Annexure I: TERMS OF REFERENCE (ToR)

Supply, Installation and Commissioning of active DWDM solution

I. Project Background:

The Government Technology (GovTech) Agency, Royal Government of Bhutan has established Government Networks (DrukREN and GovNET). The agency built a 10 Gigabit per second fibre optic backbone to interconnect 1850+ agencies, research and education institutions including schools and hospitals in the country.

The GovTech Agency is responsible for providing reliable Internet services to all the government agencies and research and education community in Bhutan. The GovTech Agency invites eligible bidders to participate in the tender - **"Supply, Installation and Commissioning of active DWDM solution"**. The eligible bidders shall propose DWDM equipment after studying the technical requirements stipulated in this ToR. The eligible bidders must meet the terms & conditions and the technical specification specified in this ToR.

II. Scope of the work:

The scope of the work for this project are:

1. The contractor shall design, supply, install, configure, test and commission DWDM Network as per the technical requirements and tentative BoQ specified in this section. The contract shall be awarded as a single package.

2. The contractor shall carry out optical fiber testing to ensure supplied equipment meets the requirement of optical power budget. The optical budget/link loss given in ***Annexure IV*** may be used for reference to design the DWDM network. The contractor shall ensure optical loss margin of 5 dB or Rx power at least -16 dBm (whichever is higher) in all the DWDM optical links.

3. The contractor shall present the Technical Approach and Methodology (including the DWDM solution), work plan, Training & Knowledge Transfer Strategy and Project Report Format to the GovTech Agency PMU at least 2 weeks prior to project execution.

4. The contractor shall coordinate with stakeholders, especially Bhutan Power Corporation (BPC) and DrukREN/GovNET SAs (Bhutan Telecom Ltd. and Tashi InfoComm Pvt. Ltd.) during implementation of the project.

5. The contractor shall identify Right of Use/Right of Way (RoU/ROW). Purchaser shall facilitate in issuing the required letter to the authorities in seeking RoW/RoU.

6. The contractor shall integrate supplied equipment with existing equipment in close consultation with the Service Agencies (SAs) of DrukREN/GovNet.

7. The contractor shall complete the transportation, installation, integration and commissioning of equipment and accessories as per delivery and completion schedule given in this section.

8. A joint team of the contractor and purchaser shall visit the field after completion of works for verification and testing.

9. The contractor shall submit a network acceptance test report after the completion of verification and testing.

10. The contractor shall provide technical training to the purchaser on topics including but not limited to maintenance and operation of all the supplied hardware and software. The training plan should be included in the Training and Knowledge Transfer Strategy.

11. The contractor shall jointly operate the active DWDM network with the purchaser and SAs for 30 days upon completion and commissioning of the network.

12. The contractor shall submit Project Completion Report (as per the agreed format with the purchaser). The completion report shall include but not limited to the following:

    a. Network Design Diagram
    b. Detail Installation report at all the sites
    c. Configuration of the equipment
    d. Training report
    e. Acceptance Test report

13. The contractor shall provide warranty support of 12 months from the date of completion of the commissioning for all equipment. The GovTech Agency shall have access to software updates & upgrades for all the equipment throughout its life cycle using OEM software management portal. The contractor shall replace the damaged/faulty equipment within 20 days during the warranty period. The contractor shall provide technical support in operation and maintenance of NMS during the warranty period.

III. Terms and Conditions

Bidders shall comply with following terms and conditions:

1. Licensed Bhutanese firms or Joint Venture (JV) with foreign firms are eligible to participate in the bidding process. A JV between two Bhutanese firms is also acceptable. In case of JV, the bidder should submit an JV Agreement executed between partners. Contract agreements

and any future undertakings with regard to the project shall be executed between the lead partner which shall be Bhutanese Firm (not foreign counterpart) and the purchaser. It shall be the lead partner's responsibility to arrange or provide any support required in future.

2. The bidders should have a registered office with legal presence and have a valid tax clearance certificate. In case of a JV, both the partners shall submit Certificate of Incorporation/Company registration document or valid trade licences.

3. The bidder must be an OEM authorised Business Partner for all proposed active DWDM equipment. OEM should provide a certificate or letter of authorization indicating the same and that the proposed active DWDM equipment is intended for the GovTech Agency for this particular project.

4. Project Team requirement:

    a. Project Manager should be of Bhutanese Nationality.

    b. 50% of the proposed technical personnels (Network/Optical Engineers and Technicians) should be Bhutanese. Proposed team member cannot take multiple roles.

    c. The bidders must demonstrate that it has the personnel for the key positions that meet the following requirements:

SN	Key Position	Minimum Qualifications	Minimum Total Work Experience [years]	Minimum Experience in Similar Work [years]
1	Project Manager - 1 No.	Engineering Graduate/ ICT Graduate	5	4
2	Network/Optical Engineer - 1 No.	B.Tech/B.E/B.Sc	5	4
3	Technicians - 4 Nos.	Diploma/Certificate	5	4

    d. The bidders shall provide details of the proposed personnel and their experience records in the relevant information forms PER-1 and PER-2 included in the ***Section IV.***

5. The bidders shall meet qualification criteria specified below:

    a. General Experience:

i. The bidders should have experience under contracts in the role of the contractor or subcontractor for at least last 5 years prior to the bid submission deadline. In the case of the JV, the lead firm should meet this requirement. The bidders shall list out all the contracts/projects carried out in the last 5 years in the "FORM EXP-1 - General Experience" included in the ***Section IV***. The bidders shall submit a copy of the Work/Supply Order(s) associated with each of their contract/project mentioned in the "FORM EXP-1 - General Experience".

ii. The bidder should have executed or is executing at least one contract value of Nu. 15 million in any ICT-related works in the last 5 years with evidence. In case of the JV, the lead partner must fulfil the set requirement.

iii. The bidders should have experience of at least five years in ICT-related supply and installation. In the case of JV, the lead firm should meet this requirement.

b. Specific Experience: The bidders must have participated as contractor, supplier, or subcontractor, in at least 1 contract within the last 7 years with value of at least Nu. 15 million that have been successfully or are substantially completed and that are similar to the proposed solution and deployment. The similarity shall be based on the physical size, complexity, method, technology or other characteristics as described in the ToR. In case of the JV, either one of the parties should meet this requirement. The bidders shall provide details of their specific experience records in the relevant form - "Form EXP-2 - Specific Experience" included in the ***Section IV.*** The bidders shall submit separate EXP-2 forms for each of their contracts/projects. The bidders shall submit a copy of the work/supply order(s) associated with all their contracts/projects mentioned in the forms EXP-2.

6. The bidders shall submit product brochures/catalogue of all the proposed equipment.

7. The bidder shall submit the BoQ of the proposed equipment - BoQ shall indicate component/part number, description and quantity. The bidders shall submit Technical Compliance Sheet form, Technical Approach and Methodology, Work Plan and Training & Knowledge Transfer Strategy.

8. The bidders shall not quote for the equipment that are end-of-sale announced by the OEM.

9. All licences for equipment should be perpetual licence and should not be subject to renewal.

10. All equipment/accessories being supplied should be configurable and compatible with the existing equipment as furnished in the ***Annexure III***. Hence, it is the responsibility of the bidder to sort out compatibility issues and supply the compatible accessories wherever required.

11. In case of the requirement of hardware/software/licences and any other accessories to support the solution, the bidder shall propose and quote accordingly as part of the solution. In case, any additional hardware/ software components are necessary for implementations which are not indicated in the BoQ, the same shall be provided by the contractor at no additional cost.

12. Virtual Machines to host the NMS shall be arranged by the purchaser. If there is a requirement of proprietary OS to host the NMS, the same shall be provided by the bidders. The OS, if any provided, should be genuine. Pirated OS shall not be accepted.

13. The lowest evaluated bidder shall be invited to make a presentation on the proposed solution including but not limited to demonstration of the proposed NMS before the work is awarded. Failing to fulfil the requirement of the purchaser shall result in disqualification, and the next lowest evaluated bidder shall be invited for the presentation and demonstration.

IV. Evaluation Criteria:

1. **Technical Criteria:**

   a. Preliminary Examination of the bid: The bidders shall ensure compliance of requirements specified in the Section I and II of bid document.

   b. The bidders must meet all the terms and conditions stipulated in the ToR. The bidders who do not meet terms and conditions specified in the ToR shall be disqualified.

   c. The bidders shall be accorded scores on its proposals based on the following Technical Evaluation Criteria:

SN	Technical Evaluation Criteria	Maximum Score
1	Project Team/ Personnel - CRITERIA I	50 (Weight)
1.1	Project Manager	14

1.2	Network/Optical Engineer	20
1.3	Technicians	16
2	Technical approach and methodology – CRITERIA II	50 (Weight)
2.1	Workplan (including approach and methodology)	10
2.2	Technical Solution (to be included in the presentation)	30
2.3	Knowledge Transfer Strategy	10
	TOTAL (Sum of Criteria I+II)	100

d. Weighted Average/Mean shall be used for Technical Proposal Evaluation to determine the final scores of the bidders.

e. Bidders shall obtain a minimum of 70% points (out of 100) in the technical evaluation to qualify. Bidders failing to obtain a minimum of 70% points (out of 100) shall be disqualified.

f. 75% weightage shall be accorded to Technical Proposal and 25% weightage shall be accorded to Financial/Price Proposal.

2. Financial Criteria:

a. Financial/Price proposal(s) of only technically qualified bidder(s) shall be evaluated.

b. 25% weightage shall be accorded to Financial/Price Proposal.

c. The formula for determining the financial score is:

- sf=(100xfm)/f; in which sf is the financial score, fm is the lowest price, and f is the price of the proposal under consideration.

3. **Combination Score:**

a. The firm with the highest combination score of technical and financial evaluation will be awarded the contract.

V. Technical Requirements:

The GovTech Agency has deployed a passive Layer-1 DWDM network to meet its high speed network requirements. However, the current network architecture entails challenges in meeting agency's network growth and maintaining the uptime of DrukREN and GovNet at 99.9% in the 13th FYP.

The GovTech Agency shall therefore upgrade the existing DWDM infrastructure along critical paths of the National Fiber Optic Network by deploying active DWDM nodes:

- DWDM components to amplify and monitor the optical channels along with the attenuation management capabilities along the Thimphu - Rurichu - Tsirang - Gelephu - Zhemgang - Panbang - Nganglam optical paths.

The existing passive DWDM network architecture deployed along the National Fiber Optic Network route is given in ***Annexure II***. The scope of the work includes the upgradation of the DWDM network along Thimphu-Rurichu-Tsirang-Gelephu-Zhemgang-Pangbang-Nganglam. List of existing equipment in use is given in ***Annexure III***.

The optical power budget/optical link loss on the existing DWDM network is given in ***Annexure IV***.

The following section includes technical requirements of the active DWDM network. The bidders shall study the requirement and propose the active DWDM solution:

1. Existing DWDM Mux/DeMux units shall be used with the new DWDM active nodes (amplifiers). More importantly the existing DWDM channels in use to connect layer 3 routers along Thimphu-Wangdue, Thimphu-Gelephu, Gelephu-Tsirang, Gelephu-Dagana, Gelephu-Zhemgang and Gelephu-Pemagatshel should continue operating on their existing DWDM links.

2. Active DWDM solution shall support full performance monitoring and diagnostic tools for all optical ports deployed along Thimphu-Rurichu-Tsirang-Gelephu-Zhemgang-Panbang-Nganglam optical path. The solution should support central management of the optical layer. This Central Management tool shall detect any failure in the DWDM system and trigger an alert on any distortion in the performance of the optical network before it causes performance degradation.

3. Active DWDM solution should support adjustment of optical attenuation for all new and existing optical links from the central management system, with support for automatic optical power balancing feature.

4. Active DWDM solution should support remote management with out-of-band OSC.

5. Purchaser shall provide Virtual Machine(s) with the Ubuntu OS along with computing resources, memory and storage to host the Central Network Management System. Bidders shall be responsible to quote the softwares/licences required for the NMS.

6. Active DWDM solution should provide flexible network expansion. The DWDM solution should be able to add or drop new network connections as per the requirement of the agency.

7. The proposed solution should also provide signal amplification and significant OSNR enhancement using OTN FECs, overcoming the link budget and distance limitations of passive networks.

8. The proposed amplifiers should support all-in-one amplification - Pre-Amp, Booster Amp and In-Line, and should be managed from the central NMS. The proposed amplifiers will replace the existing ones in use.

9. All the DWDM nodes shall comply with the technical specification given in the bid document.

VI. Payment Schedule

SN	Payment Stages	Payment Amount
1	Advance Payment	10% percent of the contract price shall be paid within 30 days of the contract signing upon submission of invoice and performance security for the equivalent amount.
2	On delivery of equipment	60% of the contract price.
3	On completion of the acceptance testing, installation, configuration and commissioning of the network including joint operation.	Remaining balance payment

VIII. Delivery and Completion Schedule

The Contractor is required to complete all the activities within stipulated time frame given in the table below:

SN	Work Schedule	Completion Days
1	Issuance of Supply/Purchase Order	Base Day (B)
2	Supply of Equipment (Delivery)	B+60
3	Transportation, Installation, Configuration and Commissioning including Acceptance Testing and Documentation	B+90
4	Joint Operation with the contractor	B+120
5	Training	B+120
6	Project Sign-off	B+120