


	<p style="text-align: center;"><b>INDIAN INSTITUTE OF TECHNOLOGY MADRAS</b> Chennai 600 036</p> <p>Telephone: [044] 2257 9798/9760      FAX: [044] 22570545/8366 E-mail: <a href="mailto:arpp@iitm.ac.in">arpp@iitm.ac.in</a></p>	
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Dr. Radhakrishna Ganti  
Project Coordinator

Ref: ELE/RADA/2019/006  
Date: 15.04.2019

**Limited Tender No: ELE/RADA/2019/006**

**Due Date: 23.04.2019, 3 PM**

**Pre-Bid meeting: - Not required.**

**Technical Bid opening meeting on 23.04.2019, 4 PM at Department of Electrical Engineering IIT-Madras.**

Dear Sir/Madam,

On behalf of the Indian Institute of Technology Madras, offers are invited for **“MMwave RRH layout and SI analysis”** limited tender conforming to the specifications given in Annexure I.

Vendor who can design HDI mixed signal boards to respond to the tender please.

**Instructions to the Bidder**

- I. **Preparation of Bids:** - The tenders should be submitted under two-bid system (i.e.) Technical bid and Financial bid.
- II. **Delivery of the tender:** - The tender shall be sent to the addresses mentioned below, either by post or by courier so as to reach our office before the due date and time specified in our schedule. The offer/bid can also be dropped in the tender box on or before the due date and time specified in the schedule.  
The tender box is kept in the office of the:

**CSD 400 (5G Lab)  
Dept. of Electrical Engineering  
I.I.T. Madras,  
Chennai - 600 036.**

- III. **Opening of the tender:** - The offer/bids will be opened by a committee duly constituted for this purpose. The technical bids will be opened first and will be examined by a technical committee which will decide the suitability of the bids as per our specifications and requirements. All bidders will be invited for opening of technical bids. With respect to opening the financial bid, only technically qualified bidders will be called.
- IV. **Prices:** - The price should be quoted in net per unit (after breakup) and must include all packing and delivery charges to **Department of Electrical Engineering**. The offer/bid should be exclusive of taxes and duties. The percentage of tax & duties should be clearly indicated separately. IIT Madras is eligible for concessional GST and relevant certificate will be issued, if applicable.
- In case of import supply, the price should be quoted without custom duty. IIT Madras is exempted from levy of IGST on Imports and eligible for concessional custom duty (not exceeding 5%) and the price should be quoted on EX-WORKS and CIP basis indicating the mode of shipment.
- V. **Agency Commission:** - Agency commission, if any, will be paid to the Indian agents in rupees after receipt of the equipment and its satisfactory installation. Agency Commission will not be paid in foreign currency under any circumstances. The details should be explicitly shown in the tender document even in the case of 'Nil' commission. The tenderer should indicate the percentage of agency commission to be paid to the Indian agent. The foreign Principal should indicate the percentage of payment and it should be included in the basic price quoted originally (if any)..
- VI. **Terms of Delivery:** - The item should be supplied to the **Departments of Electrical Engineering, IIT Madras** as per the Purchase Order. In case of import supply, the item should be delivered at the cost of the supplier to our Institution. The Installation/Commissioning should be completed as specified in our important conditions.
- VII. **Technical Bid Opening:** The technical bid will be opened on **23.04.2019** at 4 PM at the **Department of Electrical Engineering, IIT-Madras** and the financial bids of those tenders who are technically qualified will be opened on the same/later date under intimation to them.
- VIII. **IIT Madras** reserves the full right to accept / reject any tender at any stage without assigning any reason.

Yours sincerely,

**Dr. Radhakrishna Ganti**  
**Dept. of Electrical Engineering**  
**I.I.T. Madras,**  
**Chennai - 600 036.**

## SCHEDULE

### Important Conditions of the tender

1. The due date for the submission of the tender is **23.04.2019, 3 PM.**

The offers / bids should be submitted in two bids systems (i.e.) Technical bid and financial bid. The Technical bid should consist of all technical details / specifications only. The Financial bid should indicate item-wise price for each item and it should contain all Commercial Terms and Conditions including Taxes, transportation, packing & forwarding, installation, guarantee, payment terms, pricing terms etc. The Technical bid and financial bid should be put in separate covers and sealed. Both the sealed covers should be put in a bigger cover. The Limited Tender for supply of **"MMwave RRH layout and SI analysis"** should be written on the left side of the Outer bigger cover and sealed.

2. **EMD:** - The **EMD in the form of account payee DD for RS 50,000 value of the item in favor of Registrar IIT Madras should be enclosed in the cover containing Technical bid.**  
Any offer not accompanied with the EMD shall be rejected summarily as non-responsive.

The EMD of the unsuccessful bidders shall be returned within 30 days of the end of the bid validity period. The same shall be forfeited, if the tenderers withdraw their offer after the opening during the bid validity period. The Institute shall not be liable for payment of any interest on EMD. EMD is exempted for Micro and Small Enterprises (MSE) as defined in MSE Procurement Policy issued by Department of Micro, Small and Medium Enterprises (MSME).

3. **Indian agent:** If an Indian agent is involved, the following documents must be enclosed:  
Foreign principal's proforma invoice indicating the commission payable to the Indian Agent and nature of after-sales service to be rendered by the Indian Agent.
  - ✓ Copy of the agency agreement with the foreign principal and the precise relationship between them and their mutual interest in the business.
4. The offer/bids should be sent only for a machine that is available in the market and supplied to a number of customers. A list of customers in India and abroad with details must accompany the quotations. Quotations for a prototype machine will not be accepted.
5. **Validity:** Validity of Quotation not less than 90 days from the due date of tender.
6. **Delivery Schedule:** - The delivery schedule is specified in the technical specifications. Normally the delivery should be in 8 weeks from date of PO (or as specified in Annexure 1 whichever is earlier). If there is delay, the penalty will be @1% per week of delay subject to a max of 10% of the value of purchase order and if the delay is more than 10 weeks, the PO would be cancelled and liquidated damages will be enforced.
7. **Risk Purchase Clause:-** In the event of failure of supply of the item/equipment within the stipulated delivery schedule, the purchaser has all the right to purchase the item/equipment from other sources on the total risk of the supplier under risk purchase clause.

8. **Advance Payment:** No advance payment is generally admissible. In case of specific percentage of advance payment is required, the Foreign Vendor has to submit a Bank Guarantee equal to the amount of advance payment and it should be routed through the Beneficiary Bank to the end user Bank. Otherwise, the Indian Agent of the foreign vendor has to submit a Bank Guarantee through a Nationalized Bank of India.
9. **On-site Installation:** - The equipment or machinery has to be installed or commissioned by the successful bidder within 15 to 20 days from the date of receipt of the item at site of IIT Madras (as applicable).
10. **Late offer:** - The offers received after the due date and time will not be considered. The Institute shall not be responsible for the late receipt of Tender on account of Postal, Courier or any other delay.
11. **Acceptance and Rejection:** - I.I.T. Madras has the right to accept the whole or any part of the Tender or portion of the quantity offered or reject it in full without assigning any reason.
12. **Do not quote the optional items or additional items unless otherwise mentioned in the Tender documents / Specifications.**

**13. Disputes and Jurisdiction:**

**Settlement of Disputes:** Any dispute, controversy or claim arising out of or in connection with this PO including any question regarding its existence, validity, breach or termination, shall in the first instance be attempted to be resolved amicably by both the Parties. If attempts for such amicable resolution fails or no decision is reached within 30 days whichever is earlier, then such disputes shall be settled by arbitration in accordance with the Arbitration and Conciliation Act, 1996. Unless the Parties agree on a sole arbitrator, within 30 days from the receipt of a written request by one Party from the other Party to so agree, the arbitral panel shall comprise of three arbitrators. In that event, the supplier will nominate one arbitrator and the Project Coordinator of IITM shall nominate one arbitrator. The Dean IC&SR will nominate the Presiding Arbitrator of the arbitral tribunal. The arbitration proceeding shall be carried out in English language. The cost of arbitration and fees of the arbitrator(s) shall be shared equally by the Parties. The seat of arbitration shall be at IC&SR IIT Madras, Chennai.

- a. **The Applicable Law:** This Purchase Order shall be construed, Interpreted and governed by the Laws of India, Court at Chennai shall have exclusive jurisdiction subject to the arbitration clause.
- b. Any legal disputes arising out of any breach of contract pertaining to this tender shall be settled in the court of competent jurisdiction located within the city of Chennai in Tamil Nadu.

14. All Amendments, time extension, clarifications etc., will be uploaded on the website only and will not be published in newspapers. Bidders should regularly visit the above website to keep themselves updated. No extension in the bid due date/ time shall be considered on account of delay in receipt of any document by mail.

**Acknowledgement:** - It is hereby acknowledged that the tenderer has gone through all the conditions mentioned above and agrees to abide by them.

**SIGNATURE OF TENDERER  
ALONG WITH SEAL OF THE  
COMPANY WITH DATE**

[Annexure I](#)

**Vendor/Firm Compliance**

- a. Firm must have prior experience in design/layout/routing of 10/25G ethernet, PCI express 3rd gen, JESD204B, QSFP+ interfaces. At least two such boards should be designed.
- b. Firm must have experience of designing boards having Xilinx MPSOC devices and also have expertise in RF routing. Should have done FPGA boards with stackup for at least 22 layers. At least two such boards should be designed.
- c. Minimum yearly turnover of the firm should be at least INR 5 crores.
- d. Firm should have existed for at least 5 years.
- e. Firm should explicitly indicate the Fab details and its technical capabilities, where the board will be fabricated.
- g. Technical evaluation committee at IITM may ask for the demonstration of previously designed hardware (having features as mentioned in item (a) and (b)) by the firm.
- h. Documentary evidence may be asked by the IITM to verify the claims made by the vendors.

## Work to be carried out by vendor

There is one PCB board for which the placement, layout and analysis have to be carried.

(a) This will be a four stage development work as per the break up & milestones given below. A stage will be considered as over only after all the deliverables related to that stage are handed over to IITM:

### The following stages and milestones are applicable for both the boards.

Sl.No	Stage 1 activities & milestone
01	Design Study & database creation
02	Footprint Creation / QA
03	Design packaging
04	Board mechanicals and Major component placement
05	Placement completion
06	Stackup build <sup>^***</sup>
07	SI, PI
08	Placement Review
09	Placement review comments implementation
10	Placement Signoff
<p>*** Based on consultation with a reputed fab. At this stage the details should be shared with IITM and technical approval of IITM is required (so as to verify the capabilities of the fab) before proceeding.</p>	
<b>Milestone-1 -Placement completed Board file</b>	
<b>Stage 2 activities and milestone</b>	
11	Technology setup
12	Stackup signoff
13	Pre route SI analysis
14	Pre route PI analysis
15	Pre route DFA analysis
<b>Milestone-2--Pre rout Analysis reports</b>	
<b>Stage 3 activities and milestone</b>	
16	Critical signal routing
17	Review -Critical signal routing
18	Comments implementation
19	Plane creation, length matching

20	Post route SI analysis
21	SI report preparation
<b>Milestone-3-Post rout Analysis reports</b>	
<b>Stage 4 activities and milestone</b>	
22	Plane creation, routing completion
23	Routing Signoff
24	Post route PI analysis
25	Assembly, Silkscreen, Fabnotes
26	Design Signoff
27	Gerber setup, generation and Pre-CAM
28	Post route DFA analysis
29	Board QA
30	DFM and deliverables
<b>Milestone-4-Final deliverables</b>	

- (b) **The work should be completed within 5 weeks after placing supply order.**
- (c) The work progress will be reviewed by IITM team after every 10 working days. Vendor has to take approval of IITM for any amendment/modification.
- (d) The schematic of the board will be shared with L1 vendor after signing NDA
- (e) The proprietorship of all the work/design files will be with IITM only. Vendor will not share any details of the work with any party in any manner whatsoever.

### **Deliverables**

- (a) Board files
- (b) Gerber files
- (c) PCB stackup
- (d) SI & PI reports

## Technical specifications

### RRH MMwave Board

Salient features of board

1. 10 Gig lines
2. Memory modules (PS & PL)
3. Xilinx RFPSOC FPGA (1 unit)

Layout Specifications		
No	Specification	MMwave RRH (Digital Front End Boards)
1	Total Comps	1000
2	Comp Types	320
3	Total Pins	6000
4	Total Net Types	900
5	Connections	5000
6	Board Size	~180X120 mm
7	Nature of Board and No.Of Layers	HDI and 16 - 20 layers
8	Board Thickness and Finish	1.6-2.5 mm

<u>SI, PI analysis requirement for RRH (Digital Front End Board)</u>	
1	Pre & Post Signal Integrity Analysis. (including NEXT FEXT)
SFP (10 Gbps/5 GHz) x5, DDR4 x2	
2	Power Integrity Analysis (Decoupling, Plane Noise & IR Drop analysis)
	~8 Power Nets