REQUEST FOR INFORMATION (RFI)

DESCRIPTION:	**REQUEST FOR INFORMATION (RFI): INPUTS FROM QUALIFIED INDUSTRY PARTICIPANTS, RESEARCH INSTITUTIONS, AND SYSTEM INTEGRATORS ON THE DESIGN AND SPECIFICATION OF A SATELLITE SPECTRUM MONITORING SYSTEM (SSMS)**		
RFI NUMBER:	SARAO-RFI-001-2025/26		
RFI PUBLICATION DATE:	30 January 2026		
CLOSING DATE AND TIME:	18 February 2026 at 11:00AM		
RFI PROPOSALS TO BE SUBMITTED VIA EMAIL TO:	tmothupi@sarao.ac.za		
DELIVERY INFORMATION			
LOCATION:	Cape Town and SARAO site in Carnarvon		
Enquiries relating to bidding procedures may be directed to:		**Technical enquiries may be directed to:**	
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SUPPLIER INFORMATION

Name of Bidder Name:					
Street Address:					
Telephone Number					
Code		Number			
Cell Phone Number					
Code		Number			
Facsimile Number					
Code		Number			
E-Mail Address					
VAT Registration Number					
Tax Compliance Status	Tax Compliance System PIN		**OR**	Central Supplier Database No.	MAAA
B-BBEE Status Level Verification Certificate	Tick Applicable Box. ❑ Yes ❑No		**B-BBEE Status Level Sworn Affidavit**	Tick Applicable Box. ❑ Yes ❑No	
[A B-BBEE status level verification certificate/sworn affidavit (for EMEs & QSEs) must be submitted in order to qualify for preference points for B-BBEE – also refer to the SBD 6.1]					
Are you the accredited representative in South Africa for the goods/services/works offered?	❑ Yes ❑No [If yes enclose proof]		**Are you a foreign-based supplier for the goods/services/works offered?**	❑ Yes ❑No [If yes, answer the questionnaire below]	

Is the entity a resident of the Republic of South Africa (RSA)?	❑ Yes ❑No
Does the entity have a branch in the RSA?	❑ Yes ❑No
Does the entity have a permanent establishment in the RSA?	❑ Yes ❑No
Does the entity have any source of income in the RSA?	❑ Yes ❑No
Is the entity liable in the RSA for any form of taxation?	❑ Yes ❑No

If the answer is "No" to all of the above, then it is not a requirement to register for a tax compliance status system pin code from the South African Revenue Service (SARS).

1. INTRODUCTION TO SARAO

The South African Radio Astronomy Observatory (SARAO) is a National Facility of the National Research Foundation, and is responsible for implementation of South Africa's strategic investments in radio astronomy. This includes participation in the construction and operation of the international Square Kilometre Array (SKA) project, and implementation of projects and programmes such as the MeerKAT telescope in the Karoo, the Hartebeesthoek Radio Astronomy Observatory (HartRAO) in Gauteng, the Africa Program (including the African VLBI Network), as well as the associated human capital development and commercialisation endeavours.

This Request for Information (RFI) is issued by the **South African Radio Astronomy Observatory (SARAO)**, a facility of the **National Research Foundation (NRF)**, to invite input from qualified industry participants, research institutions, and system integrators on the design and specification of a **Satellite Spectrum Monitoring System (SSMS)**.

The purpose of this RFI is to gather technical, operational, and commercial information to guide the development of a comprehensive monitoring capability that can detect, analyse, and report satellite transmissions that may interfere with radio astronomy operations. The system will form a critical component of SARAO's broader **radio frequency interference (RFI) management strategy**, supporting both the protection of the **MeerKAT** and **SKA-Mid** telescopes and the strengthening of national spectrum monitoring capacity.

This document outlines SARAO's intent to engage with industry to define feasible technical pathways, establish preliminary system requirements, and understand current technology readiness levels in satellite spectrum monitoring. Responses received will assist SARAO in shaping the final technical specification, procurement approach, and implementation framework for the system.

2. BACKGROUND

The South African Radio Astronomy Observatory (SARAO), a facility of the National Research Foundation (NRF), is mandated to manage and safeguard South Africa's investment in advanced radio astronomy infrastructure, including the MeerKAT telescope and the upcoming Square Kilometre Array (SKA)-Mid telescope. These world-class scientific instruments rely on pristine radio frequency interference (RFI) conditions across multiple operational bands extending from the UHF range (580 MHz) up to high-frequency bands above 15 GHz.

In recent years, the rapid proliferation of Low Earth Orbit (LEO) satellite constellations and expanded telecommunications activity have introduced increasing levels of RFI across frequency ranges critical to radio astronomy. Of particular concern is the overlap between satellite downlink transmissions in the **8.3–15.4 GHz** range (SKA-Mid Band 5b) and the **protected 10.6–10.7 GHz** primary astronomy band. These developments pose a direct threat to the integrity of radio astronomy observations and highlight the urgent need for a dedicated, high-sensitivity monitoring capability.

To address this, SARAO supported by the Department of Science and Innovation intends to develop a **Satellite Spectrum Monitoring System (SSMS)**. This system will be designed to continuously observe, record, and analyse satellite transmissions that could impact scientific operations at the MeerKAT and SKA sites. The SSMS will provide a critical tool for both technical interference mitigation and regulatory engagement with national and international spectrum authorities (e.g., the ITU).

The system will also serve a dual function: to protect the SKA radio astronomy environment and to strengthen national spectrum management capacity through collaboration between SARAO, the Independent Communications Authority of South Africa (ICASA), and the SKA Observatory (SKAO). Its modular design will allow deployment at multiple SARAO sites, including the **Karoo Radio Astronomy Reserve** and **HartRAO**, providing a flexible platform for continuous satellite spectrum monitoring and data-driven enforcement of spectrum policies

3. OBJECTIVE OF THE RFI

The purpose of this Request for Information (RFI) is to solicit input from industry on the **design, development, and specification** of a **Satellite Spectrum Monitoring System (SSMS)** capable of fulfilling SARAO's operational and scientific requirements. The RFI aims to **identify mature, cost-effective, and adaptable technologies and solutions** that can be integrated within SARAO's existing RFI monitoring framework.

Specific objectives include:

- **Specification Development:**
  To gather technical and operational information from qualified vendors that will inform the final technical specification of the SSMS, covering hardware, software, and system integration components.

- **Capability Benchmarking:**
  To assess existing commercial and research-based spectrum monitoring technologies, including antennas, RF front-ends, data acquisition, and analytics systems suitable for operation across 8.3–15.4 GHz, with priority given to the 10.6–10.7 GHz protected band.

- **System Design Inputs:**
  To determine the most viable approaches for a **modular, mobile, and ITU-compliant** monitoring platform capable of:

    - Real-time detection and classification of LEO satellite signals.

    - Correlation of detected events with satellite orbital data (NORAD catalogue IDs).

    - Integration with SARAO's control and data management infrastructure.

    - Scalable deployment at multiple observatory locations.

- **Stakeholder Alignment:**

  To ensure that the design meets the operational needs of key stakeholders, including the SARAO RFI and Spectrum Management Teams, the Spectrum Management Group, and local regulatory authorities, while maintaining compatibility with international radio-quiet zone standards.

Technology and Commercial Readiness:

To identify potential industry partners capable of delivering components or turnkey systems meeting performance, environmental, and reliability requirements for long-term deployment in remote Karoo condition. Participants would be requested to cost their solutions if feasible while delivering on the following requirements.

USER NEEDS AND RATIONAL				
ID	**Name**	**Need Statement**	**Rationale**	**Source/ stakeholder**
SN-01	ITU-Compliant Monitoring Station	The system needs to support satellite spectrum monitoring in a manner that complies with ITU-recommended standards and practices.	ITU plays a critical role in enforcing global satellite frequency allocations and resolving interference. The SSMS must support monitoring that enables the detection of violations and generation of data suitable for engagement with international authorities.	SARAO Spectrum management Team
SN-02	Mobile Deployment Capability	The SSMS equipment enclosure needs a modular, standardized design that allows the station to be relocated to other radio-astronomy facilities with minimal additional work.	Designing for future mobility ensures rapid redeployment as requirements change or new sites become available, minimizing cost and logistical complexity.	Commercial
SN-02a	Room-Sized/ portable Equipment Enclosure	The SSMS hardware (receiver racks, RF conditioning, and processing servers) need to be housed in a single, room-sized/	A self-contained enclosure minimises new civil works, simplifies shielding, and eases maintenance access.	SARAO RFI

USER NEEDS AND RATIONAL				
		portable RF-shielded enclosure		
SN-02b	Power interface	The SSMS needs to operate from standard mains (AC) power so that it can be deployed without requiring specialized or additional power infrastructure.	Off grid solutions have a lot of RFI complications	SARAO RFI
SN-02c	Network interface	The SSMS needs to be remotely controlled and send data back over the SARAO network.	Real-time control and data reporting is required	SARAO RFI
SN-03	Satellite Tracking Capability	The system needs to track individual LEO satellites across the sky and link detected signals to specific satellites.	Enables attribution of interference events to satellite sources, supports geolocation, and aids in regulatory enforcement.	SARAO RFI
SN-03a	Real-Time Satellite Detection	The system needs to detect LEO satellite radio frequency signals in real time, logging frequency, timestamp, power level, and bandwidth.	Real-time detection enables rapid identification of satellite transmissions and interference events, especially in protected bands.	SARAO RFI
SN-04b	LEO Satellite Identification	The system needs to support mechanisms for linking detected signals to uniquely identifiable LEO satellites, using metadata such as NORAD catalogue IDs or international designators.	LEO satellites do not broadcast names directly. Accurate identification relies on matching signal observations with satellite databases. This is critical for regulatory reporting, satellite identification, and technical validation.	Sarao Spectrum management Team
SN-04c	Orbital Prediction for LEO Identification	The system needs to integrate satellite orbit prediction to support the identification of LEO satellites associated with detected signals.	Since LEO satellites do not transmit identifiers directly, predictive orbital models are necessary to correlate signal direction and timing with known satellite positions. This enables accurate satellite identification and regulatory traceability.	SARAO Spectrum Management

USER NEEDS AND RATIONAL				
SN-04e	Band 5b Monitoring Focus	The system needs to monitor the full Band 5b range (8.3–15.4 GHz), with priority given to the protected 10.6–10.7 GHz band.	Band 5b overlaps with LEO satellite downlinks and lies adjacent to a protected astronomy band, making it critical for RFI detection.	SARAO RFI, SARAO Spectrum Management, Technical Specialists, SKAO
SN-04f	Field of View	The system needs to initially support partial-sky monitoring, with a modular and scalable architecture for future full-sky coverage. (Ideally full sky monitoring is preferred)	Enables prototyping under resource constraints, while supporting long-term upgrade to full hemispherical scanning capability.	Technical workshop
SN-04g	Sensitivity	The SSMS needs to be sensitive enough to detect LEO satellite transmissions across its operational band (8.3 – 15.3 GHz), including weaker signals near the protected 10.6 – 10.7 GHz slice.	The system does not need telescope-grade sensitivity; it only needs sufficient gain and noise performance to reliably pick up typical LEO down-link levels above the site.	
SN-05	Vigilant monitoring and enforcement	The system needs to maintain interference-free operations and efficient spectrum utilization.	Continuous and reliable monitoring enables proactive enforcement and protection of protected bands.	Spectrum Management team
SN-05a	Satellite Resource Utilization	The system must be able to identify one singular satellite within its field of view and correlate it with online satellite tracking resources.	The presence of a satellite needs to be known along with its transponder output.	SARAO Spectrum Management Team.
SN-05b	Interference across the band of interest	The system must report on how much of the spectrum is currently being used by all visible satellites.	Interference across the band of interest is of concern.	SARAO Spectrum Management Team.
SN-05c	Out-of-band spectrum	The system must report on the proportion of the monitored spectrum currently being utilized by all visible satellites	For enforcement - Quantifying total interference across the band supports regulatory assessment and spectrum occupancy analysis.	Spectrum Management team

USER NEEDS AND RATIONAL				
SN-06	Interactive Dashboards and Visualization	The system needs to provide an interactive dashboard for real-time visualization of monitored spectrum data, satellite tracks, and interference statistics.	Dashboards enable rapid situational awareness, facilitate decision-making, and improve communication between technical operators and management. Visual analytics also support historical trend analysis and reporting.	SARAO RFI
SN-07	Interoperable Data Sharing and Storage	The system needs to support interoperable data sharing protocols and storage mechanisms that allow spectrum monitoring data, metadata, and events to be exchanged seamlessly with SARAO systems.	To enable SARAO to implement its own dashboards, event-triggering logic, and post-analysis workflows without dependence on vendor-specific tools or formats.	SARAO RFI Team, Spectrum Management

USER NEEDS AND RATIONAL				
SN-08	Local Processing and Data Reduction	The system needs to perform local data processing, filtering, and event extraction on site, transmitting only relevant or summarized information to the central network.	Reduces bandwidth usage, enhances real-time responsiveness, and mitigates latency in remote Karoo deployments while maintaining data integrity for critical events.	SARAO RFI
SN 09	Electronic Beam Steering Capability	The system needs to support electronic beam steering to dynamically direct the sensing field of view toward satellites or regions of interest.	Electronic beam steering enables fast, flexible, and precise pointing without mechanical movement. It supports satellite tracking, enhances detection sensitivity, and enables advanced functions such as interference attribution and directional analysis.	Technical Specialists - Receivers systems

4. Use Cases for Satellite Spectrum Monitoring and Reporting (Spectrum Management Team)

- Satellite monitoring has two primary goals, which are:
    - Goal 1: Evaluation of satellite resource utilization
        - Carrier and transponder level
        - Orbit position occupancy
        - Frequency occupancy
        - Orbit position and frequency assignment (Over long term usage)

- Power flux-density (pfd) and other technical parameters compliance
- Beam coverage

- Goal 2: Detection and resolution of interference

  - Determination if the interference transmitters are mobile or fixed
  - Detection and technical analysis of interfering satellite communication network
  - Determination of the exact position of terrestrial interferers
  - Invention and verification of emission parameters with license conditions
  - Elimination of the interference

Modern satellite receiving systems should have the ability to perform real-time, non-real-time (data is analysed later, known as post processing), and fixed time measurements. The system should have a measurement bandwidth wider than the typical satellite carriers being evaluated. The following RF parameters should be measured in real time by the receiving system:

- Centre frequency
- Doppler frequency
- Pfd in reference bandwidth and total pfd
- Equivalent Isotropic Radiated Power (e.i.r.p)
- Carrier-to-noise ratio
- Transponder bandwidth and carrier bandwidth
- Out-of-band spectrum
- Received signal to noise ratio

4. EVALUATION OF AND NEXT STEPS

SARAO will evaluate responses based on their quality, alignment with requirements, and overall feasibility. Elements from different submissions may be combined if beneficial. Shortlisted respondents may be invited to participate in a follow-up RFP process.

5. DEADLINE FOR SUBMISSION

All RFI responses must be submitted to tmothupi@sarao.ac.za on or before:
Wednesday, 18 February 2026 at 11:00AM.

6. RFI RESPONSE DOCUMENT OWNERSHIP

All RFI responses become the property of the NRF and will be used exclusively to support the development of a satellite spectrum monitoring capability. SARAO will treat all submissions confidentially.

7. DISCLAIMER

- This RFI is issued solely for the purpose of obtaining information to assist SARAO in understanding capabilities and solutions available in the market. It doesn't constitute a solicitation, offer, or commitment to procure goods or services, nor does it create any contractual obligation on the part of NRF- SARAO.

- Due to the specific need that this RFI process has to fulfil, NRF wishes to clarify that this invitation is not intended to impede, amend or replace any current or future procurement process that NRF has engaged in or will engage in.

- This RFI is a stand-alone information-gathering and market-testing exercise, intended only to inform and assist NRF further decisions. No respondent, through submission of information will gain any right to participate in any future process, and participates herein on the basis that it is providing information voluntarily to strengthen a potentially beneficial process for all stakeholders. In addition, no participant shall be prevented or excluded from participation in the bidding process due to submission of information in response to this RFI.

- All participants responding to this RFI process need to ensure that they have received all information and remain solely responsible for satisfying themselves as to the information required in responding hereto and are fully responsible for all costs incurred in relation hereto and under no circumstances will any resultant cost be borne by NRF.

- SARAO reserves the right to amend, or cancel this RFI, in whole or in part, at any time and without prior notice. Neither SARAO nor the NRF shall be liable for any costs or expenses incurred by respondents in the preparation or submission of their responses to this RFI.

ACKNOWLEDGEMENT BY RESPONDENT

By signing this Request for Information (RFI) form, the respondent confirms that they have read and understood the contents of this RFI, including the description and scope of services outlined herein, and acknowledge the requirements as described in this document.

_____ _____

Signature Date

Print name: _____

On Behalf of the Supplier (duly authorized)