

**Terms of Reference
(TOR)
Satellite Spectrum Monitoring
Equipment/Device**



འབྲུག་བཅད་དོན་བརྒྱུད་འབྲེལ་དང་བཅད་བརྒྱུད་དབང་འཛིན།
Bhutan InfoComm and Media Authority
Royal Government of Bhutan

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1. Background

The Bhutan InfoComm and Media Authority (BICMA) is mandated under the Bhutan Information, Communications and Media Act to regulate and manage the radio frequency spectrum, ensure efficient use of ICT resources, and safeguard the interests of the public and service providers. In fulfilling this mandate, the acquisition and use of satellite spectrum monitoring equipment is both a strategic and operational necessity.

With the increasing presence and use of satellite communication services in Bhutan ranging from broadband internet to broadcasting and remote sensing there is a growing need for effective spectrum management and enforcement mechanisms. One of the most critical tools is satellite spectrum monitoring equipment.

Satellite spectrum monitoring equipment is designed to detect, analyze, and manage the use of radio frequency (RF) spectrum allocated to satellite communications. These devices ensure that satellite frequencies are used efficiently, legally, and without harmful interference.

2. Objectives

Following are the objectives of satellite spectrum monitoring equipment/device.

a. **Ensure Efficient and Lawful Use of Satellite Spectrum**

Monitor satellite transmissions to ensure that all service providers operate within the assigned frequency bands and technical parameters and prevent unauthorized or illegal use of satellite spectrum within Bhutan's territory.

b. **Detect and Resolve Harmful Interference**

Identify, locate, and mitigate interference between satellite and terrestrial communication systems.

c. **Support Regulatory Enforcement and Compliance Monitoring**

Provide technical evidence for enforcement actions against violators of spectrum licensing conditions.

3. Scope of the Work

The scope of the work for satellite spectrum monitoring equipment/device:

- a. Supply Satellite Spectrum Monitoring Equipment/Device as per the required technical specifications and the quantities mentioned under the **Technical Specifications**



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Requirements and experts from the manufacturer should come physically and carry out the installation works.

- b. Provide all the hands-on-training and engineering services like operational training and Site Acceptance Test (SAT) on site based on the requirement as deemed by the Purchaser.
- c. Deploy experts/technicians from manufacturers with required and authentic certification to provide all the required materials and to complete the hands-on-training and engineering services. It should be the sole responsibility of the winning bidder to assess and reassess all the requirements.
- d. Provide documentation manual and technical training for operation, maintenance and troubleshooting.

4. Instruction on the Bid

4.1 Category of Supply

1. The Bid should consider supplying the *Satellite spectrum/monitoring equipment/device as per the technical requirement.*
2. The supply of the above mentioned shall be considered as the one lot. A winning bidder needs to clearly provide the technical and financial details as specified in the bid.
3. The work should not change the existing proposed modality for the procurement unless agreed between the parties.

4.2 Language of the Bid

The Bid prepared by the Bidder, and all correspondence and documents relating to the Bid exchanged by the Bidder and the Purchaser, shall be written in English.

4.3 Document Comprising the Bid

The Bid prepared and submitted by the Bidder shall comprise the following components:

- a. Bid Form, Technical Data Sheets and Financial Quote and any other documents mentioned as required in the eGP for satellite spectrum monitoring equipment as per specified in the Terms of Reference.
- b. Power of Attorney indicating that the person(s) signing the Bid have the authority to sign the Bid and thus that the Bid is binding upon the Bidder during the full period of its validity.



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5. Minimum Mandatory Eligibility Requirements

The bidders shall fulfill the following mandatory requirements to be eligible for further technical evaluation. The bidders not fulfilling these mandatory requirements will not be evaluated.

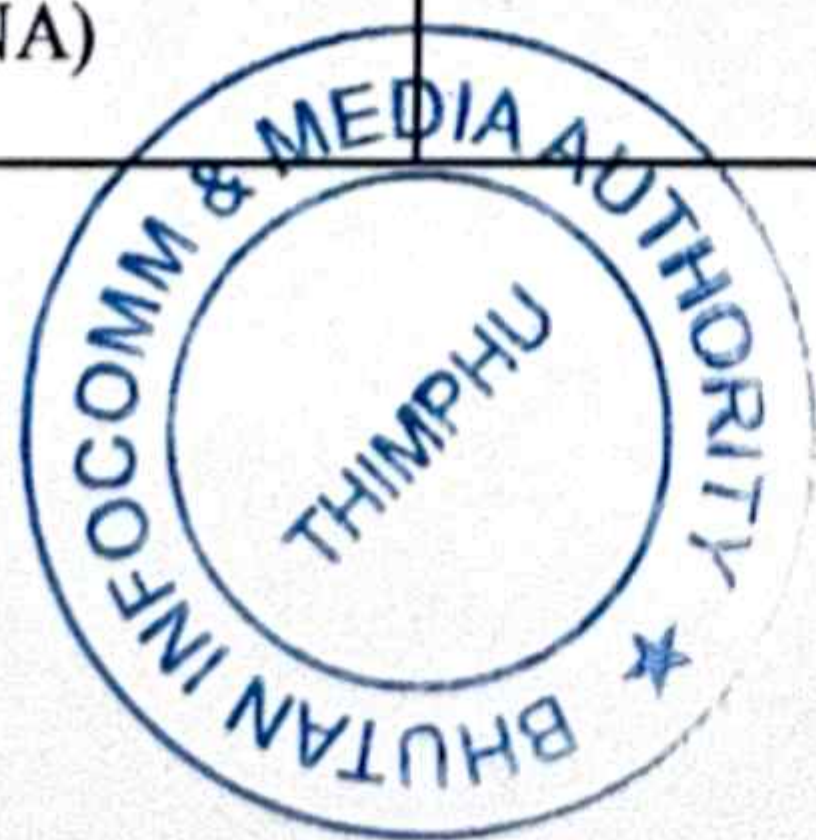
Sl.No	Mandatory Requirement	
1	Valid Trade license	Required
2	Valid Tax Clearance Certificate	Required
3	Manufacturer Authorization	Required (The manufacturer authorisation is required in order to ensure the genuinity and originality of the products (Hardware and Software). The Bidders have to obtain the signed and sealed manufacturer authorisation). (It is not the dealership certificate but the evidence to provide the originality of products from the manufacturer).
4	Technical Resources and Materials	(i) Submit the CV of the Technical Resource person from the manufacturer who will impart the physical in-person training to the officials of BICMA and installation/setup in Bhutan and should be supported with evident certificates. (ii) The Bidder shall also provide the detailed documents required by the purchaser including the brochures/specific datasheet of the products which they are bidding for.
5	Technical Operation and Integration of the System	The bidder must also provide the technical architecture, integration details, functionalities, and operational workflow of the system, including all associated equipment such as receivers, antennas, LNBS, filters, switches, and other components



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6. Technical Specifications and Requirements

Particulars	Sub-Items	Technical Specifications and Standards: <i>Satellite spectrum monitoring system/equipment should have all functionalities as specified)</i>	Quantity
Receiver	Receiver	• Wide frequency coverage: The receiver must cover the full 1 GHz – 40 GHz (L, C, Ku and Ka) • High sensitivity and wide dynamic range (1 Hz–40 GHz coverage, ≤ -140 dBm sensitivity, ≥ 100 dB dynamic range, up to 1 GHz analysis bandwidth) • Signal Routing: To feed signals from different antennas to a single receiver with minimal signal loss • Fast sampling / real-time spectrum analysis • Interference Detection, Identifies harmful interference affecting satellite communication • Spectrum Scanning: Scans the spectrum to provide real-time and historical data on spectrum occupancy. • Signal demodulation	1
Antenna	Fixed Parabolic Reflector	• Band Coverage: L, C, Ku and Ka • Frequency Range: 1-40GHz • Equipped with multiband feed system for multiband operations/ Compactible for LNB/LNA and Filters integration RF front end • Compactible/interface with Spectrum Monitoring Receiver • High Gain & Sensitivity: >35 dBi • Operation for both LEO and GEO	1
	Low-Noise Amplifier (LNA)	Monitoring one polarization at a time	4 LNA (S,C,Ku and Ka)



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	Tracking System Interface (for LEO):		As mentioned/required for the above integration of receiver and antennas
	Filters	Band pass filters	4 number of band pass filters for different bands (S,C,Ku and Ka)
	RF switch	Selects which band's IF is sent to the RF input.	1
Software Solutions and	Real Time Spectrum Processing and Analysis Software	• Spectrum visualization: Displays signal strength vs frequency • Waterfall plots / spectrograms: Show how signal changes over time, • Signal identification: Helps isolate specific satellite channels/frequencies. • Signal demodulation • Report analysis • Report extraction • Antenna Control Unit (ACU) • Control Software for spectrum monitoring and antenna • Networking and remote access • Data export and reporting	1
Other accessories	Mounting & Positioning Accessories	Fixed pedestal or polar mount, precision alignment, optional radome.	As required for the mount and positioning
	Power & Environmental Accessories	Uninterruptible Power Supply (UPS) (Minimum back up for 30 minutes)	1



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		Power Distribution Units (PDU)	As required
		Surge & Lightning Protection	As required
		Shelters and grounding (Include fencing for antenna)	As required
	Cable and connectors		As required
	Hardware Requirement (PC/laptop)	At least 32 GB or higher, At Least 1 TB SSD or higher, 13th Gen Core i7 @ 3.5GHz or higher, Licensed Windows 11 (64-bit) Pro or Enterprise Editions or higher.	1
Physical in-person training	Conduct Physical (In person) Training for the BICMA officials to observe and learn the operation. The physical in-person training to be conducted in Thimphu for a minimum period of three (5) working days by the expert from Manufacturer		Minimum three (5) working days
Installation and setup	Provide and give complete initial installation and setup of the station including the mounting and fixing of antennas along with civil works by the expert from the Manufacturer and local supplier.		NA
Technical Support	Availability of support via email, phone, and chat Access to a knowledge base and user forums		NA



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7. Financial Quote Table

A bidder can quote for Satellite Spectrum monitoring equipment/system in the following table format:

Particulars	Sub-Items	Specific products model/mode, And Name of the manufacturers/ country origin	Unit Price	Quantity	Total Price (Nu)
Satellite Spectrum monitoring Equipment/System	Receiver				
	Antenna				
	Software and solution				
	Other accessories				
	Training and Installation				
Total Quoted Price					

8. Technical Support and Warranty

- Quality assurance is expected from the supplier, such that any error or fault in hardware products and its subsystem, software requirement installation tools mentioned in technical specifications shall be acted upon, resolved, mitigated and/or replaced accordingly at no cost to the Purchaser.
- The winning bidder/supplier shall provide free support and provide after-sales services for a period of five (5) years from the time of acceptance of the hardware equipment and software.



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- c. The winning bidder/supplier shall ensure that all products and installations are accurate, complete, operable, uncompromised, and error-free.
- d. The local suppliers shall enter into contract with the manufacturer to provide any warranty support for (5) years.

9. Deliverables

- a. The winning bidder(s)/supplier(s) should deliver the fully functional goods/products and set-up and installation accordingly as per the requirement.
- b. The supplier shall provide the necessary installation, setup and configuration services of all deliverables, to include but not limited to hardware, software, Documentation Support and Maintenance.
- c. The winning bidder(s)/suppliers should provide physical in-person training to the BICMA officials in Thimphu and installation setup as required.

10. Expected Outcomes

- a. Supplied goods/products should be of high quality as in the technical specifications and provide after sales services and warranty as specified.
- b. Quality of work like installation, operational and hands-on- physical in-person training should be as deemed necessary.

11. Work Plan

The tender shall include a work-plan, which shall not exceed four (4) months for the delivery of equipment from the date of award and ten (10) days for completion of installation and operational training.

12. Supplier's Roles and Responsibilities

- a. The bidder/firm shall carry out the tasks and specific activities outlined in this TOR and in eGP to deliver the specific expected output professionally and responsibly.
- b. Prepare relevant documentation/manual of the delivered whole products (Hardware and software) and provide to the purchaser.



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- c. Control on his/her assigned staff for this assignment.

13. The Purchaser's Responsibilities

- a. The Purchaser shall pay only to the winning bidder for all service fee outlined in the contract upon submission and acceptance of the bidder's performed work by the Purchaser.
- b. Enable the bidder to execute his tasks as per the agreed work-plan.

14. Duration of Assignment

The duration of the assignment from the date of Award is tentatively four and half months and it may be subdivided into the following:

- a. 4 months: Delivery of satellite spectrum monitoring equipment/device
- b. 10 days: Installation , Setup and Physical Hands on Training

16. Mode of Payment

- a. 100% of total amount on full delivery of satellite spectrum monitoring equipment/device and on completion of the work (installation, Setup and operational physical Training).

17. Bid Security

The bidder shall provide/submit the bid security as mentioned in the eGP. Any defaulting bidders shall be served with a notice to deposit the stated amount in Bid Securing Declaration within 5 days which the bidder shall be debarred (across all Government Agencies) for a period of one year. The Authority will immediately go to the next bidder, once the notice is served to the defaulting bidder. Without the bid security, the bid will be considered unresponsive.

18. Tax Deducted at Source (TDS)

The TDS shall be deducted as per the Procurement Rules and Regulations of Bhutan during the payment.

19. Performance Security

- a. The Supplier shall produce a Performance Security of equivalent to 10% of the total bid amount.



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- b. The performance Security shall be valid for a period of five years from the date of award of the work.

20. Opening and Evaluation of Bids

The Tender Opening Committee will open the bids and the Tender Evaluation Committee shall evaluate the bids.

- a. **Mandatory Eligibility Requirement:** Non compliance to the minimum mandatory eligibility requirements will be treated as non responsive and the bid shall not be considered for further evaluation.
- b. **Clarification on Bid:** To assist in the examination, evaluation and comparison of bids, the Purchaser may at its discretion, ask the Bidder for clarification of its bid. The request for clarification and the response shall be in writing in eGP and no change in price or substance of the bid shall be sought, offered or permitted. The bidders who fulfilled technical requirements will be financially evaluated.
- c. **Preliminary Examination:** The Purchaser will examine the bids to determine whether they are complete, whether any computational errors have been made, whether the documents have been properly signed, and whether the bids are generally in order. Prior to the detailed evaluation, the Purchaser will determine the substantial responsiveness of each bid. For purposes of these clauses, a substantially responsive bid is one which conforms to all the terms and conditions of the bid without material deviations. A bid determined as not substantially responsive will be rejected by the Purchaser and may not subsequently be made responsive by the Bidder by correction of the non-conformity.
- d. **Evaluation Criteria:**

(i) Technical Evaluation

The bid fulfilling the **mandatory requirements** will be considered for technical evaluation. The bidder should submit the technical proposal (Submit Technical Datasheet/Brochures as mentioned). The technical evaluation will be done as per the required technical specifications and compliance to the Terms of Reference (ToR). The evaluation will check the fulfillment of the technical proposal of the Bidders as per the technical specification requirements. Not fulfilling the technical specifications requirement will be considered technically non-responsive. **The bid will be considered for the next evaluation which is financial evaluation only if the technical specifications are fulfilled.**



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The Purchaser may also seek clarification from the Bidders regarding technical details in writing or through presentations by the Bidder if the Purchaser feels the need to determine its technical fulfillment.

(ii) Financial Evaluation

The bids fulfilling the technical evaluation will only be financially evaluated. The award shall be made to the respective responsive bidder having the lowest financial proposal and meeting the technical specification prescribed in Terms of Reference.

Note: The Purchaser is not bound to select any of the firms submitting the bid. Furthermore, since a contract will be awarded in respect of the bid which is considered most responsive to the needs of the project concerned, due consideration being given to the Purchaser's general principles, including economy and efficiency. The Purchaser does not bind itself in any way to select the firm offering the lowest price.

21. Award Letter and Contract Signing

- a. If required, negotiations shall be conducted with the firms based on ranking of the procurement.
- b. Standstill period shall observe from the date of issuance of the letter of intent to award to allow the bidders to lodge complaints if aggrieved by the decision of the tender committee.

22. Tentative Time frame for the Completion

Activities	Oct 2025	Nov 2025	Dec 2025	Jan 2026	Feb 2026	March 2026	Apr 2026	May 2026	June 2026
Float tender									
Opening, Evaluation and Awarding of work									



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Delivery of Satellite Spectrum Monitoring equipment/system									
Inspection installation, Setup and training.									
Payment									



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