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GovTech/ACCESS/PMU/2026-27/635

September 01, 2026

AMENDMENT No. 1

Subject: **Amendment No. 1 to Request for Bids (RFB)**

Ref: Accelerating Transport and Trade Connectivity in Eastern South Asia – Bhutan Phase 2 Project (ACCESS)- Request for Bids (RFB)-
Supply, Installation, and Commissioning of Equipment – Government Networks Core and Middle-Mile Infrastructure Enhancement
 (Reference No: **ACCESS/GovTech/GD-1**)

The following amendment No.1 is issued to Request for Bids (RFB)- **Supply, Installation, and Commissioning of Equipment – Government Networks Core and Middle-Mile Infrastructure Enhancement** published by GovTech Agency.

Sl. No	Clause Reference	Existing Clause statement	Amended clause statement
1	Section III - Evaluation and Qualification Criteria TECHNICAL PART 1. Qualification Qualification Criteria (ITB 32.1)	(c) General Experience: The Bidder shall have five (5) years of overall experience in the supply of Goods related to networking/ telecommunication equipment. For a joint venture, this requirement must be met by each member	(c) General Experience: The Bidder shall have five (5) years of overall experience in the supply of Goods related to IT/ networking/ telecommunication equipment. For a joint venture, this requirement must be met by each member.

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	(c) General Experience		
2	Section III - Qualification Criteria (ITB 32.1) (d) Specific Experience	a. Lot-1: Value of at least US\$ 3 Million or equivalent. The contract will be treated as similar if it includes supply, installation, and commissioning of active network equipment such as high-end service-provider-grade routers and switches.	a. Lot-1: Value of at least US\$ 1.5 Million or equivalent. The contract will be treated as similar if it includes supply, installation, and commissioning of active network equipment such as high-end service-provider-grade routers and switches.
3	Section III - Evaluation and Qualification Criteria. THE NON-PRICE FACTORS/ TECHNICAL FEATURES AND THE CORRESPONDING SCORES ARE: (LOT-1, LOT-2, LOT-3)	3. Qualification of Key Project Team Personnel 3.1 Project Manager Certification Certified Project Manager (PMP, PRINCE2 Practitioner, or Agile PM)	3. Qualification of Key Project Team Personnel 3.1 Project Manager Certification Certified Project Manager (PMP or PRINCE2 Practitioner or Agile PM)
4	Section VII- Schedule of Requirements, 6.3 SCOPE OF WORKS. 6.3.1 LOT-1: Supply, Installation, and Commissioning of Core/Aggregation Routers,	f. The contractor shall decommission the network equipment listed in ANNEXURE-I-E and ANNEXURE-II-I strictly in accordance with the decommissioning plan approved by the purchaser.	f. The contractor shall decommission the network equipment listed in ANNEXURE-I-E strictly in accordance with the decommissioning plan approved by the purchaser. Upon completion of decommissioning, the contractor shall:

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	Repeater Switches, Agency Routers, Aggregation Switches and CPE. 3. Configuration, Transportation and Installation:		• Safely dismantle and pack all decommissioned equipment and associated accessories; • The contractor shall transport the decommissioned equipment to the designated Dzongkhag ICT Office, Dzongkhag Server Room, or other handover location identified in the Annexure I-E. The contractor shall include all associated dismantling, packing, handling, loading, transportation, unloading, inventory preparation, and handover costs in its bid. Handover shall be evidenced by an inventory and condition report signed by the contractor and the Purchaser's authorized receiving official.
5	Section VII- Schedule of Requirements, ANNEXURE-I-E List of equipment to be decommissioned	ANNEXURE-I-E	The quantity stated against each location represents the actual number of units to be decommissioned at that location. The total quantities under Annexure I-E are: Cisco ISR 4321 – 137 units; Cisco C1900 – 1 unit; Cisco

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			1841 – 1 unit; Juniper EX4300-32F – 12 units; and Cisco ISR4351 – 1 unit. Unless specifically identified by the Purchaser for continued reuse at the existing site, all power supplies, cables, modules, mounting accessories, and other accessories associated with the listed equipment shall be dismantled, packed, transported, inventoried, and handed over together with the principal equipment. Bidders shall include the cost of these activities in their bid price. Updated ANNEXURE-I-E to be attached.
6	Section VII- Schedule of Requirements, 6.3 SCOPE OF WORKS. 6.3.2 LOT-2: Supply, Installation, and Commissioning of DWDM System, Optical Modules, and Accessories. 10. Configuration, Integration and Commissioning	Additional clause (i)	(i). The contractor shall decommission the network equipment listed in ANNEXURE-II-I strictly in accordance with the decommissioning plan approved by the purchaser. Upon completion of decommissioning, the contractor shall:

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			• Safely dismantle and pack all decommissioned equipment and associated accessories; • The contractor shall transport the decommissioned equipment to the designated Dzongkhag ICT Office, Dzongkhag Server Room, or other handover location identified in the Annexure II-I. The contractor shall include all associated dismantling, packing, handling, loading, transportation, unloading, inventory preparation, and handover costs in its bid. Handover shall be evidenced by an inventory and condition report signed by the contractor and the Purchaser's authorized receiving official.
7	Section VII- Schedule of Requirements, ANNEXURE-II-I	ANNEXURE-II-I	The Lot 2 decommissioning scope includes: (a) 118 CWDM Mux/DeMux units located across the 59 links identified in Table A; and

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	List of sites to decommission CWDM Mux/DeMux		(b) 57 DWDM Mux units located at the sites identified in Table B. Accordingly, the total number of units included in the decommissioning scope is 175. The contractor's price shall include dismantling, packing, handling, transportation, inventory preparation, and formal handover of all such equipment. Unless specifically identified by the Purchaser for continued reuse at the existing site, all power supplies, cables, modules, mounting accessories, and other accessories associated with the listed equipment shall be dismantled, packed, transported, inventoried, and handed over together with the principal equipment. Bidders shall include the cost of these activities in their bid price. Updated ANNEXURE-II-I to be attached.
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8	Section III – Evaluation and Qualification Criteria. TECHNICAL PART 1. Qualification Qualification Criteria (ITB 32.1). (h) Cyber Security Compliance:	a. At least one member of the proposed project team in Lot-1 must hold one of the following cybersecurity certifications: <i>GIAC Security Essentials (GSEC) or ISC2 Certified in Cybersecurity (CC) or EC-Council Certified Network Defender (CND)</i>. b. All proposed equipment provided under Lot-1 must comply with the guidelines set forth in NIST SP 800-193. Lot-1 bidders must submit Manufacturer Attestation on the compliance. c. All bidders of Lot-1, Lot-2 and Lot-3 must align their deployment practices with the CIS Critical Security Controls and NIST SP 800-53 to ensure secure integration of the proposed equipment. Bidders must submit their compliance activities in their Installation and Related Services Methodology.	a. At least one member of the proposed project team in Lot-1 must hold one of the following cybersecurity certifications: <i>GIAC Security Essentials (GSEC) or ISC2 Certified in Cybersecurity (CC) or EC-Council Certified Network Defender (CND) or equivalent.</i> b. All proposed equipment provided under Lot-1 must comply with the guidelines set forth in NIST SP 800-193 or equivalent. Lot-1 bidders must submit Manufacturer Attestation on the compliance. c. All bidders of Lot-1, Lot-2 and Lot-3 must align their deployment practices with the CIS Critical Security Controls and NIST SP 800-53 to ensure secure integration of the proposed equipment. Bidders must submit their compliance activities in their Installation and Related Services Methodology. Where an equivalent certification or standard is proposed, the bidder shall submit sufficient documentary evidence, including details of the issuing organization and a
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			comparative matrix demonstrating that the proposed certification or standard covers substantially equivalent competencies, security controls, and requirements. An unsupported declaration of equivalence shall not be sufficient. Equivalence shall be determined solely based on the information submitted with the bid. For equipment compliance, the manufacturer's attestation should identify the applicable standard and demonstrate compliance or equivalence requirement by requirement.
9	Section VII - Schedule of Requirements, 3. Technical Specifications, Lot-2: Supply, Installation, and Commissioning of DWDM System, Optical Modules, and Accessories. Item No. 12: 1G DWDM SFP (CH20-CH35/CH21-CH36)->=40km	1G-DWDM SFP CH21-CH36 100GHz DOM Duplex LC/UPC SMF Optical Transceiver Module Wavelength: 1548.51nm-1560.61nm Form Factor: SFP Interface: Singlemode Connector: LC-Duplex/UPC Distance: >=40km Bandwidth:>=1Gbps TX Power: >=0dBm Receiver Sensitivity: <= -24dBm Power Consumption: <=2W	1G-DWDM SFP CH20-CH35/CH21-CH36 100GHz DOM Duplex LC/UPC SMF Optical Transceiver Module Wavelength:(1561.41nm-1549.32nm)/(1560.61nm-1548.51nm) Form Factor: SFP Interface: Singlemode Connector: LC-Duplex/UPC Distance: >=40km Bandwidth:>=1Gbps TX Power: >=0dBm

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		Digital Diagnostic Management (DDM)/Digital Optical Monitoring (DOM): YES Temperature Range: 0 to 70°C Note: Channel will be specified during the supply order	Receiver Sensitivity: <= -24dBm Power Consumption: <=2W Digital Diagnostic Management (DDM)/Digital Optical Monitoring (DOM): YES Temperature Range: 0 to 70°C Note: Channel will be specified during the supply order
10	Section VII - Schedule of Requirements, 3. Technical Specifications, Lot-2: Supply, Installation, and Commissioning of DWDM System, Optical Modules, and Accessories. Item No. 13: 1G DWDM SFP (CH20-CH35/CH21-CH36)->=80km	1G-DWDM SFP CH21-CH36 100GHz DOM Duplex LC/UPC SMF Optical Transceiver Module Wavelength: 1548.51nm-1560.61nm Interface: Singlemode Connector: LC-Duplex/UPC Distance: >=80km Form Factor: SFP Bandwidth:>=1Gbps TX Power: >=0 dBm Receiver Sensitivity: <=-24dBm Power Consumption: <=2W Digital Diagnostic Management (DDM)/Digital Optical Monitoring (DOM): YES Temperature Range: 0 to 70°C Note: Channel will be specified during the supply order	1G-DWDM SFP CH20-CH35/CH21-CH36 100GHz DOM Duplex LC/UPC SMF Optical Transceiver Module Wavelength:(1561.41nm-1549.32nm)/(1560.61nm-1548.51nm) Interface: Singlemode Connector: LC-Duplex/UPC Distance: >=80km Form Factor: SFP Bandwidth:>=1Gbps TX Power: >=0 dBm Receiver Sensitivity: <=-24dBm Power Consumption: <=2W Digital Diagnostic Management (DDM)/Digital Optical Monitoring (DOM): YES Temperature Range: 0 to 70°C Note: Channel will be specified during the supply order.

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11	Section VII - Schedule of Requirements, 3. Technical Specifications, Lot-2: Supply, Installation, and Commissioning of DWDM System, Optical Modules, and Accessories. Item No. 14: 1G DWDM SFP (CH20-CH35/CH21-CH36)->=120km	1G-DWDM SFP CH21-CH36 100GHz DOM Duplex LC/UPC SMF Optical Transceiver Module Wavelength: 1548.51nm-1560.61nm Form Factor: SFP Interface: Singlemode Connector: LC-Duplex/UPC Distance: >=120km Bandwidth:>=1Gbps TX Power: >=0 dBm Receiver Sensitivity: <= -30dBm Power Consumption: <=1.5W Digital Diagnostic Management (DDM)/Digital Optical Monitoring (DOM): YES Temperature Range: 0 to 70°C Note: Channel will be specified during the supply order	1G-DWDM SFP CH20-CH35/CH21-CH36 DOM Duplex LC/UPC SMF Optical Transceiver Module Wavelength:(1561.41nm-1549.32nm)/(1560.61nm-1548.51nm) Form Factor: SFP Interface: Singlemode Connector: LC-Duplex/UPC Distance: >=120km Bandwidth:>=1Gbps TX Power: >=0 dBm Receiver Sensitivity: <= -30dBm Power Consumption: <=1.5W Digital Diagnostic Management (DDM)/Digital Optical Monitoring (DOM): YES Temperature Range: 0 to 70°C Note: Channel will be specified during the supply order
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12	Section VII - Schedule of Requirements, 3. Technical Specifications, Lot-2: Supply, Installation, and Commissioning of DWDM System, Optical Modules, and Accessories. Item No. 15 : 10G DWDM SFP+ (CH20-CH35/CH21-CH36)-40km	10G DWDM SFP+ CH21-CH36 100GHz 40km DOM Duplex Duplex LC SMF Transceiver Module Wavelength: 1548.51nm-1560.61nm Form Factor: SFP+ Media: Single Mode Fiber Connector: Duplex LC Distance: 40km Bandwidth: >=10Gbps Channel Spacing: 100GHz (C-Band) Distance: 40km Digital Diagnostic Management (DDM)/Digital Optical Monitoring (DOM) Support: Yes Power Consumption:<=2W TX Power: >=-1dBm Receiver Sensitivity: <= -15 dBm Supported Protocols: 10G Ethernet Temperature Range: 0 to 70°C Note:Channel will be specified during the supply order	10G DWDM SFP+ CH20-CH35/CH21-CH36 100GHz 40km DOM Duplex Duplex LC SMF Transceiver Module Wavelength:(1561.41nm-1549.32nm)/(1560.61nm-1548.51nm) Form Factor: SFP+ Media: Single Mode Fiber Connector: Duplex LC Distance: 40km Bandwidth: >=10Gbps Channel Spacing: 100GHz (C-Band) Distance: 40km Digital Diagnostic Management (DDM)/Digital Optical Monitoring (DOM) Support: Yes Power Consumption:<=2W TX Power: >=-1dBm Receiver Sensitivity: <= -15 dBm Supported Protocols: 10G Ethernet Temperature Range: 0 to 70°C Note:Channel will be specified during the supply order
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13	Section VII - Schedule of Requirements, 3. Technical Specifications, Lot-2: Supply, Installation, and Commissioning of DWDM System, Optical Modules, and Accessories. Item No. 16 : 10G DWDM SFP+ (CH20-CH35/CH21-CH36)-80km	10G DWDM SFP+ CH21-CH36 100GHz 80km DOM Duplex Duplex LC SMF Transceiver Module Wavelength: 1548.51nm-1560.61nm Form Factor: SFP+ Media: Single Mode Fiber Connector: Duplex LC Distance: 80km Bandwidth: >= 10Gbps Channel Spacing: 100GHz (C-Band) Distance: 80km Digital Diagnostic Management (DDM)/Digital Optical Monitoring (DOM) Support: Yes Power Consumption:<=2W TX Power: >= -2dBm Receiver Sensitivity: <= -22dBm Supported Protocols: 10G Ethernet Temperature Range: 0 to 70°C	10G DWDM SFP+ CH20-CH35/CH21-CH36 100GHz 80km DOM Duplex Duplex LC SMF Transceiver Module Wavelength:(1561.41nm-1549.32nm)/(1560.61nm-1548.51nm) Form Factor: SFP+ Media: Single Mode Fiber Connector: Duplex LC Distance: 80km Bandwidth: >= 10Gbps Channel Spacing: 100GHz (C-Band) Distance: 80km Digital Diagnostic Management (DDM)/Digital Optical Monitoring (DOM) Support: Yes Power Consumption:<=2W TX Power: >= -2dBm Receiver Sensitivity: <= -22dBm Supported Protocols: 10G Ethernet Temperature Range: 0 to 70°C Note: Channel will be specified during the supply order
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14	Section VII - Schedule of Requirements, 3. Technical Specifications, Lot-2: Supply, Installation, and Commissioning of DWDM System, Optical Modules, and Accessories. Item No. 17 : 10G DWDM SFP+ (CH20-CH35/CH21-CH36)-100km	10G DWDM SFP+ CH21-CH36 100GHz 100km DOM Duplex Duplex LC SMF Transceiver Module Wavelength: 1548.51nm-1560.61nm Form Factor: SFP+ Media: Single Mode Fiber Connector: Duplex LC Distance: 100km Bandwidth: >=10Gbps Channel Spacing:100GHz(C-Band) Distance: 100km Digital Diagnostic Management (DDM)/Digital Optical Monitoring (DOM) Support: Yes Power Consumption:<=2W TX Power: >=0 dBm Receiver Sensitivity: <= -24dBm Supported Protocols: 10G Ethernet Temperature Range: 0 to 70°C Note: Channel will be specified during the supply order	10G DWDM SFP+ CH20-CH35/CH21-CH36 100GHz 100km DOM Duplex Duplex LC SMF Transceiver Module Wavelength:(1561.41nm-1549.32nm)/(1560.61nm-1548.51nm) Form Factor: SFP+ Media: Single Mode Fiber Connector: Duplex LC Distance: 100km Bandwidth: >=10Gbps Channel Spacing:100GHz(C-Band) Distance: 100km Digital Diagnostic Management (DDM)/Digital Optical Monitoring (DOM) Support: Yes Power Consumption:<=2W TX Power: >=0 dBm Receiver Sensitivity: <= -24dBm Supported Protocols: 10G Ethernet Temperature Range: 0 to 70°C Note: Channel will be specified during the supply order
15	Section VII - Schedule of Requirements, 3. Technical Specifications, Lot-2: Supply, Installation, and Commissioning of DWDM	DWDM Channel Support: Minimum 16 Channels DWDM Wavelength: CH21-CH36 in ITU G.694.1 standard DWDM region Channel Spacing: 100GHz (0.8nm)	DWDM Channel Support: Minimum 16 Channels

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	System, Optical Modules, and Accessories. Item No. 32: 16CH DWDM Mux/DeMux for 1G/10G DWDM Links	Ports & Feature Support: - Monitor Port: Support to monitor optical power levels of the DWDM C-band signals without interrupting live traffic. - Expansion Port: Should support add/drop of future channels and linking additional Mux/DeMux modules. - 1310 nm Port: For Management - Line Port: Dual Fiber - Separate fiber port for transmit and receive - DWDM CH Port: Minimum 16 CH Dual Fiber - Input and Output Connector: LC/UPC Insertion Loss (IL): - Typical IL: ≤ 4.5 dB - Maximum IL: ≤ 5 dB (for full 16 channels with monitor and expansion/1310 nm ports) Channel isolation: - Adjacent ≥ 30 dB - Non-adjacent ≥ 40 dB Channel Passband: ± 0.1 nm Passband Ripple: ≤ 0.5 dB Return Loss: ≥ 45 dB	DWDM Wavelength: CH20-CH35/CH21-CH36 in ITU G.694.1 standard DWDM region Channel Spacing: 100GHz (0.8nm) Ports & Feature Support: - Monitor Port: Support to monitor optical power levels of the DWDM C-band signals without interrupting live traffic. - Expansion Port: Should support add/drop of future channels and linking additional Mux/DeMux modules. - 1310nm or 1511nm Port: For Management - Line Port: Dual Fiber - Separate fiber port for transmit and receive - DWDM CH Port: Minimum 16 CH Dual Fiber - Input and Output Connector: LC/UPC Insertion Loss (IL): - Typical IL: ≤ 4.5 dB - Maximum IL: ≤ 5 dB (for full 16 channels with monitor and expansion including 1310nm or 1511nm ports)
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		1U, 19'' rack mount chassis (Mounting kit to be provided) Supported Protocol: At least 1G, 10G and 25G Ethernet Operating Temperature: -40 to 75°C Storage Temperature: -40 to 80°C Warranty: Minimum 1 year NOTE: DWDM Mux/DeMux should be proposed in line with the existing in-use fiber type - G.652D SMF, should be compatible with proposed 1G and 10G DWDM transceivers and existing 1G/10G DWDM transceivers.	Channel isolation: - Adjacent $\geq 30\text{dB}$ - Non-adjacent $\geq 40\text{dB}$ Channel Passband: $\pm 0.1\text{nm}$ Passband Ripple: $\leq 0.5\text{dB}$ Return Loss: $\geq 45\text{dB}$ 1U, 19'' rack mount chassis (Mounting kit to be provided) Supported Protocol: At least 1G, 10G and 25G Ethernet Operating Temperature: -40 to 55°C Storage Temperature: -40 to 80°C Warranty: Minimum 1 year NOTE: DWDM Mux/DeMux should be proposed in line with the existing in-use fiber type - G.652D SMF, should be compatible with proposed 1G and 10G DWDM transceivers and existing 1G/10G DWDM transceivers.
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16	Section VII - Schedule of Requirements, 3. Technical Specifications, Lot-2: Supply, Installation, and Commissioning of DWDM System, Optical Modules, and Accessories. Item No. 33: DWDM Mux/DeMux for 400Gbps DWDM Coherent links	400G Compatibility: The bidder must certify that the passive filters in the proposed DWDM Mux/DeMux modules support 400G ZR/ZR+ (OpenZR+) coherent signals with Tx Spectral Shaping enabled, with a filtering-induced OSNR penalty of ≤ 1.5 dB. The passive filters must also support 300G, 200G and 100G coherent signals. Proposed DWDM Mux/DeMux modules must be Open Line System compatible. DWDM Channel Support: Minimum 4 Channels DWDM Wavelength: Fixed Grid - CH31-CH34 in ITU G.694.1 standard DWDM region Channel Spacing: 100GHz (0.8nm) Ports & Feature Support: - Monitor Port: Support to monitor optical power levels of the DWDM C-band signals without interrupting live traffic. - Expansion Port: Should Supports add/drop of future channels and linking additional Mux/DeMux modules. - OSC Port: For Management	400G Compatibility: The bidder must certify that the passive filters in the proposed DWDM Mux/DeMux modules support 400G ZR/ZR+ (OpenZR+) coherent signals with Tx Spectral Shaping enabled, with a filtering-induced OSNR penalty of ≤ 1.5 dB. The passive filters must also support 300G, 200G and 100G coherent signals. Proposed DWDM Mux/DeMux modules must be Open Line System compatible. DWDM Channel Support: Minimum 4 Channels DWDM Wavelength: Fixed Grid - CH31-CH34/CH32-CH35 in ITU G.694.1 standard DWDM region Channel Spacing: 100GHz (0.8nm) Ports & Feature Support: - Monitor Port: Support to monitor optical power levels of the DWDM C-band signals without interrupting live traffic.
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		- Line Port: Dual Fiber - Separate fiber port for transmit and receive - DWDM CH Port: Minimum 4 CH Dual Fiber - Input and Output Connector: LC/UPC Insertion Loss (IL): - Typical IL: ≤ 2 dB - Maximum IL: ≤ 3.5 dB (for full 4 channels with monitor and expansion/OSC ports) Channel isolation: - Adjacent ≥ 25dB - Non-adjacent ≥ 40dB Effective Clear Passband: The filter shall provide a minimum Effective Clear Passband of 52 GHz centered on the ITU frequency. Within this bandwidth, the maximum Insertion Loss Ripple shall not exceed 0.5 dB.	- Expansion Port: Should Supports add/drop of future channels and linking additional Mux/DeMux modules. - OSC Port: For Management - Line Port: Dual Fiber - Separate fiber port for transmit and receive - DWDM CH Port: Minimum 4 CH Dual Fiber - Input and Output Connector: LC/UPC Insertion Loss (IL): - Typical IL: ≤ 2 dB - Maximum IL: ≤ 3.5 dB (for full 4 channels with monitor and expansion/OSC ports) Channel isolation: - Adjacent ≥ 25dB
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		-3dB Bandwidth: The filter -3dB Bandwidth shall be ≥ 65 GHz to minimize spectral clipping for 400G coherent signals operating at ~ 60 Gbaud. Grid Compatibility: The filters shall support a 100 GHz ITU-T fixed grid (G.694.1). The passive filter shall exhibit a maximum Polarization Dependent Loss (PDL) of ≤ 0.5 dB (Typical) to 1 dB (Maximum) across the Effective Clear Passband. The filter shall maintain a Group Delay Ripple (GDR) of ≤ 5 ps to 10 ps peak-to-peak within the 52 GHz Effective Clear Passband. Return Loss: ≥ 45dB 1U, 19'' rack mount chassis (Mounting kit to be provided) Supported Protocol: Atleast 100G, 200G, 300G, 400G Ethernet Operating Temperature: -5 to 70°C Storage Temperature: -40 to 75°C Warranty: Minimum 1 Year warranty NOTE: DWDM Mux/DeMux should be proposed in line with the existing in-use fiber type - G.652D	- Non-adjacent ≥ 40dB Effective Clear Passband: The filter shall provide a minimum Effective Clear Passband of 52 GHz centered on the ITU frequency. Within this bandwidth, the maximum Insertion Loss Ripple shall not exceed 0.5 dB. -3dB Bandwidth: The filter -3dB Bandwidth shall be ≥ 65 GHz to minimize spectral clipping for 400G coherent signals operating at ~ 60 Gbaud. Grid Compatibility: The filters shall support a 100 GHz ITU-T fixed grid (G.694.1). The passive filter shall exhibit a maximum Polarization Dependent Loss (PDL) of ≤ 0.5 dB (Typical) to 1 dB (Maximum) across the Effective Clear Passband.
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		SMF and compatible with existing amplifiers /DWDM Line systems used by the purchaser.	The filter shall maintain a Group Delay Ripple (GDR) of ≤ 5 ps to 10 ps peak-to-peak within the 52 GHz Effective Clear Passband. Return Loss: ≥ 45dB 1U, 19'' rack mount chassis (Mounting kit to be provided) Supported Protocol: Atleast 100G, 200G, 300G, 400G Ethernet Operating Temperature: -5 to 55°C Storage Temperature: -40 to 75°C Warranty: Minimum 1 Year warranty NOTE: DWDM Mux/DeMux should be proposed in line with the existing in-use fiber type - G.652D SMF and compatible with existing amplifiers/DWDM Line systems used by the purchaser.
17	Section VII - Schedule of Requirements, 3. Technical Specifications, Lot-2: Supply, Installation, and Commissioning of DWDM System, Optical Modules, and Accessories.	1. System Architecture: a. The DWDM line system shall be a modular or integrated platform capable of operating as: - Inline amplifier node (BA + PreAmp) - Terminal node with DWDM Mux/DeMux (inbuilt or modular)	1. System Architecture: a. The DWDM line system shall be a modular or integrated platform capable of operating as: - Inline amplifier node (BA + PreAmp)

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	Item No. 34: DWDM Line System	b. The system shall support bidirectional operation using separate fibers for Tx and Rx. c. The system shall support coherent and non-coherent DWDM signals simultaneously on the same fiber. 2. Optical Amplifiers (EDFA): a. Booster Amplifier (BA) - Optical amplifier type: EDFA (C-band) - Output power: - Minimum +20 dBm total composite output power - Scalable / configurable up to +23 dBm (or higher) and down to +5 dBm - Gain: Scalable from 5-25 dB - Input power: Minimum range -23 to 16 dBm - Automatic gain control (AGC) and automatic power control (APC) - Suitable for driving long-haul DWDM fiber spans b. Pre-Amplifier (PreAmp) - Optical amplifier type: EDFA (C-band) - Gain: Scalable from 5 to 35 dB (with tilt-controlled operation) - Output power: - Minimum +20 dBm	- Terminal node with DWDM Mux/DeMux (inbuilt or modular) b. The system shall support bidirectional operation using separate fibers for Tx and Rx. c. The system shall support coherent and non-coherent DWDM signals simultaneously on the same fiber. 2. Optical Amplifiers (EDFA): a. Booster Amplifier (BA) - Optical amplifier type: EDFA (C-band) - Output power: - Minimum +20 dBm total composite output power - Scalable / configurable up to +23 dBm (or higher) and down to +5 dBm - Gain: Scalable from 5-23dB - Input power: Minimum range -23 to 10dBm
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		- Scalable / configurable up to +23 dBm (or higher) and down to +5 dBm - High sensitivity receiver amplifier optimized for low input power. - Input power: Minimum range -40 to 2 dBm - Low noise figure: ≤ 6 dB - Support for Automatic gain and power control 3. Integrated/Modular DWDM Mux / DeMux - The line system shall include DWDM Mux/DeMux modules (integrated or modular). - Minimum channel capacity: Minimum 8 DWDM channels (C-band) - Channel grid support: ITU-T grid compatible and Support for 150GHz, 100 GHz, 75 GHz and 50 GHz - Must support flexible grid (Flex-Grid) operation suitable for coherent 400G per channel (reconfigurable - Software-defined) - Optical specifications: - Insertion Loss (IL): Typical IL: ≤ 5 dB, Maximum IL: ≤ 6.5 dB (for full 4 channels with monitor, 1310 nm ports) - Return Loss ≥ 40 dB	- Automatic gain control (AGC) and automatic power control (APC) - Suitable for driving long-haul DWDM fiber spans b. Pre-Amplifier (PreAmp) - Optical amplifier type: EDFA (C-band) - Gain: Scalable from 5 to 25dB (with tilt-controlled-operation) - Output power: - Minimum +17 dBm - Scalable / configurable up to +23 dBm (or higher)-and down to +5 dBm - High sensitivity receiver amplifier optimized for low input power. - Input power: Minimum range -35 to 2 dBm - Low noise figure - measured at nominal gain (25 dB) across the C-Band: ≤ 6 dB - Support for Automatic gain and power control c. Amplifier Features (Mandatory) - Independent control of BA and PreAmp
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		- Ports & Feature Support: - Monitor Port: Support to monitor optical power levels of the DWDM C-band signals without interrupting live traffic. - Line Port: Dual Fiber - Separate fiber port for transmit and receive - DWDM CH Port DWDM Mux/DeMux Module: Minimum 8 CH Dual Fiber - Input and Output Connector: LC/UPC - Channel isolation: - Adjacent $\geq 20\text{dB}$ - Non-adjacent $\geq 25\text{dB}$ - Effective Clear Passband: $\geq 100\text{ GHz}$ - -3dB Bandwidth for 400G coherent signals operating at $\sim 60\text{Gbaud}$: $\geq 75\text{ GHz}$ - Polarization Dependent Loss (PDL): ≤ 0.5 Section VII - Schedule of Requirements 181 dB (Typical) across the Effective Clear Passband. - Group Delay Ripple (GDR): $\leq 5\text{ ps}$ peak-to-peak within Effective Clear Passband. c. Amplifier Features (Mandatory) - Independent control of BA and PreAmp - Optical input/output power monitoring	- Optical input/output power monitoring - Fast transient control to support add/drop and channel changes - Built-in protection against optical overload 3. Integrated/Modular DWDM Mux / DeMux - The line system shall include DWDM Mux/DeMux modules (integrated or modular). - Minimum channel capacity: Minimum 8 DWDM channels (C-band) - Channel grid support: ITU-T grid compatible and Support for 150GHz, 100 GHz, 75 GHz and 50 GHz - Must support flexible grid (Flex-Grid) operation suitable for coherent 400G per channel (reconfigurable - Software-defined) - Optical specifications: - Insertion Loss (IL): Typical IL: $\leq 5\text{ dB}$, Maximum IL: $\leq 6.5\text{ dB}$ (for full 4 channels with monitor, 1310 nm ports)
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		- Fast transient control to support add/drop and channel changes - Built-in protection against optical overload 4. Integrated/Modular DWDM Mux / DeMux - The line system shall include an DWDM Mux/DeMux modules (integrated or modular). - Minimum channel capacity: Minimum 8 DWDM channels (C-band) - Channel grid support: ITU-T grid compatible and Support for 150GHz, 100 GHz, 75 GHz and 50 GHz - Must support flexible grid (Flex-Grid) operation suitable for coherent 400G per channel - Optical specifications: - Insertion Loss (IL): Typical IL: ≤ 4.5 dB, Maximum IL: ≤ 5 dB (for full 4 channels with monitor, 1310 nm ports) - Return Loss ≥ 45 dB - Ports & Feature Support: - Monitor Port: Support to monitor optical power levels of the DWDM C-band signals without interrupting live traffic. - Line Port: Dual Fiber - Separate fiber port for transmit and receive - DWDM CH Port DWDM Mux/DeMux Module: Minimum 8 CH Dual Fiber	- Return Loss ≥ 40 dB - Ports & Feature Support: - Monitor Port: Support to monitor optical power levels of the DWDM C-band signals without interrupting live traffic. - Line Port: Dual Fiber - Separate fiber port for transmit and receive - DWDM CH Port DWDM Mux/DeMux Module: Minimum 8 CH Dual Fiber - Input and Output Connector: LC/UPC - Channel isolation: - Adjacent ≥ 20 dB - Non-adjacent ≥ 25 dB - Effective Clear Passband: ≥ 100 GHz - -3dB Bandwidth for 400G coherent signals operating at ~ 60 Gbaud: ≥ 75 GHz - Polarization Dependent Loss (PDL): ≤ 0.5 dB (Typical) across the Effective Clear Passband. - Group Delay Ripple (GDR): ≤ 5 ps peak-to-peak within Effective Clear Passband.
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		- Input and Output Connector: LC/UPC - Channel isolation: - Adjacent $\geq 30\text{dB}$ - Non-adjacent $\geq 40\text{dB}$ - Effective Clear Passband: $\geq 115\text{ GHz}$ - -3dB Bandwidth: $\geq 130\text{ GHz}$ - Polarization Dependent Loss (PDL): $\leq 0.5\text{ dB}$ (Typical) across the Effective Clear Passband. - Group Delay Ripple (GDR): $\leq 5\text{ ps}$ peak-to-peak within Effective Clear Passband. 5. Supported Services - The DWDM line system shall support the following optical services concurrently: - 400G coherent DWDM channels (OpenZR+ / ZR+ optics) - 100G coherent DWDM channels - No external dispersion compensation modules (DCM) shall be required. 6. Optical Performance Monitoring: a. The system shall provide real-time optical performance monitoring at both composite and per-channel levels. b. Composite Signal Monitoring	4. Supported Services - The DWDM line system shall support the following optical services concurrently: - 400G coherent DWDM channels (OpenZR+ / ZR+ optics) - 100G coherent DWDM channels - No external dispersion compensation modules (DCM) shall be required. 5. Optical Performance Monitoring: a. The system shall provide real-time optical performance monitoring at both composite and per-channel levels. b. Composite Signal Monitoring - Total optical power (Tx/Rx) - Optical spectrum monitoring - Amplifier gain and tilt c. Per-Channel Monitoring - Channel optical power - OSNR per DWDM channel - Channel frequency / wavelength d. Optical Performance Monitoring shall be available via
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		- Total optical power (Tx/Rx) - Optical spectrum monitoring - Amplifier gain and tilt c. Per-Channel Monitoring - Channel optical power - OSNR per DWDM channel - Channel frequency / wavelength d. Optical Performance Monitoring shall be available via Network management system (NMS) using SNMP (v2c and v3) and NETCONF/REST APIs. e. The NMS must be provided along with the line system. The VM to host the NMS shall be provided by the purchaser. If the VM requires an operating system other than Linux, the supplier/contractor must supply the OS along with the required license. 7. Variable Optical Attenuator (VOA) a. The system shall support inbuilt VOA functionality for: - Per-channel power equalization - Composite power control	Network management system (NMS) using SNMP (v2c and v3) and NETCONF/REST APIs. e. The NMS must be provided along with the line system. The VM to host the NMS shall be provided by the purchaser. If the VM requires an operating system other than Linux, the supplier/contractor must supply the OS along with the required license. 6. Variable Optical Attenuator (VOA) a. The system shall support inbuilt VOA functionality for: - Per-channel power equalization - Composite power control b. VOA shall be: - Software configurable - Automatically adjustable based on power targets 7. Gain Tilt Control a. The system shall support automatic and manual gain tilt
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		b. VOA shall be: - Software configurable - Automatically adjustable based on power targets 8. Gain Tilt Control a. The system shall support automatic and manual gain tilt control to ensure flat gain across the DWDM spectrum. b. Tilt control shall compensate for: - Fiber spectral tilt - Channel loading changes 9. OSNR Management a. The system shall provide: - OSNR monitoring per DWDM channel - OSNR alarms and threshold configuration b. OSNR measurement shall be suitable for: - 400G coherent channels - 100G coherent channels 10. Network Management and Control a. The DWDM system shall support centralized management via: - Vendor NMS - SNMP v2c and v3	control to ensure flat gain across the DWDM spectrum. b. Tilt control shall compensate for: - Fiber spectral tilt - Channel loading changes 8. OSNR Management a. The system shall provide: - OSNR monitoring per DWDM channel - OSNR alarms and threshold configuration b. OSNR measurement shall be suitable for: - 400G coherent channels - 100G coherent channels 9. Network Management and Control a. The DWDM system shall support centralized management via: - Vendor NMS (HTTPS) - SNMPv3 - NETCONF/RESTCONF protocols utilizing standardized YANG data models. The system must support industry-standard OpenConfig models for
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		- NETCONF/REST b. Supported management functions shall include: - Amplifier gain and power control - Channel provisioning and monitoring - Alarm and performance monitoring - Historical performance trending 11. Protection and Reliability: a. Redundant hot swappable power supplies - AC input voltage 220v b. Hot swappable fan units c. Support for optical safety mechanisms (laser shutdown on fiber break) 12. Environmental Requirements a. Operating temperature: 0°C to +40°C (minimum) b. Storage temperature: As per manufacturer specification c. Compliant with telecom-grade shock, vibration, and EMC standards	optical transport. - SSHv2, SFTP/SCP b. Supported management functions shall include: - Amplifier gain and power control - OSNR monitoring - Channel provisioning and monitoring - Alarm and performance monitoring - Historical performance trending 10. License: Perpetual software licenses to support all features mentioned in the specification throughout the life cycle of the equipment. (License should be activated from day 1 and valid until end of life of the equipment) 11. Protection and Reliability: a. Redundant hot swappable power supplies - AC input voltage 220V b. Hot swappable fan units c. Support for optical safety mechanisms (laser shutdown on fiber break) 12. Environmental Requirements
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			a. Operating temperature: 0°C to +40°C (minimum) b. Storage temperature: As per manufacturer specification c. Compliant with telecom-grade shock, vibration, and EMC standards 13. Warranty: Minimum 3 Years warranty
18	Section VII - Schedule of Requirements, 3. Technical Specifications, Lot-3: Supply, installation, and commissioning of GovNets server rooms at 21 sites. Item No.8: 15-amp SS Combined Non-Modular Electrical Switch Socket with Box	15-amp SS Combined Non-Modular Electrical Switch Socket with Box Connector Type: Socket Power Plug Type: Type D Box Material: Polycarbonate (PC) Voltage: 220~240V Amperage: 16Amps Wattage: 240 Watts Compatible Device: AC	15-amp SS Combined Non-Modular Electrical Switch Socket with Box Connector Type: Socket Mounting: Surface Mounted Power Plug Type: Type D Box Material: Polycarbonate (PC) Voltage: 220~240V Amperage: 16Amps Wattage: 240 Watts Compatible Device: AC
19	Section VII - Schedule of Requirements, 3. Technical Specifications,	Type: Floor Standing UPS (Tower) Capacity: Minimum 6 kVA / 6 kW Input Voltage: 230 V AC, 1 phase Input Connector: Hard wire 3-wire (1P + N + E) Output Voltage: 230 V AC, 1 phase	UPS: 6 kVA / 6 kW Online Double Conversion Type: Floor Standing UPS (Tower) Capacity: Minimum 6 kVA / 6 kW

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	Lot-3: Supply, installation, and commissioning of GovNets server rooms at 21 sites. Item No.4: Floor standing UPS	Output Connector: Hard wire 3-wire (1P + N + E), 1 zone Output Waveform: Pure sine wave Efficiency (Full Load): Minimum 93% Output Frequency: 50/60 Hz $\pm$4 Hz Bypass Type: Internal bypass (automatic and manual) Battery Type: External Lithium-Ion (Li-Ion) (1 Number) Additional Battery Extension Support: Proposed UPS should support at-least one additional external Li-On battery type Battery Voltage: 48 V Battery Design Life: Minimum 10 years Battery Recharge Time: $\leq$5 hours Battery Charger Power: 1500 W Control Panel: Multifunction LCD Emergency Power Off : Yes Alarms: Battery operation, low battery, overload (minimum support) UPS Connectivity: Minimum 1xUSB, 1x Serial (RS-232), 1x100BaseT port Ethernet Surge Protection: Minimum 600 J Mounting Position: Vertical (tower)	Input Voltage: 230 V AC, 1 phase Input Connector: Hard wire 3-wire (1P + N + E) Output Voltage: 230 V AC, 1 phase Output Connector: Hard wire 3-wire (1P + N + E), 1 zone Output Waveform: Pure sine wave Efficiency (Full Load): Minimum 93% Output Frequency: 50/60 Hz $\pm$4 Hz Bypass Type: Internal bypass (automatic and manual) Battery Type: External Lithium-Ion (Li-Ion) (1 Number) Additional Battery Extension Support: Proposed UPS should support at-least one additional external Li-On battery type Battery Voltage: 48 V Battery Design Life: Minimum 10 years Battery Recharge Time: $\leq$5 hours Battery Charger Power: 1500 W Control Panel: Multifunction LCD Emergency Power Off : Yes Alarms: Battery operation, low battery, overload (minimum support)
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		Management Protocol Support: SSHv2, HTTPs, SNMPv3 Accessories to be included: RS-232 cable, USB cable, RJ45 cable, Battery cable, Grounding cable, Stabilization feet Standards Compliance: IEC 62040-1 and IEC 62040-3	UPS Connectivity: Minimum 1xUSB, 1x Serial (RS-232), 1x100BaseT port Ethernet Surge Protection: Minimum 600 J Mounting Position: Vertical (tower) Backup Time: Minimum 30 minutes at 6 kW load with power factor = 1.0 Management Protocol Support: SSHv2, HTTPs, SNMPv3 Accessories to be included: RS-232 cable, USB cable, RJ45 cable, Battery cable, Grounding cable, Stabilization feet Standards Compliance: IEC 62040-1 and IEC 62040-3
20	Section IX: Special Conditions of Contract GCC 16.1	GCC 16.1—The method and conditions of payment to be made to the Supplier under this Contract shall be as follows: Payment for Goods supplied from abroad: Payment of foreign currency portion shall be made in (_____) [currency of the Contract Price] in the following manner:	GCC 16.1—The method and conditions of payment to be made to the Supplier under this Contract shall be as follows: Payment for Goods supplied from abroad: Payment of foreign currency portion shall be made in the

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		(i) Advance Payment: Ten (10) percent of the pro-rata Contract Price shall be paid within thirty (30) days of signing of the Contract, and upon submission of claim and a bank guarantee for equivalent amount valid until the Goods are delivered, and in the form provided in the bidding document or another form acceptable to the Purchaser. (ii) On Shipment: Sixty (60) percent of the pro-rata Contract Price of the Goods shipped shall be paid through irrevocable confirmed letter of credit opened in favor of the Supplier in a bank in its country, upon submission of documents specified in GCC Clause 13. (iii) On Acceptance: Thirty (30) percent of the pro-rata Contract Price of Goods received shall be paid within thirty (30) days of receipt of the Goods upon submission of claim supported by the acceptance certificate issued by the Purchaser. If advance payment is not taken by the supplier, the amount will be paid with Acceptance.	currency or currencies in which the Contract Price is expressed, in accordance with the accepted bid and the Contract Agreement in the following manner: (i) Advance Payment: Ten (10) percent of the pro-rata Contract Price shall be paid within thirty (30) days of signing of the Contract, and upon submission of claim and a bank guarantee for equivalent amount valid until the Goods are delivered, and in the form provided in the bidding document or another form acceptable to the Purchaser. (ii) On Shipment: Sixty (60) percent of the pro-rata Contract Price of the Goods shipped shall be paid through irrevocable confirmed letter of credit opened in favor of the Supplier in a bank in its country, upon submission of documents specified in GCC Clause 13.
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		Payment of local currency portion shall be made in Bhutanese Ngultrum (BTN) within thirty (30) days of presentation of claim supported by a certificate from the Purchaser declaring that the Goods have been delivered and that all other contracted Services have been performed. Payment for Goods and Services supplied from within the Purchaser's Country for each Lot: Payment for Goods and Services supplied from within the Purchaser's Country shall be made in _____ [currency], as follows: (i) Advance Payment: Ten (10) percent of the pro-rata Contract Price shall be paid within thirty (30) days of signing of the Contract against a simple receipt and a bank guarantee for the equivalent amount and in the form provided in the bidding document or another form acceptable to the Purchaser. (ii) On Delivery: Sixty (60) percent of the pro-rata Contract Price shall be paid on receipt of the Goods and upon submission of the documents specified in GCC Clause 13.	(iii) On Acceptance: Thirty (30) percent of the pro-rata Contract Price of Goods received shall be paid within thirty (30) days of receipt of the Goods upon submission of claim supported by the acceptance certificate issued by the Purchaser. If advance payment is not taken by the supplier, the amount will be paid with Acceptance. Payment of local currency portion shall be made in Bhutanese Ngultrum (BTN) within thirty (30) days of presentation of claim supported by a certificate from the Purchaser declaring that the Goods have been delivered and that all other contracted Services have been performed. Payment for Goods and Services supplied from within the
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		(iii) On Acceptance: The remaining Thirty (30) percent of the pro-rata Contract Price shall be paid to the Supplier within thirty (30) days after the date of the acceptance certificate for the respective delivery issued by the Purchaser. If advance payment is not taken by the supplier, the amount will be paid with Acceptance.	Purchaser's Country for each Lot: Payment for Goods and Services supplied from within the Purchaser's Country shall be made in Bhutanese Ngultrum (BTN), as follows: (i) Advance Payment: Ten (10) percent of the pro-rata Contract Price shall be paid within thirty (30) days of signing of the Contract against a simple receipt and a bank guarantee for the equivalent amount and in the form provided in the bidding document or another form acceptable to the Purchaser. (ii) On Delivery: Sixty (60) percent of the pro-rata Contract Price shall be paid on receipt of the Goods and upon submission of the documents specified in GCC Clause 13. (iii) On Acceptance: The remaining Thirty (30) percent of the
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			pro-rata Contract Price shall be paid to the Supplier within thirty (30) days after the date of the acceptance certificate for the respective delivery issued by the Purchaser. If advance payment is not taken by the supplier, the amount will be paid with Acceptance. Payment for Related Services (Section VII, Table-2) for each Lot: Payment for Related Services shall be made in the currency or currencies in which the Contract Price is expressed, in accordance with the accepted bid and the Contract Agreement, as follows: (i) On Completion: Eighty (80) percent of the pro-rata Contract Price (Section IV - Bidding Forms: Price and Completion Schedule- Related Services) shall be paid on
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			completion of and on submission of invoices followed by Purchaser's approval. (ii) On Acceptance: The remaining Twenty (20) percent of the pro-rata Contract Price shall be paid to the Supplier within thirty (30) days after the date of the acceptance certificate for the respective service completion under each individual Lot (Lot-1, Lot-2 & Lot-3) issued by the Purchaser.
21	Section II - Bid Data Sheet (BDS) ITB 22.1	The deadline for Bid submission is: Date: August 10, 2026 Time: 1500 Hours (Bhutan Standard Time) (GMT + 6:00 hours) Bidders shall not have the option of submitting their Bids electronically.	The deadline for submission of bids is extended to September 24, 2026 at 1500 hours, Bhutan Standard Time. This deadline supersedes all previously notified bid submission deadlines. All related dates and validity requirements in the bidding document shall be read accordingly.

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22

Section III – Evaluation and Qualification Criteria
THE NON-PRICE FACTORS/
TECHNICAL FEATURES AND
THE CORRESPONDING
SCORES ARE:
For LOT-2
SL. 1

Sub-technical Factor (STF)	Description	%
1.3 Effective -3 dB Passband Width (GHz) for 400G coherent signals operating at ~60 Gbuad for Item No. 33 <i>Minimum effective - 3dB passband width/bandwidth is 65GHz</i>	More than 120 GHz	100 %
	100-120 GHz	80 %
	85-99 GHz	60 %
	76-84 GHz	40 %
	66-75 GHz	20 %

Section III – Evaluation and Qualification Criteria, Non-Price Factors/Technical Features and Corresponding Scores for Lot 2, Item Nos. 33 is amended as follows.

Sub-technical Factor (STF)	Description	%
1.3 Effective -3 dB Passband Width (GHz) for 400G coherent signals operating at ~60 Gbuad for Item No. 33 <i>Minimum effective - 3dB passband width/bandwidth is 65GHz</i>	<i>100 GHz or above</i>	100 of t sub or s
	<i>85 GHz to less than 100 GHz</i>	75%
	<i>76 GHz to less than 85 GHz</i>	50%
	<i>66 GHz to less than 76 GHz</i>	25%

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			width/bandwidth is 75GHz	Below 75 GHz	Non-compliant.														
24	Section III – Evaluation and Qualification Criteria THE NON-PRICE FACTORS/ TECHNICAL FEATURES AND THE CORRESPONDING SCORES ARE: For LOT-1 SL. 3	<table><tr><th>Sub-technical Factor (STF)</th><th>STF Wt.</th></tr><tr><td>3.5 Technician Certification</td><td>5%</td></tr><tr><td>3.6 Technician Specific Work Experience - Experience mounting rack units - switches and routers, managing DC/AC power distribution, and grounding/bonding</td><td>5%</td></tr></table>	Sub-technical Factor (STF)	STF Wt.	3.5 Technician Certification	5%	3.6 Technician Specific Work Experience - Experience mounting rack units - switches and routers, managing DC/AC power distribution, and grounding/bonding	5%	<table><tr><td colspan="2">Section III – Evaluation and Qualification Criteria, Non-Price Factors/Technical Features and Corresponding Scores for Lot-1, Key Personal is as follows:</td></tr><tr><th>Sub-technical Factor (STF)</th><th>STF Wt.</th></tr><tr><td>3.5 Technician Certification</td><td>6%</td></tr><tr><td>3.6 Technician Specific Work Experience - Experience mounting rack units - switches and routers, managing DC/AC power distribution, and grounding/bonding</td><td>4%</td></tr></table>			Section III – Evaluation and Qualification Criteria, Non-Price Factors/Technical Features and Corresponding Scores for Lot-1, Key Personal is as follows:		Sub-technical Factor (STF)	STF Wt.	3.5 Technician Certification	6%	3.6 Technician Specific Work Experience - Experience mounting rack units - switches and routers, managing DC/AC power distribution, and grounding/bonding	4%
Sub-technical Factor (STF)	STF Wt.																		
3.5 Technician Certification	5%																		
3.6 Technician Specific Work Experience - Experience mounting rack units - switches and routers, managing DC/AC power distribution, and grounding/bonding	5%																		
Section III – Evaluation and Qualification Criteria, Non-Price Factors/Technical Features and Corresponding Scores for Lot-1, Key Personal is as follows:																			
Sub-technical Factor (STF)	STF Wt.																		
3.5 Technician Certification	6%																		
3.6 Technician Specific Work Experience - Experience mounting rack units - switches and routers, managing DC/AC power distribution, and grounding/bonding	4%																		

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25	Section VII - Schedule of Requirements 3. Technical Specification Lot-1: Supply, Installation, and Commissioning of Core/Aggregation Routers, Repeater Switches, Agency Routers, Aggregation Switches and CPE. Item No. 8: Core/Aggregation Switch (AC Input)	Port Density: Minimum 24x10G SFP+ Ports, and 4x100 QSFP28 (All the SFP ports should support DWDM and CWDM Optics besides gray optics - ZR+, ZR, LR, IR, SR) Performance: - Minimum Switching capacity: 1280 Gbps (Standalone) - Minimum Forwarding Rate: 900 Mpps (for packet size 64 Byte frames) - Minimum Packet Buffer Size: 32MB (dynamic sharing) Memory: Minimum 16 GB Storage Memory: Minimum 16 GB CPU: Minimum Quad Core x86 Form Factor: 1RU Layer 2 Features support from day-1: - MAC Table 32,000 addresses - Jumbo Frame support from day 1:9000 bytes - 802.1d Spanning Tree support, 802.1w (Rapid Spanning Tree [RSTP]), Multiple	The requirement for Layer 2 support for "VLAN Spanning Tree (PVST and PVST+)", as specified in the technical specifications for Lot-1 under Section VII - Schedule of Supply, has been deleted. The requirement for Layer 2 support for "SVI/IRB interfaces: Minimum 800", as specified in the technical specifications for Lot-1 under Section VII - Schedule of Supply, is hereby amended and shall read as "VLAN Interface (SVI/IRB) or equivalent: Minimum 800"
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		Spanning Tree instances (802.1s), VLAN Spanning Tree (PVST and PVST+) - IEEE 802.3ad Link Aggregation Control Protocol (LACP), - VLAN support - 4094 VLAN IDs - Port-based and 802.1Q tag-based VLANs, MAC-based VLAN, IP subnet-based VLAN - Management VLAN - DHCP Relay at Layer 2 - Relay of DHCP traffic to a DHCP server in a different VLAN - SVI/IRB interfaces: Minimum 800 Advanced Layer 3 Features Support from day-1: - IPv4 and IPv6 Dual Stack Support - Support IP unicast routing protocols (BGP, OSPF, IS-IS) for both IPv4 and IPv6 - Virtual Router Redundancy Protocol (VRRP) - Layer 3 interface on all physical ports, Link Aggregation Group (LAG), VLAN interface, and loopback interface - Management vlan interface should be configurable using both IPv4 and IPv6 addresses	
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		- Support for Classless Interdomain Routing (CIDR) - DHCP Server - DHCP Relay at Layer 3 - IPv4 Routing Entries: 39,000 - IPv6 Routing Entries: 19,500 Security Features support from day-1: - Support for SSH v2 protocol - IEEE 802.1X support - DHCP Snooping, DHCPv6 and SLAAC Snooping - Support for STP BPDU and root guards - Dynamic ARP Inspection - Port Security - IP Source Guard - Support for TACACS+ authentication - Syslog over TLS - IPv6 Neighbor discovery inspection - Firewall filters/ACL: Upto 5000 rules Management Features support from Day-1: - Support for SFTP/SCP, SSHv2 and SNMP version 3 with support for traps - Port Mirroring including VLAN mirroring - Remote Switch Port Analyzer (RSPAN)	
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		- Standard RJ-45 console port - Link Layer Discovery Protocol (LLDP) QoS Feature support from Day-1: - Queue Mgt/Priority Level and Scheduler - Class of Service support - Port-based, 802.1p VLAN priority-based, IPv4/IPv6 IP precedence/Type of Service (ToS)/DSCP-based, Differentiated Services (DiffServ), classification and remarking ACLs, trusted QoS, Queue assignment based on DSCP and Class of Service (802.1p/CoS) - Rate limiting support - ingress policer; egress shaping and rate control per VLAN, per port, Other Features support from Day-1: - Stacking support - upto 4 switches in a stack Storage Temperature: -40 to 70 Degree Celcius Required License: Perpetual software licenses to support all features mentioned in the specification Power and Cooling Requirement: Dual	
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		redundant power supply - AC input voltage: 220V AC with redundant fan Power cable: 2 Meter C13-C14 Power Cable Warranty: Minimum 1 Year warranty	
26	Section VII - Schedule of Requirements 3. Technical Specification Lot-1: Supply, Installation, and Commissioning of Core/Aggregation Routers, Repeater Switches, Agency Routers, Aggregation Switches and CPE. ITEM No. 9: Core/Aggregation Switch (DC Input)	Port Density: Minimum 24x10G SFP+ Ports, and 4x100 QSFP28 (All the SFP ports should support DWDM and CWDM Optics besides gray optics - ZR+, ZR, LR, IR, SR) Performance: - Minimum Switching capacity: 1280 Gbps (Standalone) - Minimum Forwarding Rate: 900 Mpps (for packet size 64 Byte frames) - Minimum Packet Buffer Size: 32MB (dynamic sharing) Memory: Minimum 16 GB Storage Memory: Minimum 16 GB CPU: Minimum Quad Core x86 Form Factor: 1RU Layer 2 Features support from day-1:	The requirement for Layer 2 support for "VLAN Spanning Tree (PVST and PVST+)", as specified in the technical specifications for Lot-1 under Section VII - Schedule of Supply, has been deleted. The requirement for Layer 2 support for "SVI/IRB interfaces: Minimum 800", as specified in the technical specifications for Lot-1 under Section VII - Schedule of Supply, is hereby amended and shall read as "VLAN Interface (SVI/IRB) or equivalent: Minimum 800"

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		- MAC Table 32,000 addresses - Jumbo Frame support from day 1: 9000 bytes - 802.1d Spanning Tree support, 802.1w (Rapid Spanning Tree [RSTP]), Multiple Spanning Tree instances (802.1s), VLAN Spanning Tree (PVST and PVST+) - IEEE 802.3ad Link Aggregation Control Protocol (LACP), - VLAN support - 4094 VLAN IDs - Port-based and 802.1Q tag-based VLANs, MAC-based VLAN, IP subnet-based VLAN - Management VLAN - DHCP Relay at Layer 2 - Relay of DHCP traffic to a DHCP server in a different VLAN - SVI/IRB interfaces: 800 Advanced Layer 3 Features Support from day-1: - IPv4 and IPv6 Dual Stack Support - Support IP unicast routing protocols (BGP, OSPF, IS-IS) for both IPv4 and IPv6 - Virtual Router Redundancy Protocol (VRRP)	
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		- Layer 3 interface on all physical ports, Link Aggregation Group (LAG), VLAN interface, and loopback interface - Management vlan interface should be configurable using both IPv4 and IPv6 addresses - Support for Classless Interdomain Routing (CIDR) - DHCP Server - DHCP Relay at Layer 3 - IPv4 Routing Entries: 39,000 - IPv6 Routing Entries: 19,500 Security Features support from day-1: - Support for SSH v2 protocol - IEEE 802.1X support - DHCP Snooping, DHCPv6 and SLAAC Snooping - Support for STP BPDU and root guards - Dynamic ARP Inspection - Port Security - IP Source Guard - Support for TACACS+ authentication - Syslog over TLS - IPv6 Neighbor discovery inspection	
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		- Firewall filters/ACL: Upto 5000 rules Management Features support from Day-1: - Support for SFTP/SCP, SSHv2 and SNMP version 3 with support for traps - Port Mirroring including VLAN mirroring - Remote Switch Port Analyzer (RSPAN) - Standard RJ-45 console port - Link Layer Discovery Protocol (LLDP) QoS Feature support from Day-1: - Queue Mgt/Priority Level and Scheduler - Class of Service support - Port-based, 802.1p VLAN priority-based, IPv4/IPv6 IP precedence/Type of Service (ToS)/DSCP-based, Differentiated Services (DiffServ), classification and remarking ACLs, trusted QoS, Queue assignment based on DSCP and Class of Service (802.1p/CoS) - Rate limiting support - ingress policer; egress shaping and rate control per VLAN, per port, Other Features support from Day-1: - Stacking support - upto 4 switches in a stack	
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		Storage Temperature: -40 to 70 Degree Celcius Required License: Perpetual software licenses to support all features mentioned in the specification Power and Cooling Requirement: Dual redundant power supply - DC input voltage : 48V DC with redundant fan Warranty: Minimum 1 Year warranty	
27	Section VII - Schedule of Requirements 3. Technical Specification Lot-1: Supply, Installation, and Commissioning of Core/Aggregation Routers, Repeater Switches, Agency Routers, Aggregation Switches and CPE. Item No. 10: CPE L3 Switch	Port Density: Minimum 24x1000BaseT PoE+ Ports, and 4x1/10 SFP/SFP+ (PoE+ total budget support of 740 Watt, all the SFP ports should support DWDM and CWDM Optics besides gray optics - ZR+, ZR, LR, IR, SR) Performance: - Minimum Switching capacity: 128 Gbps (Standalone) - Minimum Forwarding Rate: 90 Mpps (for packet size 64 Byte frames) Memory: Minimum 2 GB Storage Memory: Minimum 4 GB CPU: Minimum Quad-Core ARM	The requirement for Layer 2 support for "VLAN Spanning Tree (PVST and PVST+)", as specified in the technical specifications for Lot-1 under Section VII - Schedule of Supply, has been deleted The requirement for Layer 2 support for "SVI/IRB interfaces: Minimum 800", as specified in the technical specifications for Lot-1 under Section VII - Schedule of Supply, is hereby amended and shall read as "VLAN Interface (SVI/IRB) or equivalent: Minimum 500"

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		Form Factor: 1RU Layer2 Features support from day-1: - MAC Table 16,000 addresses - Jumbo Frame support from day 1: 9000 bytes - 802.1d Spanning Tree support, 802.1w (Rapid Spanning Tree [RSTP]), Multiple Spanning Tree instances (802.1s), VLAN Spanning Tree (PVST and PVST+) - IEEE 802.3ad Link Aggregation Control Protocol (LACP), - VLAN support - 4096 VLAN IDs - Port-based and 802.1Q tag-based VLANs, MAC-based VLAN, IP subnet-based VLAN - Management VLAN - DHCP Relay at Layer 2 - Relay of DHCP traffic to a DHCP server in a different VLAN - SVI/IRB interfaces : 500 Advanced Layer 3 Features Support from day-1:	
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		- IPv4 and IPv6 Dual Stack Support - Support IP unicast routing protocols (BGP, OSPF, IS-IS) for both IPv4 and IPv6 - Virtual Router Redundancy Protocol (VRRP) - Layer 3 interface on all physical ports, Link Aggregation Group (LAG), VLAN interface, and loopback interface - Management vlan interface should be configurable using both IPv4 and IPv6 addresses - Support for Classless Interdomain Routing (CIDR) - DHCP Server - DHCP Relay at Layer 3 - IPv4 Routing Entries: 3000 - IPv6 Routing Entries: 2000 Security Features support from day-1: - Support for SSH v2 protocol - IEEE 802.1X support - DHCP Snooping, DHCPv6 and SLAAC Snooping - Support for STP BPDU and root guards - Dynamic ARP Inspection	
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		- Port Security - IP Source Guard - Support for TACACS+ authentication - Syslog over TLS - IPv6 Neighbor discovery inspection - Firewall filters/ACL: Upto 1000 rules Management Features support from Day-1: - Support for SFTP/SCP, SSHv2, SNMPv3 with support for traps - Port Mirroring including VLAN mirroring - Remote Switch Port Analyzer (RSPAN) - Standard RJ-45 console port - Link Layer Discovery Protocol (LLDP) QoS Feature support from Day-1: - Queue Mgt/Priority Level and Scheduler - Class of Service support - Port-based, 802.1p VLAN priority-based, IPv4/IPv6 IP precedence/Type of Service (ToS)/DSCP-based, Differentiated Services (DiffServ), classification and remarking ACLs, trusted QoS, Queue assignment based on DSCP and Class of Service (802.1p/CoS)	
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		- Rate limiting support - ingress policer; egress shaping and rate control per VLAN, per port, Other Features support from Day-1: - Stacking support - upto 4 switches in a stack Storage Temperature: -15 to 65 Degree Celcius Required License: Perpetual software licenses to support all features mentioned in the specification Power and Cooling Requirement: Dual redundant power supply - AC input voltage : 220V AC with redundant fan Power cable: 2 Meter C13-C14 Power Cables Warranty: Minimum 1 year warranty	
28	Section VII - Schedule of Requirements 3. Technical Specification Lot-2: Supply, Installation, and Commissioning of DWDM System, Optical Modules, and Accessories. Item No.32: 16CH DWDM	DWDM Channel Support: Minimum 16 Channels DWDM Wavelength: CH21-CH36 in ITU G.694.1 standard DWDM region Channel Spacing: 100GHz (0.8nm) Ports & Feature Support: - Monitor Port: Support to monitor optical power levels of the DWDM C-band signals without interrupting live traffic.	The form factor requirement was not specified for Item No. 32, under Lot-2, Section VII – Schedule of Supply. The form factor requirement for Item Nos. 32 is hereby added and shall be 1RU.

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	Mux/DeMux for 1G/10G DWDM Links	- Expansion Port: Should support add/drop of future channels and linking additional Mux/DeMux modules. - 1310 nm Port: For Management - Line Port: Dual Fiber - Separate fiber port for transmit and receive - DWDM CH Port: Minimum 16 CH Dual Fiber - Input and Output Connector: LC/UPC - Insertion Loss (IL): - Typical IL: ≤ 4.5 dB - Maximum IL: ≤ 5 dB (for full 16 channels with monitor and expansion/1310 nm ports) Channel isolation: - Adjacent ≥ 30dB - Non-adjacent ≥ 40dB Channel Passband: ± 0.1 nm Passband Ripple: ≤ 0.5 dB Return Loss: ≥ 45 dB 1U, 19'' rack mount chassis (Mounting kit to be provided) Supported Protocol: Atleast 1G, 10G and 25G Ethernet Operating Temperature: -40 to 75°C	
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		Storage Temperature: -40 to 80°C Warranty: Minimum 1 year NOTE: DWDM Mux/DeMux should be proposed in line with the existing in-use fiber type - G.652D SMF and should be compatible with proposed 1G and 10G DWDM Transceivers and existing 1/10G DWDM transceivers.	
29	Section VII - Schedule of Requirements 3. Technical Specification Lot-2: Supply, Installation, and Commissioning of DWDM System, Optical Modules, and Accessories. Item No. 33: DWDM Mux/DeMux for 400Gbps DWDM Coherent links	400G Compatibility: The bidder must certify that the passive filters in the proposed DWDM Mux/DeMux modules support 400G ZR/ZR+ (OpenZR+) coherent signals with Tx Spectral Shaping enabled, with a filtering-induced OSNR penalty of ≤ 1.5 dB. The passive filters must also support 300G, 200G and 100G coherent signals. Proposed DWDM Mux/DeMux modules must be Open Line System compatible. DWDM Channel Support: Minimum 4 Channels DWDM Wavelength: Fixed Grid - CH31-CH34 in ITU G.694.1 standard DWDM region Channel Spacing: 100GHz (0.8nm) Ports & Feature Support:	The form factor requirement was not specified for Item Nos. 33, under Lot-2, Section VII – Schedule of Supply. The form factor requirement for Item Nos. 33 is hereby added and shall be 1RU.

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		- Monitor Port: Support to monitor optical power levels of the DWDM C-band signals without interrupting live traffic. - Expansion Port: Should Supports add/drop of future channels and linking additional Mux/DeMux modules. OSC Port: For Management - Line Port: Dual Fiber - Separate fiber port for transmit and receive - DWDM CH Port: Minimum 4 CH Dual Fiber - Input and Output Connector: LC/UPC Insertion Loss (IL): - Typical IL: ≤ 2 dB - Maximum IL: ≤ 3.5 dB (for full 4 channels with monitor and expansion/OSC ports) Channel isolation: - Adjacent ≥ 25dB - Non-adjacent ≥ 40dB Effective Clear Passband: The filter shall provide a minimum Effective Clear Passband of 52 GHz centered on the ITU frequency. Within this bandwidth, the maximum Insertion Loss Ripple shall not exceed 0.5 dB.	
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		-3dB Bandwidth/Passband width: The filter -3dB Bandwidth shall be ≥ 65 GHz to minimize spectral clipping for 400G coherent signals operating at ~ 60 Gbaud. Grid Compatibility: The filters shall support a 100 GHz ITU-T fixed grid (G.694.1). The passive filter shall exhibit a maximum Polarization Dependent Loss (PDL) of ≤ 0.5 dB (Typical) to 1 dB (Maximum) across the Effective Clear Passband. The filter shall maintain a Group Delay Ripple (GDR) of ≤ 5 ps to 10 ps peak-to-peak within the 52 GHz Effective Clear Passband. Return Loss: ≥ 45dB 1U, 19'' rack mount chassis (Mounting kit to be provided) Supported Protocol: Atleast 100G, 200G, 300G, 400G Ethernet Operating Temperature: -5 to 70°C Storage Temperature: -40 to 75°C Warranty: Minimum 3 Years warranty	
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		NOTE: DWDM Mux/DeMux should be proposed in line with the existing in-use fiber type - G.652D SMF and compatible with existing amplifiers/DWDM Line systems used by the purchaser.	
30	Section VII - Schedule of Requirements 3. Technical Specification Lot-2: Supply, Installation, and Commissioning of DWDM System, Optical Modules, and Accessories. Item No. 34: DWDM Line System	1. System Architecture: a. The DWDM line system shall be a modular or integrated platform capable of operating as: - Inline amplifier node (BA + PreAmp) - Terminal node with DWDM Mux/DeMux (inbuilt or modular) - The system shall support bidirectional operation using separate fibers for Tx and Rx. - The system shall support coherent and non-coherent DWDM signals simultaneously on the same fiber. 2. Optical Amplifiers (EDFA): a. Booster Amplifier (BA) - Optical amplifier type: EDFA (C-band) - Output power: - Minimum +20 dBm total composite output power	The form factor requirement was not specified for Item Nos. 34, under Lot-2, Section VII – Schedule of Supply. The form factor requirement for Item Nos. 34 is hereby added and shall be <=5RU.

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		- Scalable / configurable up to +23 dBm (or higher) and down to +5 dBm - Gain: Scalable from 5-25 dB - Input power: Minimum range -23 to 16 dBm - Automatic gain control (AGC) and automatic power control (APC) - Suitable for driving long-haul DWDM fiber spans b. Pre- Amplifier (PreAmp) - Optical amplifier type: EDFA (C-band) - Gain: Scalable from 5 to 35 dB (with tilt-controlled operation) - Output power: - Minimum +20 dBm - Scalable / configurable up to +23 dBm (or higher) and down to +5 dBm - High sensitivity receiver amplifier optimized for low input power. - Input power: Minimum range -40 to 2 dBm - Low noise figure - measured at nominal gain (25 dB) across the C-Band: ≤ 6 dB	
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		- Support for Automatic gain and power control c. Amplifier Features (Mandatory) - Independent control of BA and PreAmp - Optical input/output power monitoring - Fast transient control to support add/drop and channel changes - Built-in protection against optical overload 3. Integrated/Modular DWDM Mux / DeMux - The line system shall include DWDM Mux/DeMux modules (integrated or modular). - Minimum channel capacity: Minimum 8 DWDM channels (C-band) - Channel grid support: ITU-T grid compatible and Support for 150GHz, 100 GHz, 75 GHz and 50 GHz - Must support flexible grid (Flex-Grid) operation suitable for coherent 400G per	
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		channel (reconfigurable - Software-defined) - Optical specifications: - Insertion Loss (IL): Typical IL: ≤ 5 dB, Maximum IL: ≤ 6.5 dB (for full 4 channels with monitor, 1310 nm ports) - Return Loss ≥ 40 dB - Ports & Feature Support: - Monitor Port: Support to monitor optical power levels of the DWDM C-band signals without interrupting live traffic. - Line Port: Dual Fiber - Separate fiber port for transmit and receive - DWDM CH Port DWDM Mux/DeMux Module: Minimum 8 CH Dual Fiber - Input and Output Connector: LC/UPC - Channel isolation: - Adjacent ≥ 20 dB - Non-adjacent ≥ 25 dB - Effective Clear Passband: ≥ 100 GHz - -3dB Bandwidth for 400G coherent signals operating at ~ 60 Gbaud: ≥ 75 GHz	
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		- Polarization Dependent Loss (PDL): ≤ 0.5 dB (Typical) across the Effective Clear Passband. - Group Delay Ripple (GDR): ≤ 5 ps peak-to-peak within Effective Clear Passband. 4. Supported Services - The DWDM line system shall support the following optical services concurrently: - 400G coherent DWDM channels (OpenZR+ / ZR+ optics) - 100G coherent DWDM channels - No external dispersion compensation modules (DCM) shall be required. 5. Optical Performance Monitoring: a. The system shall provide real-time optical performance monitoring at both composite and per-channel levels. b. Composite Signal Monitoring - Total optical power (Tx/Rx) - Optical spectrum monitoring - Amplifier gain and tilt c. Per-Channel Monitoring - Channel optical power	
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		- OSNR per DWDM channel - Channel frequency / wavelength d. Optical Performance Monitoring shall be available via Network management system (NMS) using SNMP (v2c and v3) and NETCONF/REST APIs. e. The NMS must be provided along with the line system. The VM to host the NMS shall be provided by the purchaser. If the VM requires an operating system other than Linux, the supplier/contractor must supply the OS along with the required license. 6. Variable Optical Attenuator (VOA) a. The system shall support inbuilt VOA functionality for: - Per-channel power equalization - Composite power control b. VOA shall be:- - Software configurable - Automatically adjustable based on power targets 7. Gain Tilt Control	
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		a. The system shall support automatic and manual gain tilt control to ensure flat gain across the DWDM spectrum. b. Tilt control shall compensate for: - Fiber spectral tilt - Channel loading changes 8. OSNR Management a. The system shall provide: - OSNR monitoring per DWDM channel - OSNR alarms and threshold configuration b. OSNR measurement shall be suitable for: - 400G coherent channels - 100G coherent channels - 9. Network Management and Control a. The DWDM system shall support centralized management via: - Vendor NMS (HTTPS) - SNMPv3 - NETCONF/RESTCONF protocols utilizing standardized YANG data models. The system must support industry-standard OpenConfig models for optical transport. - SSHv2, SFTP/SCP	
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		b. Supported management functions shall include: - Amplifier gain and power control - OSNR monitoring - Channel provisioning and monitoring - Alarm and performance monitoring - Historical performance trending 10. License: Perpetual software licenses to support all features mentioned in the specification throughout the life cycle of the equipment. (License should be activated from day 1 and valid until end of life of the equipment) 11. Protection and Reliability: a. Redundant hot swappable power supplies - AC input voltage 220V b. Hot swappable fan units c. Support for optical safety mechanisms (laser shutdown on fiber break) 12. Environmental Requirements a. Operating temperature: 0°C to +40°C (minimum)	
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		b. Storage temperature: As per manufacturer specification c. Compliant with telecom-grade shock, vibration, and EMC standards 13. Warranty: Minimum 3 Years warranty	
31	Section VII - Schedule of Requirements 3. Technical Specification Lot-1: Supply Installation, and Commissioning of Core/Aggregation Routers, Repeater Switches, Agency Routers, Aggregation Switches and CPE. Item No. 1: Core Router (DC Input)	Performance: - Minimum throughput 800 Gbps (performance of the router should be equal to or better than 800 Gbps), - Minimum Forwarding rate: 800 Mpps (for packet size 64 Byte frames) - Minimum Packet Buffer Size: 4GB Port Density: Minimum 24x1/10Gbps SFP+ ports, 16x10/25Gbps SFP28 ports and 8x100Gbps QSFP28 Ports (All the ports should support DWDM and CWDM Optics besides gray optics - ZR+, ZR, LR, IR, SR) Management Port: 1x1000BaseT Port and Console Port Memory: Minimum 32 GB	1. The requirement of memory and storage is hereby deleted. 2. The requirement for RIB: Minimum 7.5 Million for IPv4 and 2 Million for IPv6 (Simultaneously) under router table is added. 3. The requirement for power and cooling requirement is revised as follows: Power and Cooling Requirement: Hot swappable redundant power supplies - DC input voltage 48V DC, hot swappable redundant fans or N+1 redundancy fan Except for the parameters expressly amended under this amendment, all other technical requirements for the

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		CPU: Minimum 6 core Form Factor: <= 2RU Storage: Minimum 100GB SSD Layer 2 features from Day 1: Layer 2 switch ports, IEEE 802.1Q VLAN encapsulation, IEEE 802.1ad, Link Aggregation Control Protocol (LACP): IEEE 802.3ad, Jumbo frames on all ports (up to 9216 bytes), L2 ingress Access Control List (ACL)/firewall filters, VLAN trunks, Virtual Router Redundancy Protocol (VRRP) Layer 3 features from Day 1: IPv4 and IPv6 unicast, Layer 3 interfaces: physical and sub-interfaces, Routing protocols: Static, Open Shortest Path First (OSPFv2), OSPFv3, Intermediate System to Intermediate System (ISIS), and Border Gateway Protocol (BGP), BGP Router Reflector, Multiprotocol Border Gateway Protocol (MP-BGP), L3 ingress and egress IPv4 ACL/firewall filters and IPv6 ACL/firewall filters, Bidirectional Forwarding Detection (BFD), Link Aggregation Control Protocol (LACP): IEEE 802.3ad, Jumbo frame support (up to 9216 bytes), Virtual Router Redundancy Protocol (VRRP), Layer 3 Virtual Private Network (L3VPN).	relevant item shall remain unchanged and in full effect.
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		Route Table Size (FIB): Minimum 1.5 Million for IPv4 and 700k for IPv6 (Simultaneously) MPLS support from Day 1: Label switching, Label Distribution Protocol (LDP), MPLS Traffic Engineering, Layer 2 and Layer 3 VPN Segment Routing Support from Day 1: Segment Routing with MPLS data plane (SR-MPLS), Segment Routing with IPv6 data plane (SRv6), ISIS, OSPF, BGP extensions to segment routing, BGP Egress Peering Engineering (BGP-EPE), Segment Routing Traffic Engineering (SRTE) QoS: Hierarchical Quality of Service/Hierarchical class of service, CoS (Layer 2), IP Precedence, DiffServ code point (DSCP), Classification based on multiple fields, Marking, policing, and shaping, Weighted Random Early Detection (WRED) Security: Root-of-trust and secure boot, Authentication, Authorization, and Accounting (AAA), Terminal Access Controller Access-Control System Plus (TACACS+), RBAC, Syslog over TLS, Secure Shell (SSHv2), Layer 3 ingress	
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		and egress ACLs for IPv4 and IPv6, Layer 2 ingress ACLs, 802.1AE (MACsec) support on all the QSFP28 Ports Operation, Administration and Maintenance: NetFlow/J-Flow (should support industry-standard network telemetry and performance measurement protocols IPFIX) and TWAMP Management: CLI, ICMP, FTP, SNMPv3, SSHv2 License: Perpetual software licenses to support all features mentioned in the specification throughout the life cycle of the equipment (License should be activated from day 1 and valid until end of life of the equipment) Power and Cooling Requirement: Hot swappable redundant power supplies - DC input voltage 48V DC, hot swappable redundant fans Warranty: Minimum 3 Years warranty TAC Support: Minimum 3 Years access to OEM TAC support team	
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		Rack Mounting Kit to be included. Use case: Core Router - Default Free Zone, Full BGP Peering	
32	Section VII - Schedule of Requirements 3. Technical Specification Lot-1: Supply Installation, and Commissioning of Core/Aggregation Routers, Repeater Switches, Agency Routers, Aggregation Switches and CPE. Item No. 2: Core Router (AC Input)	Performance: - Minimum throughput 800 Gbps (performance of the router should be equal to or better than 800 Gbps), - Minimum Forwarding rate: 800 Mpps (for packet size 64 Byte frames) - Minimum Packet Buffer Size: 4GB Port Density: Minimum 24x1/10Gbps SFP+ ports, 16x10/25Gbps SFP28 ports and 8x100Gbps QSFP28 Ports (All the ports should support DWDM and CWDM Optics besides gray optics - ZR+, ZR, LR, IR, SR) Management Port: 1x1000BaseT Port and Console Port Memory: Minimum 32 GB CPU: Minimum 6 core Form Factor: <= 2RU Storage: Minimum 100GB SSD	1. The requirement of memory and storage is hereby deleted. 2. The requirement for RIB: Minimum 7.5 Million for IPv4 and 2 Million for IPv6 (Simultaneously) under router table is added. 3. The requirement for power and cooling requirement is revised as follows: Power and Cooling Requirement: Hot swappable redundant power supplies - DC input voltage 48V DC, hot swappable redundant fans or N+1 redundancy fan Except for the parameters expressly amended under this amendment, all other technical requirements for the

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		Layer 2 features from Day 1: Layer 2 switch ports, IEEE 802.1Q VLAN encapsulation, IEEE 802.1ad, Link Aggregation Control Protocol (LACP): IEEE 802.3ad, Jumbo frames on all ports (up to 9216 bytes), L2 ingress Access Control List (ACL)/firewall filters, VLAN trunks, Virtual Router Redundancy Protocol (VRRP) Layer 3 features from Day 1: IPv4 and IPv6 unicast, Layer 3 interfaces: physical and sub-interfaces, Routing protocols: Static, Open Shortest Path First (OSPFv2), OSPFv3, Intermediate System to Intermediate System (ISIS), and Border Gateway Protocol (BGP), BGP Router Reflector, Multiprotocol Border Gateway Protocol (MP-BGP), L3 ingress and egress IPv4 ACL/firewall filters and IPv6 ACL/firewall filters, Bidirectional Forwarding Detection (BFD), Link Aggregation Control Protocol (LACP): IEEE 802.3ad, Jumbo frame support (up to 9216 bytes), Virtual Router Redundancy Protocol (VRRP), Layer 3 Virtual Private Network (L3VPN). Route Table Size (FIB): Minimum 1.5 Million for IPv4 and 700k for IPv6 (Simultaneously) MPLS support from Day 1: Label switching,	relevant item shall remain unchanged and in full effect.
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		Label Distribution Protocol (LDP), MPLS Traffic Engineering, Layer 2 and Layer 3 VPN Segment Routing Support from Day 1: Segment Routing with MPLS data plane (SR-MPLS), Segment Routing with IPv6 data plane (SRv6), ISIS, OSPF, BGP extensions to segment routing, BGP Egress Peering Engineering (BGP-EPE), Segment Routing Traffic Engineering (SRTE) QoS: Hierarchical Quality of Service/Hierarchical class of service, CoS (Layer 2), IP Precedence, DiffServ code point (DSCP), Classification based on multiple fields, Marking, policing, and shaping, Weighted Random Early Detection (WRED) Security: Root-of-trust and secure boot, Authentication, Authorization, and Accounting (AAA), Terminal Access Controller Access-Control System Plus (TACACS+), RBAC, Secure Shell (SSHv2), Layer 3 ingress and egress ACLs for IPv4 and IPv6, Layer 2 ingress ACLs, Syslog over TLS, 802.1AE (MACsec) support on all the QSFP28 Ports Operation, Administration and Maintenance: NetFlow/J-Flow (should support industry-standard network telemetry and performance measurement	
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		protocols IPFIX) and TWAMP Management: CLI, ICMP, SFTP/SCP, SNMPv3, SSHv2 License: Perpetual software licenses to support all features mentioned in the specification throughout the life cycle of the equipment (License should be activated from day 1 and valid until end of life of the equipment) Power and Cooling Requirement: Hot swappable redundant power supplies - AC input voltage: 220V AC, hot swappable redundant fans Power Cable: 2 Meters C13-C14 Power Cable Warranty: Minimum 3 Years warranty TAC Support: Minimum 3 Years access to OEM TAC support team Rack Mounting Kit to be included. Usecase: Core Router - Default Free Zone, Full BGP Peering	
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33	Section VII - Schedule of Requirements 3. Technical Specification Lot-1: Supply Installation, and Commissioning of Core/Aggregation Routers, Repeater Switches, Agency Routers, Aggregation Switches and CPE. Item No. 4: Aggregation Router	Performance: - Minimum throughput: 300 Gbps (performance of the router should be equal to or better than 300Gbps) - Minimum Forwarding Rate: 300 Mpps (for packet size 64 Byte frames) - Minimum Packet Buffer Size: 2 GB Port Density: Minimum 24x10Gbps SFP+ ports and 4x100Gbps QSFP28 Ports (All the ports should support DWDM and CWDM Optics besides gray optics - ZR+, ZR, LR, IR, SR) Management Port: 1x1000BaseT Port and Console Port Memory: Minimum 8 GB CPU: Minimum 4 core Form Factor: 1RU Storage: Minimum 32GB SSD Layer 2 features from Day 1: Layer 2 switch ports, IEEE 802.1Q VLAN encapsulation, IEEE 802.1ad, Link Aggregation Control Protocol (LACP): IEEE 802.3ad, Jumbo frames on all ports, L2 ingress Access Control List (ACL)/firewall filters, VLAN trunks, Spanning Tree Protocols (802.1D, 802.1w, 802.1s)	1. The requirement for power and cooling requirement is revised as follows: Power and Cooling Requirement: Hot swappable redundant power supplies - DC input voltage 48V DC, hot swappable redundant fans or N+1 redundancy fan Except for the parameters expressly amended under this amendment, all other technical requirements for the relevant item shall remain unchanged and in full effect.
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		Layer 3 features from Day 1: IPv4 and IPv6 unicast, Layer 3 interfaces: physical and sub-interfaces, Routing protocols: Static, Open Shortest Path First (OSPFv2), OSPFv3, Intermediate System to Intermediate System (ISIS), and Border Gateway Protocol (BGP), Multiprotocol Border Gateway Protocol (MP-BGP), L3 ingress and egress IPv4 ACL/firewall filters and IPv6 ACL/firewall filters, Bidirectional Forwarding Detection (BFD), Link Aggregation Control Protocol (LACP): IEEE 802.3ad, Jumbo frame support (up to 9216 bytes), Virtual Router Redundancy Protocol (VRRP) Route Table Size (FIB): Minimum 64k for IP4 and 32k for IPv6 MPLS support from Day 1: Label switching, Label Distribution Protocol (LDP), MPLS Traffic Engineering, Layer 2 VPN Segment Routing Support from Day 1: Segment Routing with MPLS data plane (SR-MPLS), Segment Routing with IPv6 data plane (SRv6), ISIS, OSPF, BGP extensions to segment routing, BGP Egress Peering Engineering (BGP-EPE), Segment Routing Traffic Engineering (SRTE) QoS: Hierarchical Quality of Service/Hierarchical	
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		class of service, CoS (Layer 2), IP Precedence, DiffServ code point (DSCP), Classification based on multiple fields, Marking, policing, and shaping, Weighted Random Early Detection (WRED) Security: Root-of-trust and secure boot, Authentication, Authorization, and Accounting (AAA), Terminal Access Controller Access-Control System Plus (TACACS+), RBAC, Syslog over TLS, Secure Shell (SSHv2), Layer 3 ingress and egress ACLs for IPv4 and IPv6, Layer 2 ingress ACLs, 802.1AE (MACsec) support on all the QSFP28 Ports Operation, Administration and Maintenance: NetFlow/J-Flow (should support industry-standard network telemetry and performance measurement protocols IPFIX) and TWAMP Management: CLI, ICMP, SFTP/SCP, SNMPv3, SSHv2 License: Perpetual software licenses to support all features mentioned in the specification throughout the life cycle of the equipment (License should be activated from day 1 and valid until end of life of the equipment) Power and Cooling Requirement: Hot swappable	
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		redundant power supplies - AC input voltage : 220V AC, hot swappable redundant fans Power Cable: 2 Meters C13-C14 Power Cable Warranty: Minimum 3 Years warranty Rack Mounting Kit to be included. TAC Support: Minimum 3 Years access to OEM TAC support team Use case: Aggregation Router - Route Reflector Client (RRC) of the Core Router	
34	Section VII - Schedule of Requirements 3. Technical Specification Lot-1: Supply Installation, and Commissioning of Core/Aggregation Routers, Repeater Switches, Agency Routers, Aggregation Switches and CPE. Item No. 4: Repeater Switch (DC Input)	Performance: - Switching capacity: Minimum 9.6 Tbps (Standalone) - Forwarding Capacity: Minimum 2.7 Bpps (for packet size 64 Byte frames) - Packet Buffer: Minimum 80 MB (dynamic sharing) Port Density: Minimum 6x400G QSFP-DD (QSFP-DD ports should comply with Multi-Source Agreement (MSA) standards for coherent pluggable optics and DSP interfaces) and 24x40/100G QSFP-28 Ports (Breakout should be	1.The requirement of memory and storage is hereby deleted. 2. The requirement for MACsec Support is revised as follows: MACsec Support: IEEE 802.1AE MACsec shall be supported at least on 6x400G QSFPDD interconnection Ports.

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		supported for 10G, 25G and 50G with minimum of 48x10G ports) Memory: Minimum 32 GB Storage Memory: Minimum 100 GB SSD CPU: Minimum Quad Core x86 CPU Form Factor: <=2RU Management Port: 1x1000BaseT Port, 1xConsole Port and 1xSFP Port Layer 2 features from Day 1: Layer 2 switch ports, IEEE 802.1Q VLAN encapsulation, IEEE 802.1ad, Link Aggregation Control Protocol (LACP): IEEE 802.3ad, Jumbo frames on all ports (up to 9216 bytes), L2 ingress Access Control List (ACL)/firewall filters, VLAN trunks, Virtual Router Redundancy Protocol (VRRP) Layer 3 features from Day 1: IPv4 and IPv6 unicast, Layer 3 interfaces: physical and sub-interfaces, Routing protocols: static, Open Shortest Path First (OSPFv2), OSPFv3, Intermediate System to Intermediate System (ISIS), and Border	3. The requirement for power and cooling requirement is revised as follows: Power and Cooling Requirement: Hot swappable redundant power supplies - DC input voltage 48V DC, hot swappable redundant fans or N+1 redundancy fan Except for the parameters expressly amended under this amendment, all other technical requirements for the relevant item shall remain unchanged and in full effect.
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		Gateway Protocol (BGP), BGP Router Reflector, Multiprotocol Border Gateway Protocol (MP-BGP), L3 ingress and egress IPv4 ACL/firewall filters and IPv6 ACL/firewall filters, Bidirectional Forwarding Detection (BFD), Link Aggregation Control Protocol (LACP): IEEE 802.3ad, Jumbo frame support (up to 9216 bytes), Virtual Router Redundancy Protocol (VRRP), Layer 3 Virtual Private Network (L3VPN). MPLS support from Day 1: Label switching, Label Distribution Protocol (LDP), MPLS Traffic Engineering, Layer 2 and Layer 3 VPN Segment Routing Support from Day 1: Segment Routing with MPLS data plane (SR-MPLS), Segment Routing with IPv6 data plane (SRv6), ISIS, OSPF, BGP extensions to segment routing, BGP Egress Peering Engineering (BGP-EPE), Segment Routing Traffic Engineering (SRTE) QoS: Hierarchical Quality of Service/Hierarchical class of service, CoS (Layer 2), IP Precedence, DiffServ code point (DSCP), Classification based on multiple fields, Marking, policing, and shaping, Weighted Random Early Detection (WRED)	
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		Security: Root-of-trust and secure boot, Authentication, Authorization, and Accounting (AAA), Terminal Access Controller Access-Control System Plus (TACACS+), RBAC, Syslog over TLS, Secure Shell (SSHv2), Layer 3 ingress and egress ACLs for IPv4 and IPv6, Layer 2 ingress ACLs, 802.1AE (MACsec) support on all the QSFP-DD and QSFP28 Ports MACsec Support: IEEE 802.1AE MACsec shall be supported on all 400G QSFP-DD and 40/100G QSFP-28 interconnection ports. MACsec shall operate in full encryption mode, providing confidentiality, integrity, and replay protection. The implementation shall support MACsec Key Agreement (MKA) for peer authentication and automated key management. MACsec shall be supported at line rate on all applicable interfaces, including 400G ports, without reduction in switching or forwarding performance. The solution shall support industry-standard cryptographic algorithms (minimum AES-GCM-128, with support for AES-GCM-256 recommended). The platform shall ensure interoperability with third-party MACsec-enabled equipment compliant with IEEE 802.1AE/802.1X standards. The platform should support	
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		cryptographic agility, allowing configuration of cryptographic algorithms, key lengths, and related security parameters, and enabling adaptation to updated cryptographic standards through software or firmware updates without requiring hardware replacement. Bidders shall clearly specify MACsec capabilities per interface, performance with MACsec enabled, supported cryptographic options, and any feature, licensing, or hardware dependencies. Operation, Administration and Maintenance: NetFlow/J-Flow (should support industry-standard network telemetry and performance measurement protocols IPFIX) and TWAMP Management: CLI, ICMP, SFTP/SCP, SNMPv3, SSHv2 License: Perpetual software licenses to support all features mentioned in the specification throughout the life cycle of the equipment (License should be activated from day 1 and valid until end of life of the equipment) Power and Cooling Requirement: Hot swappable redundant power supplies - DC input voltage 48V DC, hot swappable redundant fans	
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		Warranty: Minimum 3 Years warranty TAC Support: Minimum 3 Years access to OEM TAC support team Rack Mounting Kit to be included.	
35	Section VII - Schedule of Requirements 3. Technical Specification Lot-1: Supply Installation, and Commissioning of Core/Aggregation Routers, Repeater Switches, Agency Routers, Aggregation Switches and CPE. Item No. 5: Repeater Switch (AC Input)	Performance: - Switching capacity: Minimum 9.6 Tbps (Standalone) - Forwarding Capacity: Minimum 2.7 Bpps (for packet size 64 Byte frames) - Packet Buffer: Minimum 80 MB (dynamic sharing) Port Density: Minimum 6x400G QSFP-DD (QSFP-DD ports should comply with Multi-Source Agreement (MSA) standards for coherent pluggable optics and DSP interfaces) and 24x40/100G QSFP-28 Ports (Breakout should be supported for 10G, 25G and 50G with minimum of 48x10G ports) Memory: Minimum 32 GB Storage Memory: 100 GB SSD	The requirement of memory and storage is hereby deleted. 2. The requirement for MACsec Support is revised as follows: MACsec Support: IEEE 802.1AE MACsec shall be supported at least on 6x400G QSFPDD interconnection Ports. 3. The requirement for power and cooling requirement is revised as follows: Power and Cooling Requirement: Hot swappable redundant power supplies - DC input voltage 48V DC, hot swappable redundant fans or N+1 redundancy fan Except for the parameters expressly

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		CPU: Minimum Quad Core x86 CPU Form Factor: <=2RU Management Port: 1x1000BaseT Port, 1xConsole Port and 1xSFP Port Layer 2 features from Day 1: Layer 2 switch ports, IEEE 802.1Q VLAN encapsulation, IEEE 802.1ad, Link Aggregation Control Protocol (LACP): IEEE 802.3ad, Jumbo frames on all ports (up to 9216 bytes), L2 ingress Access Control List (ACL)/firewall filters, VLAN trunks, Virtual Router Redundancy Protocol (VRRP) Layer 3 features from Day 1: IPv4 and IPv6 unicast, Layer 3 interfaces: physical and sub-interfaces, Routing protocols: static, Open Shortest Path First (OSPFv2), OSPFv3, Intermediate System to Intermediate System (ISIS), and Border Gateway Protocol (BGP), BGP Router Reflector, Multiprotocol Border Gateway Protocol (MP-BGP), L3 ingress and egress IPv4 ACL/firewall filters and IPv6 ACL/firewall filters, Bidirectional Forwarding Detection (BFD), Link Aggregation Control Protocol (LACP): IEEE 802.3ad, Jumbo	amended under this amendment, all other technical requirements for the relevant item shall remain unchanged and in full effect.
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		frame support (up to 9216 bytes), Virtual Router Redundancy Protocol (VRRP), Layer 3 Virtual Private Network (L3VPN). MPLS support from Day 1: Label switching, Label Distribution Protocol (LDP), MPLS Traffic Engineering, Layer 2 and Layer 3 VPN Segment Routing Support from Day 1: Segment Routing with MPLS data plane (SR-MPLS), Segment Routing with IPv6 data plane (SRv6), ISIS, OSPF, BGP extensions to segment routing, BGP Egress Peering Engineering (BGP-EPE), Segment Routing Traffic Engineering (SRTE) QoS: Hierarchical Quality of Service/Hierarchical class of service, CoS (Layer 2), IP Precedence, DiffServ code point (DSCP), Classification based on multiple fields, Marking, policing, and shaping, Weighted Random Early Detection (WRED) Security: Root-of-trust and secure boot, Authentication, Authorization, and Accounting (AAA), Terminal Access Controller Access-Control System Plus (TACACS+), RBAC, Syslog over TLS, Secure Shell (SSHv2), Layer 3 ingress	
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		and egress ACLs for IPv4 and IPv6, Layer 2 ingress ACLs, 802.1AE (MACsec) support on all the QSFP-DD and QSFP28 Ports MACsec Support: IEEE 802.1AE MACsec shall be supported on all 400G QSFP-DD and 40/100G QSFP-28 interconnection ports. MACsec shall operate in full encryption mode, providing confidentiality, integrity, and replay protection. The implementation shall support MACsec Key Agreement (MKA) for peer authentication and automated key management. MACsec shall be supported at line rate on all applicable interfaces, including 400G ports, without reduction in switching or forwarding performance. The solution shall support industry-standard cryptographic algorithms (minimum AES-GCM-128, with support for AES-GCM-256 recommended). The platform shall ensure interoperability with third-party MACsec-enabled equipment compliant with IEEE 802.1AE/802.1X standards. The platform should support cryptographic agility, allowing configuration of cryptographic algorithms, key lengths, and related security parameters, and enabling adaptation to updated cryptographic standards through software or firmware updates without requiring hardware replacement. Bidders shall clearly specify	
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		MACsec capabilities per interface, performance with MACsec enabled, supported cryptographic options, and any feature, licensing, or hardware dependencies. Operation, Administration and Maintenance: NetFlow/J-Flow (should support industry-standard network telemetry and performance measurement protocols IPFIX) and TWAM Management: CLI, ICMP, SFTP/SCP, SNMPv3, SSHv2 License: Perpetual software licenses to support all features mentioned in the specification throughout the life cycle of the equipment (License should be activated from day 1 and valid until end of life of the equipment) Power and Cooling Requirement: Hot swappable redundant power supplies – AC input voltage: 220V AC, hot swappable redundant fans Power Cable: 2 Meters C13-C20 Power Cable Warranty: Minimum 3 Years warranty TAC Support: Minimum 3 Years access to OEM	
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		TAC support team Rack Mounting Kit to be included.	
36	Section VII - Schedule of Requirements 3. Technical Specification Lot-1: Supply Installation, and Commissioning of Core/Aggregation Routers, Repeater Switches, Agency Routers, Aggregation Switches and CPE. Item No. 6: Agencies/Customers Router 10G (AC input)	Performance: - Minimum 18 Gbps forwarding throughput on the proposed router. Required minimum 3 Gbps throughput should cater to the real internet traffic (IMIX traffic - IPv4 and IPv6) with atleast multiprotocol services such as NAT, QoS, ACL/Firewall-rules running all together on the router. Minimum throughput on IPSec IMIX traffic should support atleast 5 Gbps. - Minimum Forwarding Capacity: 26 Mpps (for packet size 64 Byte frames) Port Density: Minimum 4x1G 1000BaseT and 4x10G SFP+ Ports (All the SFP+ ports should support DWDM and CWDM Optics besides gray optics - ZR+, ZR, LR, IR, SR and should support Layer 3) Management Port: 1x1000BaseT Port and	The memory and storage requirement is revised as below: Memory: Minimum 16GB Storage: Minimum 16GB Except for the parameters expressly amended under this amendment, all other technical requirements for the relevant item shall remain unchanged and in full effect.

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		Console Port Memory: Minimum 16GB Storage: Minimum 32GB CPU: Minimum 8 Core x86 64 Bit or Minimum 4 Core x86 64 Bit along with Dedicated PFE Chip. Form Factor: 1RU Protocols Support from Day 1: IPv4, IPv6, static routes, Open Shortest Path First (OSPF), Border Gateway Protocol (BGP), Intermediate System-to-Intermediate System (IS-IS), ACL, DHCPv4 and DHCPv6, DNS, 802.1x Authentication, MPLS, Layer 2 and Layer 3 VPN, IP sec, Bidirectional Forwarding Detection (BFD), IEEE802.1ag, and IEEE802.3ah Traffic Management: QoS, Class-Based Weighted Fair Queuing (CBWFQ)/ Marking, policing, and shaping, Classification and scheduling, Weighted Random Early Detection (WRED), Hierarchical QoS, Policy-Based Routing (PBR), Performance Routing	
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		Network Address Translation: Source NAT with Port Address Translation (PAT), Bidirectional 1:1 static NAT, DNAT Security: Firewall Rules/ACLs, IPSEC Site-to-site, Remote VPN, SSHv2, IPSEC VPN, Syslog over TLS Management: CLI, ICMP, SFTP/SCP, SNMPv3, SSHv2 Power Requirement: Redundant Power Supply - AC input voltage : 220V AC Power Cable: 2 Meter C13-C14 Power Cable Operating Temperature : 0 - 40 Degree Celcius Operating Humidity : Between 5% - 80% Operating Altitude : Upto 3000 meters Racking Mounting Kit: To be included License: Perpetual License to support all features mentioned in the specification along with security license (License should be activated from day 1 and valid until end of life of the equipment)	
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		Warranty: Minimum 1 Year Use Case: GovTech Agency shall deploy these routers for the customers which would require implementation of all the services mentioned above. Most importantly, performance of the router should be as per the requirement stipulated here. Customers/Agencies shall deploy around 1500+ ACLs/Firewall rules and will rely on NAT service to access internet resources- should support 40,000+ total translations.	
37	Section VII - Schedule of Requirements 3. Technical Specification Lot-1: Supply Installation, and Commissioning of Core/Aggregation Routers, Repeater Switches, Agency Routers, Aggregation Switches and CPE. Item No. 7: Agencies/Customers Router 10G (DC input)	Performance: - Minimum 18 Gbps forwarding throughput on the proposed router. Minimum 3 Gbps throughput should cater to the real internet traffic (IMIX traffic - IPv4 and IPv6) with atleast multiprotocol services such as NAT, QoS, ACL/Firewall-rules running all together on the router. Minimum throughput on IPSec IMIX traffic should support atleast 5 Gbps. - Minimum Forwarding Capacity: 26 Mpps (for packet size 64 Byte frames)	The memory and storage requirement is revised as below: Memory: Minimum 16GB Storage: Minimum 16GB Except for the parameters expressly amended under this amendment, all other technical requirements for the relevant item shall remain unchanged and in full effect.

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		Port Density: Minimum 4x1G 1000BaseT and 4x10G SFP+ Ports (All the SFP+ ports should support DWDM and CWDM Optics besides gray optics - ZR+, ZR, LR, IR, SR) Management Port: 1x1000BaseT Port and Console Port Memory: Minimum 16GB Storage: Minimum 32GB CPU: Minimum 8 Core x86 64 Bit or Minimum 4 Core x86 64 Bit along with Dedicated PFE Chip. Form Factor: 1RU Protocols Support from Day 1: IPv4, IPv6, static routes, Open Shortest Path First (OSPF), Border Gateway Protocol (BGP), Intermediate System-to-Intermediate System (IS-IS), ACL, DHCPv4 and DHCPv6, DNS, 802.1x Authentication, MPLS, Layer 2 and Layer 3 VPN, IP sec, Bidirectional Forwarding Detection (BFD), IEEE802.1ag, and IEEE802.3ah	
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		Traffic Management: QoS, Class-Based Weighted Fair Queuing (CBWFQ)/ Marking, policing, and shaping, Classification and scheduling, Weighted Random Early Detection (WRED), Hierarchical QoS, Policy-Based Routing (PBR), Performance Routing Network Address Translation: Source NAT with Port Address Translation (PAT), Bidirectional 1:1 static NAT, DNAT Security: Firewall Rules/ACLs, IPSEC Site-to-site, Remote VPN, SSHv2, IPSEC VPN, Syslog over TLS Management: CLI, ICMP, SFTP/SCP, SNMPv3, SSHv2 Power Requirement: Redundant Power Supply – DC input voltage : 48V DC Operating Temperature : 0 - 40 Degree Celcius Operating Humidity : Between 5% - 80% Operating Altitude : Upto 3000 meters Racking Mounting Kit: To be included License: Perpetual License to support all features	
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		mentioned in the specification along with security license (License should be activated from day 1 and valid until end of life of the equipment) Warranty: Minimum 1 Year Use Case: GovTech Agency shall deploy these routers for the customers which would require implementation of all the services mentioned above. Most importantly, the performance of the router should be as per the requirement stipulated here. Customers/Agencies shall deploy around 1500+ ACLs/Firewall rules and will rely on NAT services to access internet resources- should support minimum 40,000+ total translations.	
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Project Management Unit

ACCESS Bhutan Project, GovTech Agency

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