

Minutes of Pre-bid meeting held on 25.10.2023 for the "Procurement of 08 Nos. of C-Band DWRs"

India Meteorological Department (IMD) has issued the tender through GeM portal vide GeM Bid No: GEM/2023/B/4018964 dated 16-10-2023 for procurement of 08 numbers of SSPA based C-Band DWRs. The competent authority constituted a Pre-Bid Committee vide DGM-24017(16)/1/2022-UAID dated 23rd Oct, 2023 for conducting Pre-Bid meeting to provide the clarifications to the likely suppliers as per provisions of the tender, consisting of following members:

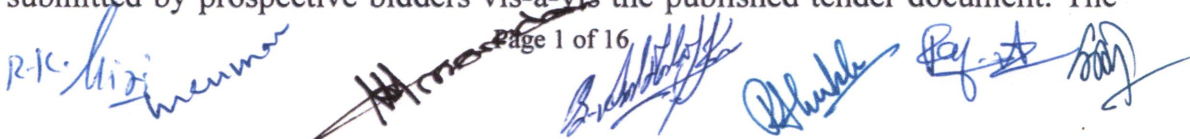
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| 1. Dr. V. K. Anandan, Scientist 'G', ISTRAC Bengaluru | Chairman |
| 2. Dr. G. Pandithurai, Scientist 'G', IITM Pune | Member |
| 3. Director (Finance), IFD, MoES | Member |
| 4. Sh. Gajendra Kumar, Scientist 'F' & Head UAID, IMD | Member |
| 5. Dr. R. K. Giri, Scientist 'F' & Head, CPU, IMD | Member |
| 6. Sh. B. A. M. Kannan, Scientist 'F', IMD | Member |
| 7. Sh. Rangaraj AG, Scientist 'E', IMD | Member |
| 8. Sh. Rohit Shukla, Scientist 'D', IMD | Member Secretary |

The Pre-Bid meeting was conducted as per schedule on 25.10.2023 at 1000 hours IST in hybrid mode i.e., in the Conference Room at Floor 6 of Mausam Bhawan, IMD, New Delhi through physical mode and online mode through VC. Director (Finance), IFD, MoES and Sh. B. A. M. Kannan, Scientist 'F', IMD could not attend the meeting due to preoccupations. The bidders from the following firms attended the meeting:

S. No.	Name of participating firm	Mode of attendance
1.	M/s Astra Microwave Products Limited	Physical & Online
2.	M/s Bharat Electronics Limited	Physical & Online
3.	M/s Data Patterns (India) Private Limited	Physical
4.	M/s Tata Advanced Systems Limited	Physical
5.	M/s Varisis Advanced Engineering Private Limited	Physical
6.	M/s SGS Weather	Online

The Committee discussed and deliberated on all Pre-Bid queries submitted by prospective bidders vis-à-vis the published tender document. The

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detailed clarifications to the queries raised by various firms received in writing via email and point wise clarifications are as follows:

1. <u>M/s. SGS Weather & Environmental, Gurugram</u>				
S. No	Tender Reference	Point Description	Firm Query / Clarification	Recommendations of the Committee
i.	Clause 2.23: Pointing resolution 0.01 Deg or better.	0.01° or better	<p>The proposed antenna system has the pointing resolution of 0.02 degrees". Typical requirements for weather radar antenna pointing accuracy range from ± 0.05 degree to ± 0.1 degree.</p> <p>We would like to inform that currently IMD and IITM are using C Band Radar from Vaisala which have the same pointing accuracy as stated above and the Radars have proven their performance in last many years without any issue with the antenna pointing accuracy. Number of Similar C band Radars of Vaisala make are functional across the globe with excellent performance record.</p> <p>We request IMD to change this specification to "0.02 deg pointing resolution" so that we can offer similar quality Radar under technical collaboration from Vaisala.</p>	<p>The pointing resolution may be read as 0.02 degrees or better. Vendor shall give the details of the design and analysis on the encoder and servo system which effectively brings out the expected pointing accuracy with proper resolution in observation. Same will be tested during FAT and SAT with bore sight and point target to consider the acceptance of the system. The encoder selected should support this requirement, considering all implementation issues.</p>

ii.	<p>Clause 2.29: Angular data resolution in AZ & EL axes 0.01° or better using 21 bits or better absolute angle Encoder.</p>	<p>0.01° or better using 21 bits or better absolute angle Encoder.</p>	<p>Angular data resolution in AZ & EL axes of 0.02° or better using 14 bits or better absolute angle Encoder". Vaisala weather radar is equipped with 14 bit absolute digital angle encoders, giving a resolution of about 0.02 degrees in the measurement.</p> <p>This is more than enough to monitor and control the antenna position and movement within the required tolerance. 21 bit angle encoders would mean angular resolution of about 0.0002 degrees, which is far beyond what is needed to control a weather radar antenna with about 1 degree beam width.</p> <p>Number of Similar C band Radars of Vaisala make are functional across the globe with proven performance including IMD & IITM. We would like to offer the similar proven technology of Vaisala for this C band Radar project.</p> <p>We therefore request IMD to change this clause as "Angular data resolution in AZ & EL axes of 0.02° or better using 14 bits or better absolute angle Encoder."</p>	<p>Angular data resolution in AZ & EL axes may be read as 0.02 degrees or better. Vendor shall give the details of the design and analysis on the encoder and servo system which effectively brings out the expected pointing accuracy with proper resolution in observation. Same will be tested during FAT and SAT with bore sight and point target to consider the acceptance of the system. The encoder selected should support this requirement, considering all implementation issues.</p>
iii.	<p>Clause 2.34 (b) Transmission Loss: better than 0.2 dB one way. Loss: better than 0.2</p>	<p>Transmission Loss: better than 0.2 dB one way.</p>	<p>The radome transmission loss is specified as 0.2 dB. The same need to be revised to 0.35 dB or better one way.</p>	<p>As per Tender Document.</p>

iv.	FAT (Factory Acceptance Test)	The bidder shall submit detailed test plans for Factory Acceptance Testing (FAT) prior to shipment and Site Acceptance Test (SAT) after installation at site for system acceptance. The test plan shall require concurrence by the IMD.	Mention about FAT is seen in many parts of the document. However in the "Price Schedule" and "List of deliverables" though SAT is finding place as an item, FAT is not seen as listed.	The travel and lodging charges of IMD team designated to conduct FAT is borne by IMD. Therefore, not included in list of deliverables.
v.	Clause 12 (i) Warranty- During warranty the bidder shall deploy trained manpower at each site preferably Graduates in Engineering in Electrical/ n Electronics/ Communication for maintenance support round the clock.	The Bidder shall deploy trained manpower at each site preferably Graduates in Engineering in Electrical / Electronics / Communication for maintenance round the clock.	In the Warranty and CAMC clauses, mention about posting trained manpower at each site for supporting round the clock operation is seen. However in the "List of deliverables" and "Price schedule" this item is not seen listed.	Chapter - 2, 3 CoC, Point: 18-12 (e)(i) stands deleted. <i>Alhank</i>
vi.	As per RFP	Annexure-VI	In the list of deliverables items 9 & 10	Point. No. 10

	Price Schedule BoQ	10. Tower 22. Towers for installation inclusive of all civil works	seems redundant as they are well specified under 22 & 24. However In the price schedule item 9 corresponding to list of deliverables (Tower) is seen removed, but item 10 (Equipment Shelter) seems redundant.	stands deleted. Point No. 22 'Towers for installation inclusive of all civil works' to be retained.
2.	<u>M/s Bharat Electronics Limited, Bangalore</u>			
S. No	Tender Reference	Point Description	Firm Query / Clarification	Recommendations of the Committee
i.	Chapter 3: Page No. 34 Table-1: Technical Specification 2.25 Cross polar radiation	Better than 36dB	Cross polar radiation of 30dB sufficient for meeting the Radar specifications as per RFP with modern radar signal processing techniques. Technical paper "Polarization Isolation Requirements for Linear Dual-Polarization Weather Radar in Simultaneous Transmission Mode of Operation" by Yanting Wang, Member, IEEE, and V. Chandrasekar, Fellow, IEEE also indicates the sufficiency of 30dB cross polarisation. With the isolations at RF and digital available at different stages, and the feasibility to perform calibration and update biases of polarimetric variables, the radar performance requirement can be met with 30dB cross pol. In view of the above, the cross polarisation specification may be revised to 30dB.	Cross polar radiation may be read as 30 dB or better.
ii.	Chapter 3: Page No. 35 2.32. Tower	c) The structural design should be certified by	1) Type of foundation and tower material are dependent on soil conditions of sites and height of tower, which has commercial	The details will be provided to the successful Lowest bidder

	height lights Page No. 50 8. Installation	a competent third-party authorized agency.	implications. Geographical conditions for remote sites such as rain/ soil/ wind etc. to be shared for estimating the tower installation related activities. Please provide the data. 2) It is requested that the tower and foundation requirement is standardised to meet the requirements. Please consider and update RFP.	(L1) after the issue of Supply Order.
iii.	Chapter 3: Page No. 41 Power requirement s	Power requirements	As some of the site locations are in remote areas, in order to ensure the quality of power supply for the system, request that a requirement for 'Voltage Stabiliser' be added in the RFP. Please consider and update RFP.	Voltage Stabilizer to be added as part of UPS by the firm.
iv.	Chapter 3: Page No. 44 Table-1: Technical Specification 2.54. General	32) Communication hardware for data transfer to central location. Contractor shall provide all necessary communication hardware i.e. Firewall (UTM Protection 24x7 Forticare plus Application control, IPS, AV, Web Filtering and Antispam services)	The specification "Forticare plus Application control" is a feature specific to a single OEM. The features- UTM Protection, IPS, AV, Web Filtering and Antispam services are available with multiple vendors. Request to generalise the requirement and update the RFP as "Communication hardware for data transfer to central location. Contractor shall provide all necessary Communication hardware i.e. Firewall (UTM Protection, IPS, AV, Web Filtering and Antispam services)" Please consider and update RFP.	Communication hardware i.e. Firewall (UTM Protection 24x7 Forticare plus Application control, IPS, AV, Web Filtering and Antispam services) or equivalent to Forticare Plus.
v.	Chapter 3: Page No. 50 5.4.2.	f. Rainfall intensity, rainfall rate and	Please provide data rate and format.	The details will be provided to the successful

	Hydrology Products	<p>accumulation products shall have an option to be adjusted in real time by Rain Gauge, disdrometer data. Rain gauge and disdrometer data shall be displayed along with the radar data.</p> <p>g. Adjustment of rainfall rate by appropriate rain gauge or disdrometer data shall be possible</p>		Lowest bidder (L1) after the issue of Supply Order.
vi.	Chapter 3: Page No. 51 5.4.4. Warning and Forecasting Products	Workstation with TITAN software running in real time should be provided and made available with appropriate data intake.	Can Titan s/w be provided in "Display and NRT workstation" mentioned in Section 2.49. Please confirm.	<p>As per Tender Document.</p> <p>A separate workstation to be provided by the firm for Titan software.</p>
vii.	Chapter 3: Page No. 52 7. Provision for networking and communication system for data transfer to central	h) Data of all radars to be overlayed on GIS map with option to include underlay maps from Google, Open street map or ESRI, Arc GIS etc.	<p>The requirement may please be corrected as "Google GIS with Google maps OR Arc GIS with Openstreet maps" OR Is it "Data of all Radars to be overlayed on world map."</p> <p>Please confirm and update RFP.</p>	<p>As per tender document.</p> <p>WMS tiles are provided by Google, OSM, ESRI-Arc GIS etc. are to be overlaid on these with selectable underlay / overlay</p>

	location.	Locally installed and accessible GIS server using Open street map to be provided. The products which are to be overlayed are: Reflectivity, Rainfall, Warnings based on Rainfall, Velocity, Hydrometeor classification. License for GIS shall be provided by the bidder.		options. However, GIS server with OSM is also required to serve the map tiles to overlay radar products within local LAN.
viii	Annexure VIII Page No. 74	LIST OF TENTATIVE LOCATIONS FOR INSTALLATION OF EIGHT (08) Nos. C-BAND DUAL POLARIZED SSPA BASED DOPPLER WEATHER RADARS	For remote sites such as Kavaratti and Port Blair: 1) Exact Site location/position to be shared for study for Tower installation as civil foundation requirement to be assessed. 2) The necessary Govt. / local body environmental clearance approvals for survey/ transportation will be required to be provided for the remote sites. 3) At remote areas please confirm that the power supply (solar/ grid power) will be made available. Please confirm.	The details will be provided to the successful Lowest bidder (L1) after the issue of Supply Order.
ix.	Chapter 3: Page No. 57 14.	i) Supply of first radar at site within 12	i) Supply within 15 months for land based sites considering the lead times required for manufacturing.	As per Tender Document.

	PROJECT SCHEDULE a) Delivery	months from the issue of supply order.	Subsequent 3 months for installation & commissioning. ii) Delivery of Equipment for Island based sites (02 sites) 18 months to be considered due to geographical terrain, using sea routes and lack of proper transportation system. Subsequent 6 months for installation & commissioning to be considered. Request to amend RFP accordingly.	
3.	<u>M/s Tata Advanced Systems Limited, Noida</u>			
S. No.	Tender Reference	Point Description	Firm Query / Clarification	Recommendations of the Committee
i.	Page 12: Point 5 I(a)	5. Qualification criteria for Bidders: I. Eligibility a) Bid is open to all manufacturers of weather radars in India. The bids are only open for Class I local supplier and class II local suppliers. Purchase preference would be	TASL are the manufacturers of two of the most advanced radars being supplied to MoD in partnership with global OEMs. There is hardly any difference in a normal Air surveillance radar/air defence radar and a weather radar other than the displaying of information. IMD is requested to open the Bid to all manufacturers of radar and not just the weather radars, especially to increase the competition.	Bidder shall be a radar manufacturer in India with following clause. If the product is being manufactured in India under a license from a foreign manufacturer who holds intellectual property rights and where there is a technology collaboration agreement / transfer of technology agreement for

		available for Class I local supplier. As per Govt. of India Procurement Policies.		indigenous manufacture of a product developed abroad with clear phasing of increase in local content, then experience of manufacturing 01 Doppler Weather Radar of consortium partner is required.
ii.	Page 14 Point IV	Experience and Past Performance: The Bidder should satisfy any one or more of the following criteria to qualify. The bidder shall be a weather radar manufacturer in India or shall have arrangements with foreign collaborators with phased indigenization as per DoPPOM No. P-4502L/2/2017-PP (BE-II)	As requested above and based on the same logic, IMD is requested to amend this line from a weather radar manufacturer to a radar manufacturer.	Bidder shall be a radar manufacturer in India with following clause. If the product is being manufactured in India under a license from a foreign manufacturer who holds intellectual property rights and where there is a technology collaboration agreement / transfer of technology agreement for indigenous manufacture of a product developed abroad with clear phasing of

		dated 4th June 2020.		increase in local content of radar, then experience of manufacturing 01 Doppler Weather Radar of consortium partner is required.
iii.	No Reference	SSPA Based Transmitter	<p>We do understand that Doppler Weather Radar Systems with SSPA based transmitters (DWRs with SSPA) have been gaining a lot of attention over the last few years in the market and we would like to share our opinion on what could be the best choice for the IMD.</p> <p>Our OEM partners are one of the leading providers of X, C, and S band radar technology in the world and are currently offering all three weather radar systems through a tube-based (Magnetron and Klystron) transmitter designs. Through their previous experiences with production and deployment of DWRs with SSPA years ago to the US Department of Defence / Air Force, and with reference to current inputs from leading sources in the industry, we believe the magnetron and klystron amplifier based configurations are still the most scientifically superior technologies available today for the government meteorological agencies worldwide. Therefore, we would like to take a moment to explain why tube based DWRs would be the best solution for IMD.</p> <p>There are some of the challenges with solid state transmitters which are</p>	As per Tender Document.

			<p>enumerated as follows:</p> <ol style="list-style-type: none">1. As we understand, the IMD desires radar data to be eventually assimilated into the weather forecasting models. The data quality from DWRs (with SSPA) are not to the level of quality and accuracy of tube-based DWRs, and thus could greatly impact model performance. This is especially important for the operational Hydrological models.2. For a SSPA to achieve the required sensitivity (for weather detection) a very long pulse must be used to achieve an equivalent average transmitted power to a high-power tube transmitter. A long pulse must be compressed in time using a modulation scheme and filter to get useable range resolution.3. The radar minimum detection range is equal to $3E8 \cdot PW/2$. For 100uS PW the minimum range is 15 km, so the radar won't see anything closer than 15 km. Therefore, a "fill-in" pulse(s) must also be transmitted, and it's returned echo must also be processed. The short pulse has very low average power and thus reduced sensitivity. With a high-power transmitter, we can see returns as close as 1km from the radar without any sensitivity reduction.4. Pulse Compression can cause Time sidelobes to appear which can cause false targets to appear on display if not controlled. Time sidelobes are usually controlled by amplitude weighting functions but this will cause a mismatch loss of several dB (loss of sensitivity).	
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			<ol style="list-style-type: none"> 5. No known Ground Clutter Filtering techniques can process data from pulses with different resolutions appropriately. 6. Sufficient research and operational testing have not yet been performed to accurately determine system ZDR bias and system PHIDP in DWRS with SSPA, particularly at C-Band frequencies. 7. In addition, all operational products and algorithms are impacted because of the lack of end-to-end systemwide testing due to system sensitivity differences along the radial. 8. Because a SSPA uses less power it is undetermined how well these transmitters will perform in sub-tropical and tropical environments where frequent heavy rain events could cause loss of signal through a precipitation cell. 9. Power consumption on an hourly basis of the tube based DWRs are sometimes even lesser than those of DWRs with SSPA due to the longer pulses used in DWRs with SSPA. 10. Tube based DWRs, and especially klystron based, are as sustainable as DWRs with SSPA, or more (klystron amplifiers in the US NEXRAD DWRs run for over 25 years without exchange). 11. Prices for the C-band tube based DWRs are comparable with DWRs with SSPA C-band solutions. <p>We and our OEM partners would not like to advise IMD to acquire and deploy the C-band DWRs with SSPA until the industry is ready with answers to these solutions. Till then, DWRs with SSPA will always have a sub-optimal performance as compared to tube based</p>	
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			<p>DWRs. We and our technological partners have begun a renewed R&D effort in the field of advanced C-band DWRs with SSPA, however it would take some time for finding the right solutions and offering an appropriate solution for your requirements.</p> <p>Refer to recent bid submissions in the world, in last two years several well established European meteorological agencies, which have begun to upgrade ageing weather radar networks have either prohibited the bidding of DWRs with SSPA or have procured a single DWR with SSPA to be used for testing purposes. This emphasizes the fact that DWRs with SSPA are not yet ready for mass deployment by any meteorological agency worldwide. Please, see one such representative example from the recent tender in Romania in the attached Annex I.</p> <p>Considering all said above, we would request IMD to consider changing the tender specification from DWRs with SSPA to tube based (magnetron) DWRs or allow bidding both DWRs with SSPA and tube based DWRs while amending the tender document accordingly.</p>	
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4. M/s Data Patterns (India) Private Limited, Chennai

S. No.	Tender Reference	Point Description	Firm Query / Clarification	Recommendations of the Committee
i.	Para 18: (CAMC) (e) on Page No. 58	"The Bidder shall deploy trained manpower at each site	Does it means IMD wants dedicated manpower/human resource at each site for 24X7X365 operations in daily shifts (i.e. 8 Hr * 3 Man Shifts/Day/Month/Year) only during	Chapter – 2, CoC, Point: 18 (e) stands deleted. However, the

		preferably graduates in Engineering in Electrical / Electronics / Communication for maintenance round the clock."	CAMC (i.e. 7 Years) period or total 10 years which includes warranty period also. Please clarify the requirement to calculate the manpower cost in Price Bid. We request IMD to mentioned total man resource hourly required per site and their provision for accommodations / logging specially on remote areas etc.	availability of the radar for operational purpose as per the requirement is the responsibility of the vendor during contract period. Essential manpower and material shall be ensured for this purpose.
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5. **M/s Varisis Advanced Engineering Private Limited, Noida**

S. No.	Tender Reference	Point Description	Firm Query / Clarification	Recommendations of the Committee
i.	Page No. 33: Table 1: 2.10, 2.11, 2.12.	Transmitted power: Required to meet 13 dBZ at 230 Km as per Point No. 2.5. Pulse repetition frequency: To meet Range and Velocity requirement as per Points No. 2.3 & 2.4. Pulse width: NLFM based pulse width required to match the range of observation and detection with Range side lobe less than 35dB.	Is it possible to define Transmitter power (KW), PRF, Pulse Width and Duty Cycle?	As per Tender Document.

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Note: The Costing of every item, sub items offered in bidder's technical bid, shall be done with all breakup prices. The cost of Equipment and Services shall not be clubbed at any stage. The said tender on GeM has been uploaded with default (as available on GeM) terms such as payment terms, delivery schedule etc. In all the cases, terms mentioned under the tender document shall prevail.



(Dr. V. K. Anandan)

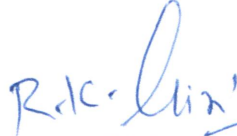


(Dr. G. Pandithurai)

(S. Gopal Krishna)


10/11/2023

(Gajendra Kumar)



(Dr. R. K. Giri)



(B. A. M. Kannan)



(Rangaraj AG)



(Rohit Shukla)