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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.

No.	Functionality Criteria per Category	Weight
Α.	Price	80
В.	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;	20
	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.	
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;	30
	4. Manuals.	
	4 = Provide all the below:	
	1. Conforming standards and regulations: ITU-R;	
	2. Conforming standards and regulations: SABS,	

	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	
	r – 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	
		50
	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.	

TOTAL FOR FUNCTIONAL	PRE-QUALIFICATION CRITERIA.	100
1 = No submission of testime	onial references or letters	
2 = Provide all the below: 1. Provide one (1) testim monitoring equipmer 2. Letter of intent (LOI) t	nonial reference letter of specialised RF nt supply; and to distribute or supply locally by OEM.	
 3 = Provide all the below: 1. Provide two (2) testin RF monitoring equips 2. International and loca supply letter. 	monial reference letters of specialised ment supply; and al product development or equipment	

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 supp	lied 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	Activity Logs Exported to *.csv, HTML &		
history	Excel file formats		
GPS	Integrated		
Software compatibility/ integration	GEW SkyMon Software		

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Optional features		Comply	Not
(software)			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	20 MHz to 3.6	3.6 GHz to 6 GHz		
	MHz	GHz			
	Fre	equency		Comply	Not
					Comply
Pre-Selection	11 Filters &	4 Filters	2 Filters		
	Pass-				
	Through				
Tuning Resolution	1 Hz	10 Hz	10 Hz		
Tuning Error1	0.01 ppm	0.01 ppm	0.01 ppm typical		
	typical	typical			
Synthesizer	≤ 300 µs	≤ 300 µs	≤ 300 µs		
Settling Time					
LO Phase Noise	Better than:	Better than:	Better than:		
	-120 dBc/Hz	-100 dBc/Hz	-80 dBc/Hz		
	(Δf = 10 kHz)	(∆f = 10 kHz)	(Δf = 10 kHz)		

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

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

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

A.1.2. Demodulation Specification Summary

				Compl	Not
				У	Comply
Parameter	HF	V/UHF	SHF		
	LU	1	LS		
Frequency Range	9 kHz to 20	20 MHz to	3.6 GHz to 6		
	MHz	3.6 GHz	GHz		
	Demodulati	ion		Compl	Not
				У	Comply
Demodulation modes	CW, AM, FM,		N/A		
	PM, SSB, ISB				
Digital demodulation	TETRA, GSM,		N/A		
modes	AIS				
Demodulation bandwidth Hz	100, 200, 400	100	, 200, 400		
kHz1	1, 1.5, 2.4, 2.7,	1, 1.5, 2.4, 2	.7, 4, 6, 8, 10, 20,		
	4, 6, 8, 10, 20	40, 100, 160	, 200, 320		
MHz 2		2	2, 5, 10		

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

	General	Compl	Not	
		У	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	xdB method			
measurements	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 o	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	At least: -10 to +55 °C	
temperature		
Storage temperature	At least: -30 to +70 °C	
Operational high	MIL-STD-810 method 507.4 ≥ 95% RH @ 30°C	
humidity		
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 ITLLR specs):		
Antenna specifications (ivinininum n 0-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		
IIIdot		

	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.		