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APPOINTMENT OF A SERVICE PROVIDER TO SUPPLY THE AUTHORITY WITH RADIO FREQUENCY MONITORING EQUIPMENT FOR THE SQUARE KILOMETRE ARRAY (SKA) AREA PROJECT ON AN 80/20 PPPFA 2000, PREFERENTIAL PROCUREMENT REGULATION: 2017.

1. Background

1.1. ICASA ("The Authority") is mandated according to Chapter 5 (Control of Radio Frequency Spectrum) of the Electronic Communications Act 2005, to ensure efficient usage and effective management of the radio frequency spectrum.

1.2. The Authority initiated the project to establish a fixed spectrum monitoring capability in the Karoo Central Astronomy Advantage Areas in the Northern Cape Province, to perform spectrum monitoring over the SKA radio telescopes to ensure the protection thereof, as well as to monitor and protect the communications services offered to the public in the surround towns.

1.3. The Authority's aims of monitoring is to investigate the spectrum usage of the frequencies to ensure the compliant use of the spectrum. The Authority uses a compliment of fixed and mobile spectrum monitoring systems to undertake this function across South Africa and in neighbouring countries.

1.4. The goal is to ensure that the SKA radio telescopes are protected from radio interference and unwanted radio frequency emissions in the KCAAA. The KCAAA regulations will come into effect on 15 December 2020.

1.5. The project has been prioritised and forms part of the ICASA five (5) year Strategic Plan approved by Parliament and it is critical that this milestone and deliverable be achieved.

1.6. The Authority understand and recognises the importance of maintaining continuous monitoring and control over the spectrum usage in the KCAAA.

1.7. The Authority acknowledges that in terms of section 22(6) of the Astronomy Geographic Advantage Act (Act No. 21 of 2007) ("the AGA Act") read with section 30(1) of the Electronic Communication Act (Act no. 36 of 2005) (the Act), it has an obligation not to issue a broadcasting service license or radio frequency spectrum license where the service or frequency could cause radio frequency interference in the KCAAA.

1.8. The monitoring systems make use of masts and related facilities (GPS, electricity and wireless communications). Radio frequency monitoring receivers are installed at each fixed site to be able to continuously receive and collect (measure) radio frequency spectrum signals. To establish the monitoring capability, the Authority is obliged to take into consideration the International Telecommunications Union (ITU) Radio Regulations (RRs) and Spectrum Monitoring Guidelines as adopted by South Africa.

2. Scope

ICASA intends to appoint a service provider to supply the following equipment:

2.1. 1x radio frequency monitoring receiver according to the technical specifications in Appendix A1

2.2. 2x High Frequency (HF) omni-directional antennae according to the specifications in Appendix A2

2.3. 2x Broadband (BB) omni-directional antennae according to the specifications in Appendix A3

2.4. 4x steel cabinets according to the specifications in Appendix A4

The detailed specifications are contained in Annexure A.

3. Support of the Equipment

Warranties and/ or guarantees will apply to the manufacturers' OEM specifications and terms and conditions. Equipment to be procured should be covered for a minimum of 1 year of any manufacturing defects/ failure. The service provider must guarantee the availability of spares for at least 5 years after the procurement of the equipment.

4. Period of assignment

The appointed service provider, upon award of the bid, is expected to deliver all items defined in the terms of reference document. All work is to be carried out in accordance with the time schedule as agreed with the Authority. The Authority will not be responsible for any cost incurred due to an extension of the project as result of delays by the Supplier.

5. Briefing Session

There will be **no** briefing session.

6. Mandatory Requirements

The service provider must ensure:

6.1. The radio frequency receivers are developed to measure radio frequency signals according to ITU-R SM1839 guidelines.

6.2. The radio frequency receivers are software compatible and can be integrated with the GEW SkyMon software – to measure according to ITU-R SM1839 guidelines.

6.3. Full compliance with the functional requirements as outlined in Annexure A of the document.

7. Evaluation of the Bids

The bid will be advertised for a period of 21 working days in the Government Tender Bulletin on an 80/20 procurement principle.

Bidders will be evaluated on; a) price, b) bb-bee status, c) submission of the required documents and functionality. Only bidders who meet the cut-off score of 70 points out of 100 points for functionality will be considered further for price evaluation. All bid proposals submitted will be evaluated in accordance with the 80/20 procurement principle as prescribed by National Treasury Regulations.

Table 1 Evaluation criteria

No.	Functionality Criteria per Category	Weight
A.	**Price**	**80**
B.	**BBBEE Status Level Contribution**	**20**
	TOTAL	**100**
C.	**Functionality: Pre-qualification criteria**	
1.	Provide delivery plans or project schedule including but not limited to preparations, contingency, and logistical plans: 5 = A project schedule with: Milestones, Work Breakdown Structure, Pricing Schedule, Responsibility Matrix, and Contingency Plans; 4 = A project schedule with: Milestones, Work Breakdown Structure, Pricing Schedule, Responsibility Matrix and Excludes Contingency Plan; 3 = A project schedule with: Milestones, Work breakdown structure, Pricing Schedule, and Excludes Responsibility Matrix and Contingency Plan; 2 = A project schedule with: Milestones and Pricing Schedule; 1 = No project schedule submitted.	**20**
2.	Provide equipment documentation and/ or methodology: 5 = Provide all the below: 1. Conforming standards and regulations: ITU-R; 2. Conforming standards and regulations: SABS; 3. Datasheets; 4. Manuals. 4 = Provide all the below: 1. Conforming standards and regulations: ITU-R; 2. Conforming standards and regulations: SABS,	**30**

	3. Manuals, 3 = Provide all the below: 1. Conforming standards and regulations; ITU-R), 2. Conforming standards and regulations; SABS, 2 = Provide the below: 1. Conforming standards and regulations (ITU-R) 1 = No documentation provided	
3.	Proof that you have the support from the Original Equipment Manufacturer (OEM) regarding the availability of spares and parts and their repair facilities for the below listed: - Radio frequency spectrum receivers - High-frequency (HF) omni-directional antennae - Broadband omni-directional antennae, And providing at least 3 references, in the company letterhead, where the radio frequency (RF) products listed below were successfully deployed by you locally or internationally in the past 10 years: - Radio frequency spectrum receivers - High-frequency (HF) omni-directional antennae - Broadband omni-directional antennae 5 = Provide all the below: 1 Provide more than three (>3) testimonial reference letters of specialised RF monitoring equipment supply; and 2 International and local product development **and** equipment supply letter including availability of spares locally. 4 = Provide all the below: 1. Provide three (3) testimonial reference letters of specialised RF monitoring equipment supply; and 2. International and local product development **or** equipment supply letter including availability of spares locally.	**50**

	3 = Provide all the below: 1. Provide two (2) testimonial reference letters of specialised RF monitoring equipment supply; and 2. International and local product development **or** equipment supply letter. 2 = Provide all the below: 1. Provide one (1) testimonial reference letter of specialised RF monitoring equipment supply; and 2. Letter of intent (LOI) to distribute **or** supply locally by OEM. 1 = No submission of testimonial references or letters	
	TOTAL FOR FUNCTIONAL PRE-QUALIFICATION CRITERIA.	**100**

ANNEXURE A

A.1. Radio Receiver Specifications

This section defines the configuration and functionality requirements which are imperative in order to fulfil the requirements as set out in this document. Bidders are thus required to demonstrate how the under-mentioned will be achieved. Please provide a response to these requirements, by indicating whether you comply or not.

		Comply	**Not Comply**
The receiver must be supplied with a 19" bracket for cabinet installation, power cables, connectors, and related paraphernalia.			
		Comply	**Not Comply**
Feature	***Detail***		
Frequency range	9 kHz up to 6 GHz		
Instantaneous bandwidth	20 MHz		
Frequency accuracy	2 ppb, best case with GPS lock (10 ppb typical)		
Power consumption	35 Watts (without laptop or tablet PC)		
Operating modes	ITU Parameter Measurement GSM TETRA AIS Fixed Frequency Detection Mode		
Reporting & operator history	Activity Logs Exported to *.csv, HTML & Excel file formats		
GPS	Integrated		
Software compatibility/ integration	GEW SkyMon Software		

Optional features (software)		**Comply**	**Not Comply**
Data signal decoding	MRSI2000		
Control centre integration2	Remote control software (SpecMon)		
TDOA	Location fixing using time difference of arrival		

A.1.1. Radio Frequency Specification Summary

				Comply	**Not Comply**
Parameter	***HF***	***V/UHF***	***SHF***		
	LU		***LS***		
Frequency Range	9 kHz to 20 MHz	20 MHz to 3.6 GHz	3.6 GHz to 6 GHz		
Frequency				**Comply**	**Not Comply**
Pre-Selection	11 Filters & Pass-Through	4 Filters	2 Filters		
Tuning Resolution	1 Hz	10 Hz	10 Hz		
Tuning Error1	0.01 ppm typical	0.01 ppm typical	0.01 ppm typical		
Synthesizer Settling Time	≤ 300 µs	≤ 300 µs	≤ 300 µs		
LO Phase Noise	Better than: -120 dBc/Hz (Δf = 10 kHz)	Better than: -100 dBc/Hz (Δf = 10 kHz)	Better than: -80 dBc/Hz (Δf = 10 kHz)		

Linearity				**Comply**	**Not Comply**
Intermodulation IP22,3	≥ 70 dBm	≥ 40 dBm			
Intermodulation IP32,3	Better than: +30 dBm, +35dBm typical	Better than: +15 dBm, +18 dBm typical	≥0dBm		
Interference Rejection				**Comply**	**Not Comply**
IF Rejection	Direct Conversion	≥ 80 dB Typical	≥ 70 dB (3.6 to 7 GHz) ≥ 50 dB (7 to 9 GHz)		
IF Image Rejection	Direct Conversion	≥ 80 dB Typical	≥ 45 dB Typical		
Sensitivity				**Comply**	**Not Comply**
Noise Figure 4	20dB, 18 dB Typical	≤ 12dB, up to 1.8 GHz ≤ 14dB, 1.8 to 3.6 GHz	≤ 16dB		
AM Sensitivity	Better than: - 100dBm BW = 6 kHz, m = 0.5 Modulation Frequency of: 1 kHz	Better than: - 107 dBm, up to 1.8 GHz Better than: - 105dBm, 1.8 up to 3 GHz Better than:	N/A		

	For SINAD of: 12 dB	- 100dBm, 3GHz up to 3.6 GHz BW = 6 kHz, m = 0.5 Modulation Frequency of: 1 kHz For SINAD of: 12 dB			
FM Sensitivity	Better than: - 100dBm BW = 6 kHz Dev = 2.4 kHz Modulation Frequency of 1 kHz SINAD of 20 dB	Better than: - 107 dBm, up to 1.8 GHz Better than: - 105dBm, 1.8 up to 3 GHz Better than: -100dBm, 3 up to 3.6 GHz BW = 15 kHz Dev = 5 kHz Modulation Frequency of 1 kHz SINAD of 20 dB	N/A		
1. Dependent on GPS satellite	3. Measured according to	N/A	N/A		

reception0.1 ppm without GPS 2. High linearity mode	ITU-R SM1837 4. Measured according to ITU-R SM1838 5. Measured according to ITU-R SM1840				

A.1.2. Demodulation Specification Summary

				Comply	**Not Comply**
Parameter	***HF***	***V/UHF***	***SHF***		
	LU		***LS***		
Frequency Range	9 kHz to 20 MHz	20 MHz to 3.6 GHz	3.6 GHz to 6 GHz		
Demodulation				**Comply**	**Not Comply**
Demodulation modes	CW, AM, FM, PM, SSB, ISB	N/A			
Digital demodulation modes	TETRA, GSM, AIS	N/A			
Demodulation bandwidth Hz	100, 200, 400	100, 200, 400			
kHz1	1, 1.5, 2.4, 2.7, 4, 6, 8, 10, 20	1, 1.5, 2.4, 2.7, 4, 6, 8, 10, 20, 40, 100, 160, 200, 320			
MHz 2		2, 5, 10			

Gain control	Automatic Gain Control (IF, Audio)				
	Manual Gain Control (IF, Audio)				
AGC range	130	140	140		
Dynamic range	≥ 75 dB, 80 dB Typical	≥ 75 dB, 80 dB Typical	≥ 75 dB, 80 dB Typical		
Wideband				**Comply**	**Not Comply**
Wideband modes	Scanning – Full panoramic, no demodulation over 20 MHz Staring – 20 MHz max BW only, demodulation active				
Panorama scan speed3	1GHz/s @ 2.5 kHz resolution	10 GHz/s @ 25 kHz resolution			
IF bandwidths	100 kHz, 500 kHz, 1 MHz, 2 MHz	100 kHz, 500 kHz, 1 MHz, 2 MHz, 5 MHz, 10 MHz, 20 MHz			
Channel scanning speed	500 channels/s	1000 channels/s			
Memory channels	>10,000 channels				
RF inputs/outputs				**Comply**	**Not Comply**
Impendence	50 Ω nominal	50 Ω nominal	50 Ω nominal		
VSWR	≤ 2	≤ 2.5	≤ 2.5		
Connectors	N-Type	N-Type	N-Type		
10MHz reference out	1x BNC				
GPS in	1x BNC (3 V DC bias out)				

General		**Comply**	**Not Comply**
Squelch	At least: -140 dBm to 0 dBm		
Audio recording	High quality compressed (Limited by Hard Disk Space)		
IF recording	7.2 GB / Hour @ 320 kHz (Limited by Hard Disk Space)		
Measurements	AM, Modulation Depth		
	FM, Frequency Deviation		
	PM, Phase Deviation		
Bandwidth measurements	xdB method		
	Occupied bandwidth method (β%)		
Level measurements	Received power and Field strength (Automated)		
	Cursors (Manual)		
1. Demodulation bandwidths only available in IQ block mode (A mode where only snapshots of a signal can be viewed at a time) 2. Measured according to ITU-R SM1839			

A.1.3. General Specification Summary

		Comply	**Not Comply**
Receiver Parameter	***Specification***		
GPS	16 Channel, ≤ 2.5m CEP Accuracy		
Power supply	12 – 32 VDC input,		

	External 110 – 220 VAC (50 – 60 Hz) PSU supplied with desktop and portability pack		
Power consumption	35 Watts LU, (45 Watts LS)		
Operating temperature	At least: -10 to +55 °C		
Storage temperature	At least: -30 to +70 °C		
Operational high humidity	MIL-STD-810 method 507.4 ≥ 95% RH @ 30°C		
Shock & vibration	MIL-STD-810		
EMC	IEC 61000		
	CISPR 22 CLASS B (EN 55022)		
Data interface	LAN 1Gb Ethernet TCP/IP USB (Used for Tablet PC interface in portable configuration)		

A2 - Broadband Antennae Specifications

	Comply	Not Comply
Antenna specifications (Minimum ITU-R specs):		
• Broadband omni-direction antenna for outdoor geo-location/ use (Active or Passive): • Frequency range: 20Mhz – 6Ghz • Vertical polarised • Impedance: 50 ohms • VSWR: ≤ 3 for 400Mhz to 6Ghz • N-type connector • Ingress: IP67 • Wind load: Min 150 km/h • Universal clamps and brackets to be supplied, for a steel lattice or pole mast		

A-3 High Frequency Omni Antennae Specifications

	Comply	Not Comply
Antenna specifications:		
• Active high frequency monopole omni-direction antenna for outdoor geo-located sites for ground- or sky wave applications: • Frequency range: 0.25Mhz – 30Mhz • Vertical polarised (Omni-directional) • Impedance: 50 ohms • VSWR: ≤ 1.5:1 for 3Mhz to 30Mhz • N-type or C-type connector • Ingress: IP67 • Power requirement: 19 – 32 VDC • Wind load: Min 150 km/h • Universal clamps and brackets to be supplied, for a steel lattice or pole mast		

A-4 – Steel Cabinet Specifications

	Comply	**Not Comply**
19-inch 9U cabinet:		
• External dimensions in millimetres: 600 (Width) x 560 (Depth) x 488 (Height); • Free standing powder coated steel cabinet; • Integrated power supply outlet/ socket for equipment (Optional: Sine Wave Filtered) • Cylinder type lockable glass door; • Minimum of 2 cooling fans (220 VAC); • Secure openable side panel(s); • 1 pair of heavy duty 19-inch mounting rails; • Relevant compliance certification.		