other sites of ring with the addition of transponder / muxponder cards only.

ANNEX-D5-6: PLANNED TRAFFIC MATRIX - RING 2 LAMBDA 3-6

S#	A-End	B-End	Lemda Capacity
1	NewMultan	MultanCentral	4 x 100G Protected
2	MultanCentral	Sukkur	4 x 100G Protected
3	Sukkur	Shikarpur	4 x 100G Protected
4	Shikarpur	QCK	4 x 100G Protected
5	QCK	NewMultan	4 x 100G Protected

Note: In addition to above mentioned sites, lambda should be droppable at other sites of ring with the addition of transponder / muxponder cards only.

ANNEX-D5-7: PLANNED TRAFFIC MATRIX - RING 3 LAMBDA 1

S#	A-End	B-End	Lemda Capacity
1	Sukkur	Khairpur	100G Protected
2	Khairpur	QaziAhmed	100G Protected
3	QaziAhmed	Hyderabad	100G Protected
4	Hyderabad	Kotri	100G Protected
5	Kotri	Dadu	100G Protected
6	Dadu	Larkana	100G Protected
7	Larkana	Shikarpur	100G Protected
8	Shikarpur	Sukkur	100G Protected

ANNEX-D5-8: PLANNED TRAFFIC MATRIX - RING 3 LAMBDA 2

S#	A-End	B-End	Lemda Capacity
1	Sukkur	Hyderabad	100G Protected
2	Hyderabad	Kotri	100G Protected
3	Kotri	Shikarpur	100G Protected
4	Shikarpur	Sukkur	100G Protected

Note: In addition to above mentioned sites, lambda should be droppable at other sites of ring with the addition of transponder / muxponder cards only.

ANNEX-D5-9: PLANNED TRAFFIC MATRIX - RING 3 LAMBDA 3-6

S#	A-End	B-End	Lemda Capacity
1	Sukkur	Hyderabad	4 x 100G Protected
2	Hyderabad	Kotri	4 x 100G Protected
3	Kotri	Shikarpur	4 x 100G Protected
4	Shikarpur	Sukkur	4 x 100G Protected

Note: In addition to above mentioned sites, lambda should be droppable at other sites of ring with the addition of transponder / muxponder cards only.

ANNEX-D5-10: PLANNED TRAFFIC MATRIX - RING 4 LAMBDA 1

S#	A-End	B-End	Lemda Capacity
1	Sargodha	Faisalabad	100G Protected
2	Faisalabad	Okara	100G Protected
3	Okara	Sahiwal	100G Protected
4	Sahiwal	Khanewal	100G Protected
5	Khanewal	NewMultan	100G Protected
6	NewMultan	QCK	100G Protected
7	QCK	Layyah	100G Protected
8	Layyah	Bhakkar	100G Protected
9	Bhakkar	Johrabad	100G Protected
10	Johrabad	Sargodha	100G Protected

ANNEX-D5-11: PLANNED TRAFFIC MATRIX - RING 4 LAMBDA 2

S#	A-End	B-End	Lemda Capacity
1	Sargodha	Faisalabad	100G Protected
2	Faisalabad	Okara	100G Protected
3	Okara	NewMultan	100G Protected
4	NewMultan	QCK	100G Protected
5	QCK	Bhakkar	100G Protected
6	Bhakkar	Sargodha	100G Protected

Note: In addition to above mentioned sites, lambda should be droppable at other sites of ring with the addition of transponder / muxponder cards only.

ANNEX-D5-12: PLANNED TRAFFIC MATRIX - RING 4 LAMBDA 3-6

S#	A-End	B-End	Lemda Capacity
1	Sargodha	Faisalabad	4 x 100G Protected
2	Faisalabad	Okara	4 x 100G Protected
3	Okara	NewMultan	4 x 100G Protected
4	NewMultan	QCK	4 x 100G Protected
5	QCK	Bhakkar	4 x 100G Protected
6	Bhakkar	Sargodha	4 x 100G Protected

Note: In addition to above mentioned sites, lambda should be droppable at other sites of ring with the addition of transponder / muxponder cards only.

ANNEX-D5-13: PLANNED TRAFFIC MATRIX - RING 5 LAMBDA 1

S#	A-End	B-End	Lambda Capacity
1	Lahore	Muridkay	100G Protected
2	Muridkay	Gujranwala	100G Protected
3	Gujranwala	Gujrat	100G Protected
4	Gujrat	Kharian	100G Protected
5	Kharian	Bhalwal	100G Protected
6	Bhalwal	Sargodha	100G Protected
7	Sargodha	Chiniot	100G Protected
8	Chiniot	Faisalabad	100G Protected
9	Faisalabad	Shaikhupura	100G Protected
10	Shaikhupura	Lahore	100G Protected

ANNEX-D5-14: PLANNED TRAFFIC MATRIX - RING 5 LAMBDA 2

S#	A-End	B-End	lambda Capacity
1	Lahore	Gujranwala	100G Protected
2	Gujranwala	Kharian	100G Protected
3	Kharian	Sargodha	100G Protected
4	Sargodha	Faisalabad	100G Protected
5	Faisalabad	Lahore	100G Protected

Note: In addition to above mentioned sites, lambda should be droppable at other sites of ring with the addition of transponder / muxponder cards only.

ANNEX-D5-15: PLANNED TRAFFIC MATRIX - RING 5 LAMBDA 3-6

S#	A-End	B-End	lambda Capacity
1	Lahore	Kharian	4 x 100G Protected
2	Kharian	Sargodha	4 x 100G Protected
3	Sargodha	Faisalabad	4 x 100G Protected
4	Faisalabad	Lahore	4 x 100G Protected

Note: In addition to above mentioned sites, lambda should be droppable at other sites of ring with the addition of transponder / muxponder cards only.

ANNEX-D5-16: PLANNED TRAFFIC MATRIX - RING 6 LAMBDA 1

S#	A-End	B-End	Lemda Capacity
1	Karachi	Thatta	100G Protected
2	Thatta	Kotri	100G Protected
3	Kotri	Hyderabad	100G Protected
4	Hyderabad	LoniKot	100G Protected
5	LoniKot	Karachi	100G Protected

ANNEX-D5-17: PLANNED TRAFFIC MATRIX - RING 6 LAMBDA 2

S#	A-End	B-End	Lemda Capacity
1	Karachi	Kotri	100G Protected
2	Kotri	Hyderabad	100G Protected
3	Hyderabad	Karachi	100G Protected

Note: In addition to above mentioned sites, lambda should be droppable at other sites of ring with the addition of transponder / muxponder cards only.

ANNEX-D5-18: PLANNED TRAFFIC MATRIX - RING 6 LAMBDA 3-6

S#	A-End	B-End	Lemda Capacity
1	Karachi	Kotri	4 x 100G Protected
2	Kotri	Hyderabad	4 x 100G Protected
3	Hyderabad	Karachi	4 x 100G Protected

Note: In addition to above mentioned sites, lambda should be droppable at other sites of ring with the addition of transponder / muxponder cards only.

ANNEX-D5-19: PLANNED TRAFFIC MATRIX - RING 7 LAMBDA 1

S#	A-End	B-End	Lemda Capacity
1	Lahore	Shaikhupura	100G
2	Shaikhupura	Faisalabad	100G
3	Faisalabad	Okara	100G
4	Okara	Lahore	100G

ANNEX-D5-20: PLANNED TRAFFIC MATRIX - RING 7 LAMBDA 2

S#	A-End	B-End	Lemda Capacity
1	Lahore	Faisalabad	100G
2	Faisalabad	Okara	100G
3	Okara	Lahore	100G

Note: In addition to above mentioned sites, lambda should be droppable at other sites of ring with the addition of transponder / muxponder cards only.

ANNEX-D5-21: PLANNED TRAFFIC MATRIX - RING 7 LAMBDA 3-6

S#	A-End	B-End	lambda Capacity
1	Lahore	Faisalabad	4 x 100G Protected
2	Faisalabad	Okara	4 x 100G Protected
3	Okara	Lahore	4 x 100G Protected

Note: In addition to above mentioned sites, lambda should be droppable at other sites of ring with the addition of transponder / muxponder cards only.

ANNEX-D5-22: PLANNED TRAFFIC MATRIX - SMALL RING SR1

S#	A-End	B-End	Lambda Capacity
1	Taxila	Haripur	10G protected
2	Haripur	Havelian	10G protected
3	Havelian	Abbotabad	10G protected
4	Abbotabad	Murree	10G protected
5	Murree	Rawalpindi	10G protected

Note: 6 x 100 G Lambdas of Ring 1 to be protected via Smaller Ring of 10G (SR1) as a pass-through.

ANNEX-D5-23: PLANNED TRAFFIC MATRIX - SMALL RING SR2

S#	A-End	B-End	Lemda Capacity
1	Peshawar	Charsadda	10G protected
2	Charsadda	Mardan	10G protected
3	Mardan	Nowshera	10G protected

Note: 6 x 100 G Lambdas of Ring 1 to be protected via Smaller Ring of 10G (SR1) as a pass-through.

ANNEX-D5-24: PLANNED TRAFFIC MATRIX - SMALL RING SR3

S#	A-End	B-End	lambda Capacity
1	Gujranwala	Daska	10G protected
2	Daska	Sialkot	10G protected
3	Sialkot	Narowal	10G protected
4	Narowal	Gujranwala	10G protected

ANNEX-D5-25: PLANNED TRAFFIC MATRIX - SPURS

S#	A-End	B-End	lambda Capacity
1	Kamra	Kamra-Exch	10 G
2	Kamra	Attock	10 G
3	Johrabad	KCP	10 G
4	Sargodha	Iqbal Town	10 G
5	Hyderabad	HyderabadCentral	10 G
6	HyderabadCentral	HyderabadCity	10 G

Note: Optical and electrical layer Protection + Dynamic Restoration provision required for future.

ANNEX-D6: REQUIREMENT OF INTERFACES FOR 600G

Node Detail	L1									L2	L3			Total									
	Site Name	E1	STM 1	STM 4	STM1 6	FE Elec t	FE Op t	GE Op t	GE Ele c		10 G Op t	10 G Op t	10 G Op t	100 G Op t	E1	STM 1	STM 4	STM1 6	FE Elec t	FE Optic al	GE Op t	GE Elec t	10 G Op t
Abbottabad	0	0	0	0	2	0	6	0	2	0	0	0	0	0	0	0	0	2	0	6	0	2	0
Attock	3	0	1	0	2	0	5	0	2	0	0	0	0	3	0	1	0	2	0	5	0	2	0
Haripur	0	0	0	0	2	0	8	0	3	0	0	0	0	0	0	0	0	2	0	8	0	3	0
Havelian	0	0	0	0	2	0	6	0	2	0	0	0	0	0	0	0	0	2	0	6	0	2	0
Islamabad	24	0	0	0	3	2	21	0	6	10	10	3	24	0	0	0	0	3	2	21	0	26	3
Kamra	5	0	2	0	2	0	7	0	3	0	0	0	5	0	2	0	2	0	7	0	3	0	
KamraExch	3	0	0	0	5	2	3	0	2	0	0	0	3	0	0	0	5	2	3	0	2	0	
Rawalpindi	7	0	0	0	6	0	6	0	2	0	0	0	7	0	0	0	6	0	6	0	2	0	
Taxila	2	0	1	0	2	0	10	0	3	10	0	0	2	0	1	0	2	0	10	0	13	0	
Dadu	0	0	0	0	7	0	3	0	2	0	0	0	0	0	0	0	7	0	3	0	2	0	
Hyderabad	8	0	0	0	11	0	9	0	3	10	0	0	8	0	0	0	11	0	9	0	13	0	
Hyderabad Central	6	0	0	0	2	0	2	0	2	0	0	0	6	0	0	0	2	0	2	0	2	0	
Hyderabad City	0	0	0	0	8	0	3	0	2	0	0	0	0	0	0	0	8	0	3	0	2	0	
Karachi	5	0	0	0	12	3	11	0	5	10	10	3	5	0	0	0	12	3	11	0	25	3	
Khairpur	0	0	0	0	2	0	3	0	2	0	0	0	0	0	0	0	2	0	3	0	2	0	
Larkana	0	0	0	0	5	1	6	0	2	0	0	0	0	0	0	0	5	1	6	0	2	0	
LoniKot	0	0	0	0	2	0	3	0	2	0	0	0	0	0	0	0	2	0	3	0	2	0	
PannuAqil	0	0	0	0	2	0	2	0	2	0	0	0	0	0	0	0	2	0	2	0	2	0	
QaziAhmed	0	0	0	0	2	0	3	0	2	0	0	0	0	0	0	0	2	0	3	0	2	0	

Node Detail	L1										L2	L3		Total									
	E1	STM 1	STM 4	STM1 6	FE Elec t	FE Op t	GE Op t	GE Ele c	10 G Op t	10 G Op t	10 G Op t	100 G Op t	E1	STM 1	STM 4	STM1 6	FE Elec t	FE Optic al	GE Op t	GE Elec t	10 G Op t	100 G Op t	
Shikarpur	3	0	0	0	4	1	3	0	2	0	0	0	3	0	0	0	4	1	3	0	2	0	
Sukkur	2	0	0	0	7	0	7	0	2	10	0	0	2	0	0	0	7	0	7	0	12	0	
Thatta	2	0	0	0	2	0	3	0	2	0	0	0	2	0	0	0	2	0	3	0	2	0	
Bhalwal	0	0	0	0	2	0	3	0	2	0	0	0	0	0	0	0	2	0	3	0	2	0	
Chiniot	0	0	0	0	2	0	3	0	2	0	0	0	0	0	0	0	2	0	3	0	2	0	
Daska	2	0	0	0	2	0	2	2	2	0	0	0	2	0	0	0	2	0	2	2	2	0	
Faisalabad	12	0	0	0	2	0	8	0	3	10	0	0	12	0	0	0	2	0	8	0	13	0	
Gujranwala	14	0	0	2	3	1	8	0	3	10	0	0	14	0	0	2	3	1	8	0	13	0	
Gujrat	6	0	0	0	2	0	5	0	2	0	0	0	6	0	0	0	2	0	5	0	2	0	
IqbalTown	9	0	0	0	2	0	6	0	2	0	0	0	9	0	0	0	2	0	6	0	2	0	
Jehlum	0	0	0	0	2	0	4	1	2	0	0	0	0	0	0	0	2	0	4	1	2	0	
Johrabad	4	0	0	0	3	0	5	0	2	0	0	0	4	0	0	0	3	0	5	0	2	0	
KCP	4	0	0	0	2	0	5	0	2	0	0	0	4	0	0	0	2	0	5	0	2	0	
Kharian	1	0	0	0	2	0	3	0	2	0	0	0	1	0	0	0	2	0	3	0	2	0	
Lahore	2	0	1	0	2	1	13	0	5	10	10	3	2	0	1	0	2	1	13	0	25	3	
Sargodha	1	0	1	0	2	0	6	0	2	10	0	0	1	0	1	0	2	0	6	0	12	0	
Shaikhupur a	0	0	0	0	2	0	3	0	2	0	0	0	0	0	0	0	2	0	3	0	2	0	
Sialkot	0	0	0	0	2	0	6	0	2	0	0	0	0	0	0	0	2	0	6	0	2	0	
Arifwala	2	0	1	0	5	0	4	0	2	0	0	0	2	0	1	0	5	0	4	0	2	0	
Bahawalpur	6	0	0	0	4	0	6	0	2	0	0	0	6	0	0	0	4	0	6	0	2	0	
Bhakkar	2	0	0	0	2	0	3	0	2	0	0	0	2	0	0	0	2	0	3	0	2	0	
DGKhan	5	0	0	0	3	0	4	0	2	0	0	0	5	0	0	0	3	0	4	0	2	0	
Khanewal	2	0	0	0	4	0	3	0	2	0	0	0	2	0	0	0	4	0	3	0	2	0	
Layyah	0	0	1	0	2	0	5	0	2	0	0	0	0	0	1	0	2	0	5	0	2	0	

Node Detail	L1										L2	L3		Total									
	E1	STM 1	STM 4	STM1 6	FE Elec t	FE Op t	GE Op t	GE Ele c	10 G Op t	10 G Op t	10 G Op t	100 G Op t	E1	STM 1	STM 4	STM1 6	FE Elec t	FE Optic al	GE Op t	GE Elec t	10 G Op t	100 G Op t	
Lodhran	0	0	0	0	2	0	4	0	2	0	0	0	0	0	0	0	2	0	4	0	2	0	
MGarh	1	0	0	0	3	0	3	0	2	0	0	0	1	0	0	0	3	0	3	0	2	0	
MultanCentral	26	0	0	0	2	2	15	0	4	10	20	2	26	0	0	0	2	2	15	0	34	2	
NewMultan	6	0	2	0	2	1	5	0	2	0	0	0	6	0	2	0	2	1	5	0	2	0	
Okara	2	0	0	0	2	0	3	0	2	0	0	0	2	0	0	0	2	0	3	0	2	0	
Rajanpur	0	0	1	0	1	1	3	0	2	0	0	0	0	0	1	0	1	1	3	0	2	0	
RYK	0	0	0	0	2	0	7	0	2	0	0	0	0	0	0	0	2	0	7	0	2	0	
Sahiwal	2	0	0	0	2	0	6	0	2	0	0	0	2	0	0	0	2	0	6	0	2	0	
Bannu	0	0	0	0	2	0	7	0	2	0	0	0	0	0	0	0	2	0	7	0	2	0	
DIKhan	0	0	0	0	3	0	6	0	2	0	0	0	0	0	0	0	3	0	6	0	2	0	
Kohat	3	0	1	0	2	0	3	0	2	0	0	0	3	0	1	0	2	0	3	0	2	0	
Mardan	0	0	0	0	2	0	7	0	2	0	0	0	0	0	0	0	2	0	7	0	2	0	
Nowshera	1	0	0	0	2	0	5	0	2	0	0	0	1	0	0	0	2	0	5	0	2	0	
Peshawar	5	0	1	0	2	0	12	0	4	10	20	2	5	0	1	0	2	0	12	0	34	2	
QCK	0	0	0	0	1	1	4	0	2	0	0	0	0	0	0	0	1	1	4	0	2	0	
Murree	0	0	0	0	1	1	4	0	2	0	0	0	0	0	0	0	1	1	4	0	2	0	
Charsadda	0	0	0	0	1	1	4	0	2	0	0	0	0	0	0	0	1	1	4	0	2	0	
Mianwali	0	0	0	0	1	1	4	0	2	0	0	0	0	0	0	0	1	1	4	0	2	0	
Narowal	0	0	0	0	1	1	4	0	2	0	0	0	0	0	0	0	1	1	4	0	2	0	
Muridkay	0	0	0	0	1	1	4	0	2	0	0	0	0	0	0	0	1	1	4	0	2	0	
Kotri	0	0	0	0	1	1	4	0	2	0	0	0	0	0	0	0	1	1	4	0	2	0	
	188	0	13	2	180	22	349	3	148	110	70	13	188	0	13	2	180	22	349	3	328	13	

Note: Interfaces count is subject to change.

ANNEX-D7: INTERFACE DETAILS - LINE

S #	Destination	Destination Port	Interface Type	Interface Detail
1	Gujranwala	12-SLD16/1	S-16.1,LC	2500mb/s-1310.00nm-LC-15Km(0.009mm)
2	Kamra	6-SLQ4/2	I-4,LC	622mb/s-1310.00nm-LC-10Km(0.009mm)
3	Taxila	5-SLQ4/3	S-4.1,LC	622mb/s-1310.00nm-LC-15Km(0.009mm)
4	Attock	11-SLQ4/1	S-4.1,LC	622mb/s-1310.00nm-LC-15Km(0.009mm)
5	Kohat	14-SLD4/1	S-4.1,LC	622mb/s-1310.00nm-LC-15Km(0.009mm)
6	Kamra	6-SLQ4/3	S-4.1,LC	622mb/s-1310.00nm-LC-15Km(0.009mm)
7	NewMultan	16-SLQ4/2	S-4.1,LC	622mb/s-1310.00nm-LC-15Km(0.009mm)
8	NewMultan	16-SLQ4/1	S-4.1,LC	622mb/s-1310.00nm-LC-15Km(0.009mm)
9	Rajanpur	14-SLD4/1	S-4.1,LC	622mb/s-1310.00nm-LC-15Km(0.009mm)
10	Layyah	5-SLD4/1	S-4.1,LC	622mb/s-1310.00nm-LC-15Km(0.009mm)
11	Lahore	31-SLQ4/1	S-4.1,LC	622mb/s-1310.00nm-LC-15Km(0.009mm)
12	Peshawar	12-SL4/1	S-4.1,LC	622mb/s-1310.00nm-LC-15Km(0.009mm)
13	Sargodha	7-SL4/1	S-4.1,LC	622mb/s-1310.00nm-LC-15Km(0.009mm)
14	Arifwala	8-SLD4/1	L-4.1,LC	622mb/s-1310.00nm-LC-40Km(0.009mm)

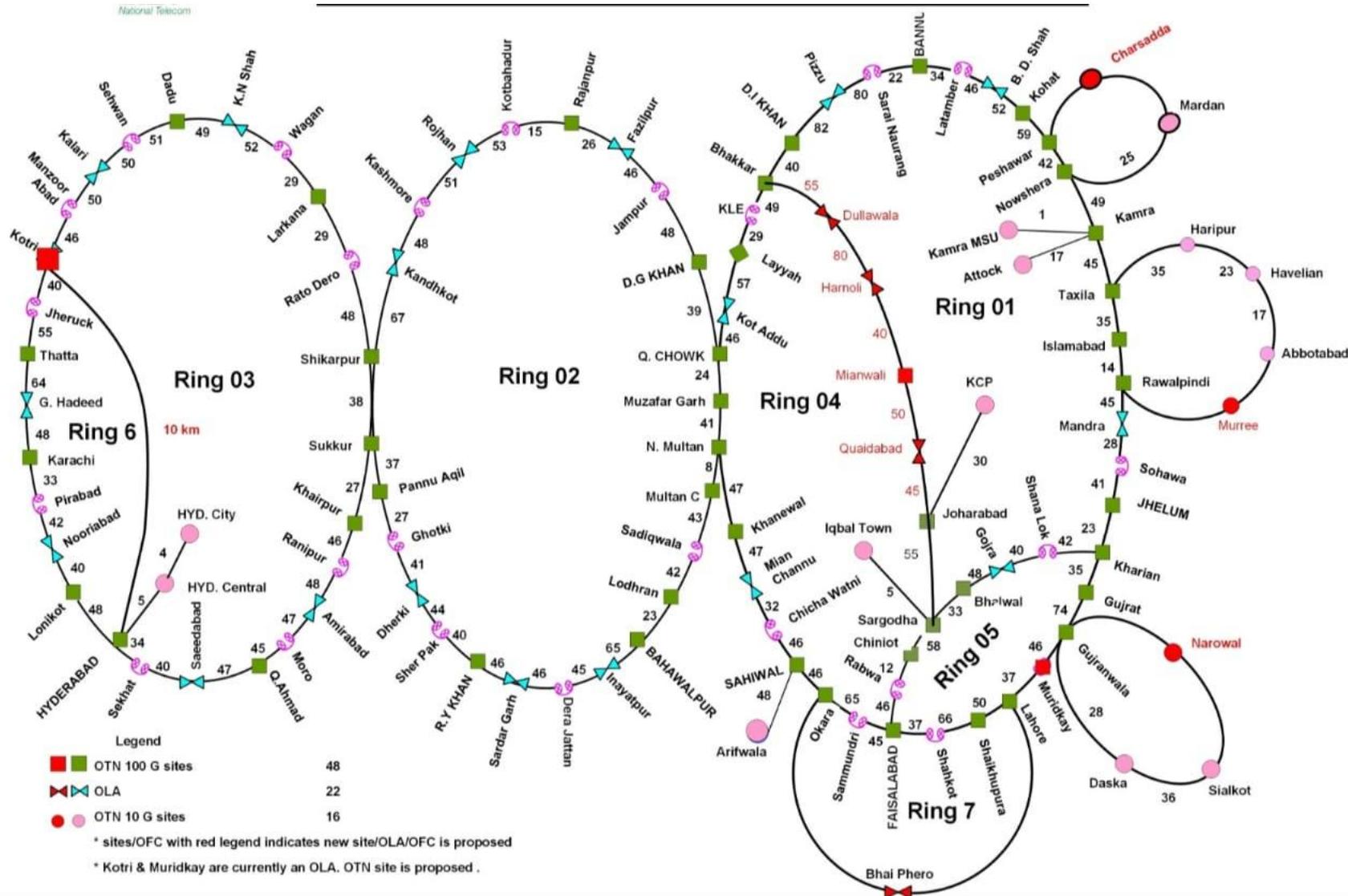
Note: Interface details are subject to change.

ANNEX-D7: INTERFACE DETAILS - FE/GE

E1	-	2 Mbps	188
FE Electrical	100BASE-TX, RJ45	2 Mbps to 100 Mbps	180
FE Optical	100BASE-LX , 1310-LC, SMF	2 Mbps to 100 Mbps	22
GE Optical	1000Base-LX, 1310-LC, 10km, SMF	2 Mbps to 1000 Mbps	349
GE Electrical	1000BASE-TX, RJ45	2 Mbps to 1000 Mbps	3
GE Optical	1000Base-VX, 1310-LC, 40 km, SMF	2 Mbps to 1000 Mbps	1
GE Optical	1000Base-ZX, 1550-LC, 80 km, SMF	2 Mbps to 1000 Mbps	1
10G Optical	10GBase-LR, 1310-LC, 10 km, SMF	upto 10000 Mbps	328
100 G Optical	100GBASE-LR4, 1310-LC, 10 km, SMF	upto 100 Gbps	13

Note: Interface details are subject to change.

ANNEX-D8: PROPOSED NETWORK DIAGRAM



ANNEX-E: SERVICE LEVEL AGREEMENT (SLA)

(To be signed between NTC and contractor for a period of ten (10) years at the time of signing of contract. Commencement of SLA period shall be from the date of issuance of FAC).

1 INTRODUCTION

This Service Level Agreement (SLA) defines the service scope, performance benchmarks, support levels, responsibilities, penalties, and governance framework for the DWDM/OTN network supplied and maintained by the contractor for NTC.

2 SCOPE OF SERVICES

The SLA covers supply, commissioning, operation, maintenance, and support of DWDM/OTN equipment including but not limited to optical line systems, ADMs, Amplifiers, Transponders, DCN Switches, DCN Routers, Servers, Rectifier, Battery Banks, NMS/PMS/BMS, Software Upgrades, Repair and Return of Faulty Modules along with protection and restoration mechanisms. The support service solution is made of the following:

- Backing/On-line/Telephonic Support Services
- On-Site and Remote Support Services
- Emergency Recovery Services
- Software and Patch Upgrade Services
- Repair and Return of Faulty Parts

3 SERVICE AVAILABILITY & PERFORMANCE

The contractor shall ensure minimum monthly network availability of 99.95% (excluding OFC Cuts). Availability shall be calculated on a monthly basis excluding approved maintenance.

4 DIAMOND LEVEL SUPPORT (24X7X365)

Diamond Level Support is a premium support service providing continuous 24x7x365 coverage, priority handling, and direct access to senior OEM resources.

5 FAULT SEVERITY CLASSIFICATION

Severity	Description
P1 - Critical	Complete network outage or major service impact
P2 - High	Significant degradation affecting multiple services
P3 - Medium	Partial service degradation
P4 - Low	Minor issue or informational request
P5- Repair and Return of faulty module	Repair and Return of faulty modules

6 RESPONSE & RESOLUTION TARGETS

Severity	Response Time	Resolution Time
P1	15 minutes	4 hours
P2	30 minutes	8 hours
P3	2 hours	16 hours
P4	4 hours	24 hours
P5	1 working day	60 Working days

7 PENALTIES & SERVICE COST

Penalties shall be applied as service cost against monthly invoices. The structure is simple, transparent, and enforceable.

SLA Breach	Penalty
Availability below 99.95%	5% monthly service cost
Availability below 99.5%	10% monthly service cost
P1 resolution breach	5% monthly service cost
P2 resolution breach	3% monthly service cost
P5 resolution breach	5% monthly service cost
Three SLA breaches in one quarter	Additional 5% monthly service cost

8 EQUIPMENT PURCHASING

During the 10 years post warranty SLA period, the contractor shall be bound to provide Spares (Equipment including licenses) at the same contractual rates for upgradation of nodes /Network.

9 ROLES & RESPONSIBILITIES

9.1 Contractor Responsibilities:

- Maintain DWDM/OTN network availability.
- Repair and Return of faulty modules.

9.2 NTC Responsibilities:

- Provide site access
- Approve maintenance windows

10 COMPLETION OF SLA PERIOD

Director (NOC) NTC HQs shall issue SLA completion certificate.

ANNEX-F: COMMERCIAL COMPLIANCE STATEMENT

S.No.	Description	Complied	Not Complied	Partially complied	Remarks
1	Invitation To E-Bids				
2	General Introduction				
3	Scope Of Work				
4	Qualification Criterion Of Bidders				
5	Cost Of Tendering				
6	Clarifications Of Tender Documents				
7	Engineering Survey & System Design				
8	Amendment Of Tender Documents				
9	Preparation Of Bid				
10	Language Of Bid Documents				
11	Price				
12	Bid Security				
13	Validity Of Bids				
14	Deadline For Submission Of Bid				
15	Opening Of Bid				
16	Responsiveness Of Bidders				
17	Evaluation Criterion For Most Advantageous Bidder				
18	Clarifications / Corrections Of Bid				
19	Commercial Compliance Statement				
20	Variation Order				
21	Spare Availability and Upgradation				
22	Award Criteria & NTC's Right				
23	Notification Of Award & Signing Of Contract Agreement				
	Contract Conditions				
1	Performance Security				
2	Contractors Responsibilities				
3	NTC Responsibilities				
4	Time For Completion				
5	Pre-Shipment Factory Inspection				
6	Equipment Delivery Verification				
7	Warranty / Services				
8	Provisional Acceptance Certificates				
9	Nil Deficiency Certificates				
10	Network Optimization & Performance Validation				
11	Training				
12	Liquidity Damages				
13	Payment Terms				
14	Final Acceptance Certificates				

S.No.	Description	Complied	Not Complied	Partially complied	Remarks
15	Amendment in Contract				
16	Waiver				
17	Severability				
18	Independent Contractors				
19	Survival				
20	Interpretation				
21	Counterparts				
22	Default By Contractor				
23	Arbitration And Applicable Law				
24	Force Majeure				
25	Termination For Insolvency				
26	Termination For Convenience				
27	Project Director				
28	Ultimate Consignee				
29	Debarment / Blacklisting Of Firm				
30	Integrity				
31	Declaration Of Beneficial Owners' Information				
32	Language				

ANNEX-G: BID SECURITY FORMAT

Bank Guarantee No. -----
Dated at Islamabad, the -----
Amount _____
Validity _____

To,

THE MANAGING DIRECTOR,
NATIONAL TELECOMMUNICATION CORPORATION
HEAD QUARTERS G-5/2
ISLAMABAD.

Dear Sir,

WHEREAS M/s _____ (hereinafter called the Tenderer) have requested us through _____ Bank Ltd., to furnish Bid Security by way of Bank Guarantee in your favour in the sum of _____ (IN FIGURE) _____ (IN WORDS) against your Tender Notice No. _____ dated _____ for _____.

WE HEREBY AGREE AND UNDERTAKE:

- i. To make unconditional payment _____ to you on demand without further question or reference to the Tenderer in case of withdrawal or modification of bid or any default or non-execution of the Contract or refusal to accept order by the Tenderer from the date of opening of bids until the expiry of the validity of their offer,
- ii. To keep this guarantee in full force from (date) _____ upto _____ (date) _____ the date until which the Tenderer's offer is valid.
- iii. To extend the period of guarantee if such extension be necessary beyond the date stated in para (ii) and as so desired by the tenderer.

Any claim arising out of this guarantee must be lodged with this Bank within the period the guarantee is valid and before the date of its expiry. After this date the guarantee will be considered null and void and should be returned to us.

Yours faithfully,

Name of the Bank: _____
Authorized officer's Signature & Seal:

ANNEX-H: PERFORMANCE BOND FORMAT

Bank Guarantee No. -----
Date of Issue -----
Valid upto -----
Value (Rs.) -----

FROM: _____

TO,
THE MANAGING DIRECTOR,
NATIONAL TELECOMMUNICATION CORPORATION
HEAD QUARTERS G-5/2
ISLAMABAD.

SUBJECT: B/G AND DATE FOR _____ ON BEHALF OF _____ FOR
DUE AND FAITHFUL PERFORMANCE ORDER NO. _____
DATED _____.

Whereas M/s _____ (hereinafter called the Supplier) have
requested us to furnish a Bank Guarantee in your favour in the sum _____ (IN WORDS)
_____ as performance security against order
No.. _____ dated _____ to be concluded between the Supplier and National
Telecommunication Corporation HQs G-5/2 Islamabad.

WE HEREBY AGREE:

- 1). To make an un-conditional payment of _____ to you on demand without any further question or reference to the Supplier upon failure of the Supplier to perform the Order for which you will be the sole judge.
- 2). To keep this guarantee valid in full force from this date upto the time of the due and faithful completion of the Order under reference (the schedule of implementation shall be as described in the Purchase order and its subsequent amendments) or till _____ whichever date is later. The faithful completion of the order by the Supplier will be intimated by the NTC.
- 3). To extend the period of the enforceability of this guarantee if such extension be necessary or desired by you of us. All claims thereunder must be submitted to the Bank of _____ on or before the expiry date mentioned in this guarantee are the date mentioned in its extensions issued from time to time, after which this guarantee will become null and void and should be returned to us. Irrespective of its return, we shall consider ourselves fully discharged from any obligation there under after the said expiry date.

Dated This Day of

Authorized Signature:

& Seal of bank

ANNEX-I: DECLARATION OF BENEFICIAL OWNER INFORMATION

Declaration of Ultimate Beneficial Owners Information for Public Procurement Contracts

1. Name
2. Father's Name/Spouse's Name
3. CNIC/NICOP/Passport no.
4. Nationality
5. Residential address
6. Email address
7. Date on which shareholding, control or interest acquired in the business.
8. In case of indirect shareholding, control or interest being exercised through intermediary companies, entities or other legal persons or legal arrangements in the chain of ownership or control, following additional particulars to be provided:

1	2	3	4	5	6	7	8	9	10
Name	Legal form (Company/Limited Liability Partnership/Association of Persons/Single Member Company/ Partnership Firm/ Trust/Any other individual, body corporate (to be specified))	Date of incorporation	Name of registering authority	Business Address	Country	Email address	Percentage of shareholding, control or interest of BO in the legal person or legal arrangement	Percentage of shareholding, control or interest of legal person or legal arrangement in the Company	Identity of Natural Person who ultimately owns or controls the legal person or arrangement

9. Information about the Board of Directors (details shall be provided regarding number of shares in the capital of the company as set opposite respective names).

1	2	3	4	5	6	7	8
Name and surname (In Block Letters)	CNIC No. (in case of foreigner, Passport No)	Father's/ Husband's Name in full	Current Nationality	Any other Nationality (ies)	Occupation	Residential address in full or the registered/ principal office address for a subscriber other than natural person	Number of shares taken by each subscriber (in figures and words)
			Total number of shares taken (in figures and words)				

10. Any other information incidental to or relevant to Beneficial Owner(s).

Name & signature

(Person authorized to issue notice on behalf of the company)