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From: Director, CSIR-NPL
Ref No. 14-VIII/SKD(16-GTE)2024PB/T-99 Dated : 03.12.2024

CORRIGENDUM

With reference to NPL's Global Tender ID: **2024_CSIR_777214_1**, for "Vector Network Analyzer (110GHz-170GHz)". Consequent upon the outcome of PBC, **some changes have been made in the technical specification of captioned tender. Revised specifications are as follows:**
Final Specs after Pre-Bid Meeting

FINAL DETAILED TECHNICAL SPECIFICATIONS

S.No.	Parameter	Specifications
1	Specification for 110-170 GHz (D Band) VNA • 4 Port Vector Network Analyzer Base unit 67 GHz (or higher) with all S parameter analysis • Base VNA unit must be extendable to millimetre range (D band) for 2 ports to perform all S-Parameters measurements (S11, S12, S21 and S22). •All necessary accessories like cables, test controller, adaptors, compatible cal kit must be offered.	
1	**Base unit specifications**	
1.1	Frequency Range	10MHz to 67 GHz or better
1.2	Frequency Resolution	1Hz or better
1.3	Frequency aging	±1.0 ppm/year or better
1.4	No of Test Ports	4 Ports or better
1.5	Internal sources	2 Source or more
1.6	Number of Sweep Points	100000 or more
1.7	IF Bandwidth	1 Hz to 1 MHz or better
1.8	Measurement	S-parameters, Gain compression: **I/p power at compression pt. v/s Frequency.** **O/p power at compression pt. v/s Frequency,** **Gain at different frequency points and** **3D plot for amplifier characterization.** IMD Measurements: **To configure two tones, internal combiner.** **IMD measurement/plot:** **Frequency sweep with Fixed/ Variable carrier spacing,**

		Power Sweep with fixed carrier spacing
1.9	Direct access for Internal receiver and source	Required at all 4 ports
1.10	Internal Combiner	Should be available inbuilt in the base unit
1.11	Source and receiver attenuators	To be provided (internal)
1.12	Direct IF Access	Input & Output to be available
1.13	Multiple (external) source control mode	External generator control to be available
1.14	System dynamic range (at 10 Hz IF bandwidth)	500MHz to 40GHz: 100dB 40GHz to 67GHz: 90dB
1.15	Output Power	**10 MHz - 2.5 GHz:** **+8 dBm to -80dBm or Better** **2.5 GHz - 20 GHz:** **+3 dBm to -80dBm or Better** **20 GHz to 35 GHz :** **-2 dBm to -80 dBm or Better** **35 GHz- 67 GHz: -7 dBm to -80 dBm or Better"**
1.16	Power resolution	0.01 dB
1.17	Corrected System Parameters (up to 40 GHz)	
(a)	Directivity & Load Match	30 dB or better
(b)	Source Match	25 dB or better
(c)	Reflection & Transmission Tracking	±0.2 dB or better
1.18	Sweep Type	Frequency sweep, Power sweep, CW mode
1.19	Input damage power level for test ports (at all the ports)	20 dBm, 30 V
2	**Specifications for frequency Extender/mixer Module (110 GHz to 170GHz)**	
2.1	Extenders module should be compatible with quoted VNA base unit to measure all possibleS-parameter parameters with required accessories to work with base VNA, cal-kit and cables to be provided	
2.2	**Frequency range for extender & output connector**	**Suitable Extenders/mixers with waveguide flanges for (110 GHz to 170 GHz) (WR-6or equivalent)**
2.3	IF Meas and Ref Out	To be available
2.4	Maximum Output Power	+5dBm or better
2.5	Dynamic range	≥90dB
2.6	Damage level	+20dBm or better
2.7	Manual Attenuation **(Inbuilt)**	**0 to 30dB or better**
3	**Accessories**	
3.1	Cal-kits	(i) Precision coaxial cal-kit up to 67GHz or better for base unit (Open/Short, Match, through; Male & Female)- 01 set with torque wrench
		(ii) Waveguide cal-kit to cover full frequency range from 110GHz to 170 GHz (WR 6 or equivalent)
3.2	VNA grade Test port cables	Low Loss & Phase Stable Cables (1.85 mm or similar:

		min 04 Nos.
3.3	In-built Display	Color touch screen 10inches. Or better
3.4	Connectivity/ Interfaces	LAN and USB
3.5	Future Upgradability option	Spectrum Analysis
3.6	Warranty	**3 years warranty for base unit and D Band Extenders alongwith Standard warranty for Component, cables and Cal kits**
3.7	a) Calibration and test reports to be made available from NMI traceable or equivalent lab for the base unit	
	b) OEM must have NABL **accredited or equivalent** service and repair facility in India for the base unit	

Warranty for 5 years for the system may be quoted separately. However, L1 will be decided only on the 3 year warranty basis .

Therefore, following extension in due date of submission & date of opening of the said tender may be read exactly as follows:

Due date & time of tender submission

For : 09.12.2024 up to 3.00PM (IST)
Read as : 23.12.2024 up to 3.00PM (IST)

Date & Time of Tender Opening

For : 10.12.2024 at 3:00PM (IST)
Read as : 24.12.2024 at 3.00PM (IST)

All other terms & conditions of said tender will remain the same.

Sr. Controller of Stores & Purchase

Minutes of TSC

Pre-bid Meeting(To be typed clearly by the I/O)

Name of Indentor: Satya Kesh Dubey
Indent No.: NPL28082024MMPO152012
Item Description: Vector Network Analyzer (110 GHz- 170GHz)
Project No.: MMP015201
Estimated Cost (in INR: 250 Lakh
No. of Budgetary Quotes: 2
(1)a pre-bid meeting of TSC was held on19/11/2024.
(2) Following queries were raised by participating Bidders:

Name of the Firm	Queries Raised	Remarks, if any
Keysight	1. We request you kindly provide the test controller requirement. Please note 4- port VNA does not required test controller to extend to millimeter range (D band) for 2 ports to perform all S-Parameters measurements (S11, S12, S21 and S22).	Any GUI based software-controlled system is required.
Keysight	1.10 gain compression requirement for swept power	I/p power at compression pt. v/s Frequency. O/p power at compression pt. v/s Frequency, Gain at different frequency points and 3D plot for amplifier characterization.
Keysight	1.11 Kindly confirm source and receiver attenuator are required on each port?	It should be available on at least2 Ports.

Indentor's recommendation

1. The comments, as received from bidders during PBC, and our response is as follows:

Tender Specification and its number	Comment of bidder	Response of Indentor (Accepted/ Not accepted)	Revised specification (If any)	Justification for non-acceptance
1. A 4 Port Vector Network Analyzer Base unit 67 GHz (or higher) with all S parameter analysis	M/s Anritsu requested to reduce it to two port instead of 4 port VNA	**Not accepted**	-	4 Port VNA is required for RIS, MIMO and other applications. It is available as per firm datasheet available in public domain.
1.4 Number of test port: 4	M/s Anritsu suggest to 2 port or better	**Not accepted**		4 Port VNA is required for RIS, MIMO and other applications. It is available as per firm datasheet

				available in public domain.
1.7IF Bandwidth 1 Hz to 1 MHz or better	M/s Keysight suggested to 1 Hz to 15 MHz	**Not Accepted**		For wider participation specifications **For our application, 1 Hz to 1 MHz is sufficient.**
1.8 S-parameters, Gain Compression, IMD Measurements	M/s Anritsu suggest to remove IMD Measurements	**Not accepted**		Intermodulation distortion measurements areessentialfor mixers, **Amplifier**measurements
1.9 Direct access for Internal receiver and source: Required at all 4 ports	M/s Anritsu suggest to 2 port or better	**Not Accepted**		As mentioned in 1 and 1.4
1.10 Internal Combiner Should be available inbuilt in the base unit	M/s Keysight Requested to remove inbuilt internal combiner in base unit.	**Not Accepted**		As it will become very complex to calibration the external combiner. Its available with all three OEMs as per open source datasheets.
1.11 Source and Receiver Attenuators: To be provided (internal)	M/s Anritsu suggest to add internal Bias-Tee M/s Keysight suggest to add Bias-Tee option on each port	**Not accepted**		Bias Tee can be used externally, too. Its an accessory available in the market, not required in this tender
1.12 Direct IF Access: Input & output to be available	M/s Anritsu suggest to change to 'should be available'	**Not Accepted**		Both IF should be accessible
1.15 Output Power: 10 MHz - 2.5 GHz: +10 dBm to -80dBm or Better 2.5 GHz - 25 GHz: +4 dBm to -80dBm or Better 25 GHz to 40 GHz : -5 dBm to -80 dBm or Better 40 GHz- 67 GHz: -10 dBm to -80 dBm or Better 1.16	M/s Anritsu suggest to amend to "10 MHz - 2.5 GHz: +10 dBm to -80dBm or Better 2.5 GHz - 20 GHz: +3 dBm to -80dBm or Better 20 GHz to 35 GHz : +0dBm to -80 dBm or Better 35 GHz- 67 GHz: -7 dBm to -80 dBm or Better" M/s Kesight requested 10 MHz - 2.5 GHz: +8 dBm to -80dBm or Better 2.5 GHz - 25 GHz: +6 dBm to -	**Accepted**	10 MHz - 2.5 GHz: **+8 dBm** to -80dBm or Better 2.5 GHz - 20 GHz: +3 dBm to -80dBm or Better 20 GHz to 35 GHz :**-2 dBm**to -80 dBm or Better 35 GHz- 67 GHz: -7 dBm **to -80 dBm** or Better"	Accepted as below to keep specification broad in nature as they are minor modifications

	80dBm or Better 25 GHz- 40 GHz: 0 dBm to - 80dBm or Better 40 GHz- 67 GHz: 2 dBm to - 80dBm or Better			
2.7 Manual attenuation: 0 to 30dB	M/s Anritsu suggest to amend/change to Built-in Attenuators (0 to 30 dB) on both freq extenders	**Accepted.**		**Manual attenuation (Inbuilt): 0 to 30dB or Better. Only clarification**
3.6 Warranty: 12 months warranty for whole system	M/s Anritsu suggest to amend to "3 Years for VNA Base unit and 1year for cal Kit and waveguide extenders" M/s Keysight Suggested 5 years Warranty M/s Rohde & Schwarz suggested 3 years warranty	**Accepted**	Warranty Three Years	
3.7 (b) OEM must have NABL accredited service and repair facility in India for Base Unit Minimum	M/s Anritsu suggest to delete this clause as Most of the OEM's in India do not NABL accredited service facility upto 67GHz M/s Keysight NABL accredited lab in India but provide UKAS calibration	**Not Accepted.** **Accepted**	NABL accredited lab or equivalent certification is OK	Accreditation is essential for any kind of standardization development Acceptedue to degree of equivalence.

The specifications are generic and broad based.
Warranty for 5 years for the system may be quoted separately. However, L1 will be decided only on the 3 year warranty basis.