

**GOVERNMENT OF INDIA
DEPARTMENT OF SPACE
ISRO TELEMETRY TRACKING & COMMAND NETWORK (ISTRAC)
BANGALORE**

Tender for Telemetry, Tracking and Command Processor (TTCP)

Bids to be submitted online

Tender No.: ISTRAC/ISTRAC PURCHASE/TR202100025201 dated 15-02-2023

A. Tender Details

Tender No :	ISTRAC/ISTRAC PURCHASE/TR202100025201
Tender Date :	15-02-2023
Tender Classification:	GOODS
Purchase Entity :	ISTRAC PURCHASE
Centre :	ISRO TELEMETRY TRACKING & COMMAND NETWORK (ISTRAC)

Telemetry, Tracking and Command Processor (TTCP)

Note: 1) This is a Dual Part Tender. Please submit your Offers separately for Technical and Price Bid under relevant Templates. Please upload Price Bid under Price Bid only and nowhere else. If price is mentioned anywhere other than Price Bid, your offer will not be considered. 2) Please provide your compliance separately for (a) Security Deposit Clause (b) Performance Bank Guarantee Clause Liquidated Damages Clause (c) Security Deposit cum Performance Bank Guarantee (SD cum PBG) Clause (d) DELAY IN COMPLETION / LIQUIDATED DAMAGES (e) Certificate of Undertaking (f) MII and other terms and conditions.

A.1 Tender Schedule

Bid Submission Start Date :	22-02-2023 10:00
Bid Clarification Due Date :	27-03-2023 17:00
Bid Submission Due Date :	02-04-2023 17:00
Bid Opening Date :	03-04-2023 09:00
Price Bid Opening Date :	06-04-2023 17:00

B. Tender Attachments

NA

Instructions To Vendors

1. INSTRUCTIONS TO TENDERERS FOR ONLINE SUBMISSION OF TENDERS THROUGH E-PROCUREMENT SYSTEM

1. a) Bidders shall arrange themselves all resources, including Digital signature certificates and Internet Connections at their own cost, for participating in online tendering.
- b) Vendors can download the tender details and submit their offers online using their vendor accounts (obtained during registration) in our portal. Help demos for tender download and bidding processes are given on home page.
- c) The tender should be submitted online in the ISTRAC link before the due date and time as specified in the tender schedule in the portal.
- d) Vendors shall also take note of other Instructions to tenderers indicated in the tender documents.

2. Conditions for online submission of tenders:

- a) It is mandatory for interested parties to register as vendors in our e-procurement portal <https://eproc.vssc.gov.in/home.html> for participating in online eProcurement process of ISRO. Only registered vendors can submit their offers online in our eProcurement portal.
- b) Vendors who are already registered in the existing EGPS software of ISRO, please register by clicking the link in the email you would have already received from 'eproc@vssc.gov.in'. After registration, do the profile update by login to this portal.
- c) For new vendors, who are not registered in the existing EGPS software, vendor registration will be released along with the portal release. To register as vendors please refer to the help demos listed on the home page of the e-procurement link mentioned above. They may approach help desk (contact details provided on the home page) for any technical help for registration and subsequent process.
- d) OEM details should be added in your E-Procurement profile under Add Agent/Principal without fail.

3. ISTRAC shall not be responsible for failure of vendors in submitting bids online caused due to technical reasons at vendor end such as network or power failures, computer failure, internet-browser, mistakes / errors in filling the bids on line by vendor etc.

4. Procedure for seeking clarifications/help for the tender:

- a) All enquiries regarding the tenders and submission of offers shall be online and only through our eProcurement portal.
- b) Vendors may approach help desk e-mail id and phone number given on the home page for any technical help (e-mail: eproc@vssc.gov.in and Phone: +91471 2565454/4574/2527/3753/3289).

5. Queries by vendors on technical problems on the last day of tender will not be binding on ISTRAC/ISRO for resolving/addressing. ISTRAC will not be responsible for non-submission of bids for those cases.

2. PROFORMA FOR INSTRUCTIONS TO TENDERERS AND TERMS & CONDITIONS OF TENDER

1. a) All available technical literature, catalogues and other data in support of the specifications and details of the items should be furnished along with the offer.
- (b) Samples, if called for, should be submitted free of all charges by the tenderer and the Purchaser shall not be responsible for any loss or damage thereof due to any reason whatsoever. In the event of nonacceptance of tender, the tenderer will have to remove the samples at his own expense.
- (c) Approximate net and gross weight of the items offered shall be indicated in your offer. If dimensional details are available the same should also be indicated in your offer.
- (d) Specifications: Stores offered should strictly confirm to our specifications. Deviations, if any, should be clearly indicated by the tenderer in his quotation. The tenderer should also indicate the Make/Type number of the stores offered and provide catalogues, technical literature and samples, wherever necessary, along with the quotations. Test Certificates, wherever necessary, should be forwarded along with supplies. Wherever options have been called for in our specifications, the tenderer should address all such options. Wherever specifically mentioned by us, the tenderer could suggest changes to specifications with appropriate response for the same.

2. ACCEPTANCE OF STORES: (a) The stores shall be tendered by the Contractor for inspection at such places as may be specified by the purchaser at the Contractor's own risk, expense and cost. (b) It is expressly agreed that the acceptance of the stores Contracted for, is subject to final approval by the purchaser, whose decision shall be final. (c) If, in the opinion of the purchaser, all or any of the stores do not meet the performance or quality requirements specified in the Purchase Order, they may be either rejected or accepted at a price to be fixed by the purchaser and his decision as to rejection and the prices to be fixed shall be final and binding on the Contractor. (d) If the whole or any part of the stores supplied are rejected in accordance with Clause No. (c) above, the purchaser shall be at liberty, with or without notice to the Contractor, to purchase in the open market at the expense of the Contractor stores meeting the necessary performance and quality Contracted for in place of those rejected, provided that either the purchase, or the agreement to purchase, from another supplier is made within six months from the date of rejection of the stores as aforesaid.

3. ARBITRATION : All disputes, differences, claims and demands arising under or pursuant to or touching this agreement shall be referred to Arbitration of a sole Arbitrator to be appointed by the Director, ISTRAC, whose decision/award will be final and binding on both the parties. Such arbitration shall be held in Bangalore and shall be subject to and governed by the provisions of the Arbitration and Conciliation Act of 1996 or any statutory modification or re-enactment thereof. The language to be used in Arbitration is English only.

4. As a Government of India Department, this office is exempted from payment of Octroi and similar local levies. Tenderers shall ensure that necessary Exemption Certificates are obtained by them from the Purchase Officer concerned to avoid any payment of such levies.
5. a) Your offer should be valid for 120 days from the date of opening of the tender. b) Prices are required to be quoted according to the units indicated in the annexed tender form. When quotations are given in terms of units other than those specified in the tender form, relationship between the two sets of units must be furnished.
6. CUSTOMS DUTY : This office is eligible for Concessional Customs Duty @ 5.5% against Ministry of Finance, Department of Revenue, Government of India, vide Customs Notification No.51/96-Cus Dated 23-07-1996 (SI.No.1) and amended under Notification No.93/96 dated 11th December 1996 and 24/2002 dated 01-03-2002
7. DESPATCH: The Contractor is responsible for obtaining a clear receipt from the Transport Authorities specifying the goods despatched. The consignment should be despatched with clear Railway Receipt/Lorry Receipt. If sent in any other mode, it shall be at the risk of the Contractor. Purchaser will take no responsibility for short deliveries or wrong supply of goods when the same are booked on 'said to contain' basis. Purchaser shall pay for only such stores as are actually received by them in accordance with the Contract.
8. TAXES: GST is payable as per applicable rates.
9. GUARANTEE & REPLACEMENT: (a) The Contractor shall guarantee that the stores supplied shall comply fully with the specifications laid down, for material, workmanship and performance. (b) Warranty shall be for the period mentioned in the tender document. After the acceptance of the stores, if any defects are discovered therein or any defects therein found to have developed under proper use, arising from faulty stores design or workmanship, the Contractor shall remedy such defects at his own cost provided he is called upon to do so within the warranty period, by the purchaser who shall state in writing in what respect the stores or any part thereof are faulty. (c) If, in the opinion of the purchaser, it becomes necessary to replace or renew any defective stores such replacement or renewal shall be made by the Contractor free of all costs to the purchaser, provided the notice informing the Contractor of the defect is given by the purchaser in this regard within the said period of warranty from the date of acceptance thereof. (d) Should the Contractor fail to rectify the defects, the purchaser shall have the right to reject or repair or replace at the cost of the Contractor the whole or any portion of the defective stores. (e) The decision of the Purchaser notwithstanding any prior approval or acceptance or inspection thereof on behalf of the Purchaser, as to whether or not the Stores supplied by the Contractor are defective or any defect has developed within the said period of warranty or any other period or as to whether the nature of defects requires renewal or replacement, shall be final, conclusive and binding on the Contractor. (f) To fulfill guarantee conditions outlined in (a) to (e) above, the Contractor shall, at the option of the Purchaser, furnish a Bank Guarantee (as prescribed by the

Purchaser)

10. If the IGST is applicable, the same will be reimbursed if it is reflected in Bill Of Entry. Proof shall be provided while claiming payment.

11. It is to be noted that either Customs Duty or GST is applicable (any one)

12. JURISDICTION : The contract/ purchase order shall be governed by an interpreted and construed in accordance with the laws of India. The courts situated at Bangalore only shall have jurisdiction to deal with and decide any legal matter or dispute arising out of contract/ purchase order.

13. PACKING FORWARDING & INSURANCE: The Contractor will be held responsible for the stores being sufficiently and properly packed for transport by rail, road, sea or air to withstand transit hazards and ensure safe arrival at the destination. The packing and marking of packages shall be done by and at the expense of the Contractor. The purchaser will not pay separately for transit insurance, all risks in transit being exclusively of the Contractor and the Purchaser shall pay only for such stores as are actually received in good condition in accordance with the Contract.

14. Please provide your compliance for Security Deposit, Performance Bank Guarantee and Liquidated Damages Clause.

15. PRICES: Tender offering firm prices will be preferred. Where a price variation clause is insisted upon by a tenderer, quotation with a reasonable ceiling should be submitted. Such offers should invariably be supported by the base price taken into account at the time of tendering and also the formula for any such variation/s.

16. REJECTED STORES: Rejected stores will remain at destination at the Contractor's risk and responsibility. If instructions for their disposal are not received from the Contractor within a period of 14 days from the date of receipt of the advice of rejection, the purchaser or his representative has, at his discretion, the right to scrap or sell or consign the rejected stores to Contractor's address at the Contractor's entire risk and expense, freight being payable by the Contractor at actuals.

17. Sales Tax and/or other duties/levies legally leviable and intended to be claimed should be mentioned in the price bid template. If nothing is mentioned, then it will be presumed that the rate quoted is inclusive of all taxes/duties.

18. SECURITY DEPOSIT: Wherever, the Purchase Order value is Rs. 5.00 Lakhs or more, on acceptance of the tender, the Contractor shall, at the option of the Purchaser and within the period specified by him, deposit with him, in cash or in any other form as the Purchaser may determine, security deposit not exceeding ten percent of the value of the Contract as the Purchaser shall specify. If the Contractor is called upon by the Purchaser to deposit, 'Security' and the Contractor fails to

provide the security within the period specified, such failure shall constitute a breach of the Contract, and the Purchaser shall be entitled to make other arrangements for the re-purchase of the stores Contracted at the risk of the Contractor in terms of Sub-Clause (ii) and (iii) of clause regarding Delivery. (b) hereof and/or to recover from the Contractor, damages arising from such cancellation.

19. SETTLEMENT OF DISPUTES : Except as otherwise specifically provided in the contract, all disputes concerning question of fact arising under the Contract shall be decided by the Purchaser subject to a written appeal by the Contractor to the Purchaser whose decision shall be final to the parties hereto. Any disputes or differences including those considered as such by only one of the parties arising out of or in connection with the Contract shall be, to the extent possible, settled amicably between the parties. If amicable settlement cannot be reached, then all disputes shall be settled by arbitration.

20. TERMS & CONDITIONS OF TENDER

21. TEST CERTIFICATE: Wherever required, test certificates should be sent along with the despatch documents.

22. The authority of the person signing the tender, if called for, should be produced.

23. The Purchaser reserves the right to place order on the successful tenderer for additional quantity up to 25% of the quantity offered by them at the rates quoted.

24. The purchaser shall be under no obligation to accept the lowest or any tender and reserves the right of acceptance of the whole or any part of the tender or portions of the quantity offered and the tenderers shall supply the same at the rates quoted.

25. The tenderer should supply along with his tender, the name of his bankers as well as the latest Income-Tax clearance certificate duly countersigned by the Income-Tax Officer of the Circle concerned under the seal of his office, if required by the Purchaser.

26. The term Contractor shall mean, the person, firm or company with whom or with which the order for the supply of Stores is placed and shall be deemed to include the Contractor's successors, representative, heirs, executors and administrators unless excluded by the Contract.

27. The term Purchase Order shall mean the communication signed on behalf of the Purchaser by an Officer duly authorised intimating the acceptance on behalf of the Purchaser on the terms and conditions mentioned or referred to in the said communication accepting the tender or offer of the Contractor for supply of stores or plant, machinery or equipment or part thereof.

28. The term Purchaser shall mean the President of India or his successors or assigns.

29. The term "Stores" shall mean what the Contractor agrees to supply under the Contract as specified in the Purchase Order including erection of plants & machinery and subsequent testing, should such a condition is included in the Purchase Order.

3. CERTIFICATE OF UNDERTAKING

1. A certificate from the bidder shall be enclosed along with their quotation (Technical bid) as per the format enclosed.

2. An AGENT is a person employed to do any act for another, or to represent another in dealings with third person.

3. Any bidder from a country which shares a land border with India will be eligible to bid in this tender only if the bidder is registered with the Competent Authority. (Competent authority is : DEPARTMENT FOR PROMOTION OF INDUSTRY AND INTERNAL TRADE (DPIIT)).

4. (b)Control shall include the right to appoint majority of the directors or to control the management or policy decisions including by virtue of their shareholding or management rights or shareholders agreements or voting agreements.

5. Bidder from a country which shares a land border with India for the purpose means:

(a)An entity incorporated, established or registered in such a country; or

(b)A subsidiary of an entity incorporated, established or registered in such a country; or

(c)An entity substantially controlled through entities incorporated, established or registered in a such a country; or

(d)An entity whose beneficial owner is situated in such a country; or

(e)An Indian (or other) agent of such an entity; or

(f)A natural person who is a citizen of such a country; or

(g)A consortium or joint venture where any member of the consortium or joint venture falls under any of the above.

6. BIDDER (including the term tenderer, consultant or service provider in certain contexts) means any person or firm or company, including any member of a consortium or joint venture (that is an association of several persons, or firms or companies), every artificial juridical person not falling in any of the descriptions of bidders stated hereinbefore, including any agency branch or office controlled by such person, participating in a procurement process.

7. CERTIFICATE

8.

COMPANY NAME AND SEAL:

9. DESIGNATION:

10. Explanation:

(a) Controlling Ownership interest means ownership of or entitlement to more than twenty-five per cent of shares or capital or profits of the company;

11. GOVERNMENT OF INDIA

DEPARTMENT OF SPACE

ISTRAC, BENGALURU: 560 058.

12. iii) In case of an unincorporated association or body of individuals, the beneficial owner is the natural person(s), who, whether acting alone or together, or through one or more juridical person, has ownership of or entitlement to more than fifteen percent of the property or capital or profits of such association or body of individuals.

13. (iii). I/We _____ hereby undertake that if the Certificate is found to be false at any given time ISRO/ISTRAC may treat this as a ground for immediate termination and further legal action in accordance with law can be initiated.

14. ii) In case of a partnership firm, the beneficial owner is the natural person(s) who, whether acting alone or together, or through one or more juridical person, has ownership of entitlement to more than fifteen percent of capital or profits of the partnership.

15. (ii). I/We hereby confirm that the country of origin of goods is _____

16. i) In case of a company or Limited Liability Partnership, the beneficial owner is a natural person(s), who, whether acting alone or together, or through one or more juridical person, has a controlling ownership interest or who exercises control through other means.

17. (i). I/WE _____ read the clause regarding restrictions on procurement from a bidder of a country which shares a land border with India. I /

We _____ Certify that this bidder is not from such a country.

18. iv) Where no natural person is identified under (i) or (ii) or (iii) above, the beneficial owner is the relevant natural person who holds the position of senior managing official.

19. I / We _____ Certify that this bidder is from such a country and registered with the Competent Authority (i.e. Registration Committee constituted by the Department for Promotion of Industry and Internal Trade (DPIIT). Copy of Registration Certificate is enclosed.

20. NAME:

21. OR*

I/We _____ read the clause regarding restrictions on procurement from a bidder of a country which shares a land border with India.

22. Ref:Tender No _____ date _____

Our Quotation No. _____ date _____

23. REQUIREMENT OF REGISTRATION:

24. SIGNATURE:

25. (* Strike out whichever is not applicable).

26. Subject: Restrictions under Rule 144 (xi) of the General Financial Rules (GFRs) 2017 - reg.

27. The beneficial owner for the purpose of (6) above will be as under:

28. (TO BE PRINTED ON THE LETTER HEAD OF THE VENDOR)

29. v) In case of a trust, the identification of beneficial owner(s) shall include identification of the author of the trust, the trustee, the beneficiaries with fifteen percent or more interest in the trust and any other natural person exercising ultimate effective control over the trust through a chain of control or ownership.

4. MAKE IN INDIA UNDERTAKING (VENDORS SHALL SUBMIT THE BELOW CERTIFICATE ON THEIR LETTER HEAD DULY SIGNED)

1. The type of Class which the vendor belongs: Class-I or Class-II Local Suppliers as defined under DPIIT Order dtd 04/06/2020- Preference to Make in India Order-2017 Revision.(Class I local supplier means a supplier or service provider, whose goods, service or works offered for procurement, has local content equal to or more than 50% & Class II local supplier means a supplier or service provider, whose goods, services or works offered for procurement, has local content more than 20% but less than 50%). NOTE: Bidders offering imported products will fall under the category of Non-local suppliers. They cannot claim themselves as Class I Local suppliers/Class II Local suppliers by claiming the services such as transportation, insurance, installation, commissioning, training and after sales service support like AMC/CMC etc. as local value addition.

2. Percentage of local content for the quoted item.

3. Details of location (s) at which the local value addition is made

4. Provide self-certification that the item (s) offered meets the local content requirement for Class-I/Class-II Local Suppliers as the case may be.

5. TENDER TERMS AND CONDITIONS

1. All information in Vendor Specified Terms shall be provided without fail to avoid unnecessary correspondence / delay in process. The same should reach before technical bid opening date and time without fail.

2. a) Order no: F.No.6/18/2019 PPD dated 23.07.2020 of Department of Expenditure), Ministry of Finance

Under Public procurement division for the General Financial rule (GFRs).

3. As per Rule 144(xi) of General Financial Rules, 2017, any bidder from a country which shares a land border with India will be eligible to bid in any procurement whether of goods, services (including consultancy services and non consultancy services) or works (including turnkey projects) only if the bidder is registered with the Competent Authority (i.e., Department for Promotion of Industry and Internal Trade) in line with Order (Public Procurement No. 1, 2 and 3) dated 23/07/2020 and 24/07/2020 or any amendments thereon issued by the Public Procurement Division, Department of Expenditure, Ministry of Finance. Hence, Vendors or Agents of a Vendor (Indian or Others) from a country sharing border with India shall submit the copy of Valid Registration made with DPIIT along with the tender mandatorily, without which the offer will be treated as invalid.

4. A supplier who has been debarred by any procuring entity for violation of this order shall not be eligible

for preference under this order for procurement by any other procuring entity for the duration of the debarment. The debarment for such other procuring entities shall take effect prospectively from the

date on which it comes to the notice of other procurement entities, in the manner prescribed.

5. b) Class I local supplier means a supplier or service provider, whose goods, service or works offered for procurement, has local content equal to or more than 50%, as defined under order.

6. c) Class II local supplier means a supplier or service provider, whose goods, services or works offered for procurement, has local content more than 20% but less than 50%, as defined under this Order.

7. d) Bidders offering imported products will fall under the category of Non-local suppliers. They cannot claim themselves as Class I Local suppliers/Class II Local suppliers by claiming the services such as transportation, insurance, installation, commissioning, training and after sales service support like AMC/CMC etc. as local value addition.

8. Delivery Terms: FOR ISTRAC

9. e) Verification of local content:

i) The Class I local supplier/ Class II local supplier at the time to tender, bidding or solicitation shall be required to indicate percentage of local content and provide self certification that the item offered meets the local content requirement for Class I local supplier / Class II local supplier as the case may be. They shall also give details of the location(s) at which the local value addition is made.

10. GENERAL TERMS & CONDITIONS FOR BIDDERS: For this procurement, bids from Class I & class II Local Suppliers are admissible. hence provisions contained in Public Procurement (Preference to Make in India), Order 2017 issued by Department for Promotion of Industry and Internal Trade (DIPP), Ministry of Commerce & Industries vide letter No. P 45021/2/2017 PP(BE II) dated 04.06.2020 and subsequent amendment & directives shall be followed. Accordingly, offer will be evaluated & processed in conformation with above referred GOI order (Specially mentioned below). The bidder shall provide compliance and undertaking as per order and hereafter amendments:

11. If an agent submit bid on behalf of the principal/OEM, the same agent shall not submit a bid on behalf of another principal/OEM in this tender for the same item. If submitted, all offers will be liable for rejection.

12. iii) False declarations will be in breach of the code of Integrity under Rule 175(1)(i)(h) of the General Financial Rules (GFR) for which a bidder or its successors can be debarred for up to two years as per Rule 151 (iii) of the general Financial Rules along with such other actions as may be permissible under Law.

13. ii) In case bid value is in excess of Rs. 10 Cr., Class I local supplier/ Class II local supplier shall be required to provide a certificate from the statutory auditor or cost auditor of the company (in the case of companies) or from a practicing cost accountant or practicing chartered accountant (in respect of suppliers other than companies) giving the percentage of local content.

14. In case the bidders propose any other payment terms in deviation with the standard terms mentioned in the tender enquiry, it may be noted that applicable cash flow implications will be loaded on the prices quoted for commercial comparison of the offers. If advance payments are insisted by the bidders, interest at the rate of MCLR (Marginal Cost Linked Rate) as notified by State Bank of India from time to time shall be loaded on the prices for price comparison.

15. In this tender either the Indian agent on behalf of the principal/OEM or the principal /OEM itself can bid, but both cannot bid simultaneously for the same item. Indian agents while quoting on behalf of their principals shall provide necessary latest authorisation letter obtained from their principals/manufacturers.

16. Liquidated damages: If the vendor fails to deliver the items on or before the delivery date, or any extension thereafter purchaser shall recover from the vendor as liquidated damages a sum of 0.5% of the contract price of the undelivered stores for each calendar week of delay. The total liquidated damages shall not exceed 10% of the contract price of the unit or units so delayed.

17. Model Certificate for Tenders:

I have read the clause regarding restrictions on procurement from a bidder of a country which shares a land border with India I certify that this bidder is not from such a country or, if from such a country, has been registered with the Competent Authority. I hereby certify that this bidder fulfills all requirements in this regard and is eligible to be considered.

18. Model Certificates for Tenders for Work involving possibility of sub contacting:

I have read the clause regarding restrictions on procurement from a bidder of a country which shares a land border with India and on sub contracting to contracting from such countries I certify that this bidder is not from such a country or, if from such a country, has been registered with the Competent Authority and will not sub contract any work to a contract form such countries unless such contractor is registered with the Competent Authority. I hereby certify that this bidder fulfills all requirements in this regard and is eligible to be considered.

Provide Compliance for the above in Vendor Specified Commercial Terms.

19. NO EMD AND TENDER FEE.

20. Performance Bank Guarantee (PBG) to be furnished as a security for fulfilment of warranty obligations by the successful vendor after satisfactory execution of purchase order/Contract (3% of the value of the purchase order/Contract). Central SUs/PSE/Autonomous bodies are exempted from the

production of Performance Bank Guarantee. Instead; an indemnity bond shall be furnished in lieu of PBG.

21. Product Scope: Class I local supplier/ Class II local supplier shall offer only standard and catalogued product for Equipment / Spares Cards / assemblies. If the above offered Equipment / Cards / Assemblies are under development / to be developed the bid will not be considered.

22. PUBLICITY: No publicity of any kind whatsoever in case of PURCHASE ORDER shall be given by the Supplier without prior permission of the Purchaser.

23. SECRECY: The technical information, drawings, specifications and other related documents, forming part of the CONTRACT, are the property of the Purchaser and shall not be used for any other purpose, except for execution of the CONTRACT. All rights, including rights in the event of grant of patent and registration of designs are reserved. The technical information, drawings, specifications, records and other documents shall not be copied, transcribed, traced or reproduced in any other form or otherwise in whole and/or duplicated, modified, divulged and/or disclosed to a third party nor misused in any other form whatsoever without Purchasers consent in writing except to the extent required for the execution of this CONTRACT. These technical informations, drawings, specifications and other related documents shall be returned to the Purchaser with approved copies and duplicates, if any, immediately after they have been used for the agreed purpose.

24. Senior Purchase and Stores Officer, ISTRAC, reserves the right to accept or reject any/or all the tenders in part or full without assigning any reasons thereof.

25. Submit the bid on or before due date.

26. Successful vendor has to submit the security deposit. (3 % of the value of the purchase order). Central PSUs/PSE/Autonomous bodies shall be exempted from the payment of security deposit, and instead, an indemnity bond shall be secured from them.

27. VENDORS HAS TO REFLECT THE POINT NO (4), (5) AND (6) IN THEIR BID.

28. TAXES: GST is payable as per applicable rates.

29. Foreign OEMs/Agents quoting on behalf of Foreign OEMs are not permitted to quote. High Sea Sales quotes not permitted. The bids shall be in INR only.

C. Bid Templates

C.1 Technical Bid - Telemetry, Tracking and Command Processor (TTCP)

1. Telemetry Tracking and Command Processor

Item specifications for Telemetry Tracking and Command Processor

SI No	Specification	Value	Compliance	Offered Specification	Remark
1	SPECIFICATIONS OF Telemetry, Tracking and Command (TTC) PROCESSOR for Satellite and launch missions		-		
2	INTRODUCTION		-		
3	ISTRAC is operating network of TTC stations for supporting different satellite and launch vehicle missions.		-		
4	Under this RFP ISTRAC, is planning to procure TTC processor with latest state of the art hardware and software elements for supporting all present and future LEO, GEO and launch missions.		-		
5	The new TTC Processor shall be capable of providing Telemetry data acquisition, tele-command generation and modulation, ranging and Doppler measurement, simulation etc.,		-		
6	TTC processor supplied should functionally adhere to all technical requirement listed below.		-		

7	ISTRAC is also willing to exchange old TTC processors bring used since year 2007 against new TTC Processors under buyback option.		-		
8	FUNCTIONAL DESCRIPTION TTC Processor shall perform the following major functions as described below.		-		
9	1.The TTC Processor shall receive two orthogonally polarized (RCP & LCP) 70 MHz down converted signals; perform pre-detection diversity combination and carryout Phase, Frequency, BPSK and xQPSK demodulation of the carrier.		-		
10	2. In case of direct PCM/PM, PCM/FM, PCM/BPSK, PCM/QPSK, PCM/OQPSK and PCM/SOQPSK modulated signals, the unit shall bit and frame synchronize the demodulated PCM signal, carry out CCSDS decoding,		-		
11	if required, and make it available as formatted and time tagged data on a TCP/IP and UDP/IP (selectable).		-		

12	3.In case of PCM/PSK/PM modulated signals the unit shall also carry out PSK sub-carrier demodulation, bit and frame synchronization, for two sub-carriers simultaneously and make both data streams available as formatted and time tagged on a TCP/IP bus.		-		
13	4.The unit should be able to output data without a break, even if the bit rate changes (with also frame size change) in between, by having suitable configuration (i.e. by configuring two separate TM demodulator for different data rates).		-		
14	5.The system should have CCSDS standard De-randomizer, Viterbi, Reed-Solomon Turbo and LDPC (optional) Decoders for both streams for all kinds of modulations. The TTC Processor shall, in the uplink chain, phase or frequency modulate the internally		-		
15	generated range tones and the telecommand video or the externally provided ISRO standard Telecommand video, either one at a time or simultaneously, on a 70 MHz carrier and the 70 MHz modulated output shall be provided for further up conversion.		-		

16	Noise generator for simulation at 70 MHz, shall also be provided as an internal part of the system. The modulator shall also accept external simulation signal for modulation.		-		
17	As an option, it can also have option to program user defined de-randomizer polynomial.		-		
18	6.Offered product shall also be capable of supporting 8-PSK demodulation with 4D-TCM decoding. It shall be capable of processing all CCSDS recommended 4D-TCM codes.		-		
19	7.The uplink module shall also consist of a CCSDS compatible Tele-command encoder/ controller for the generation of CCSDS standard command signals and the PSK sub-carrier modulator.		-		
20	8.The offered system should be compatible with all CCSDS standards dealing with the physical layer and channel coding sub-layer. It shall meet following CCSDS standards: •CCSDS 131.0-B-3 TM synchronization and channel		-		

21	<ul style="list-style-type: none"> •CCSDS 132.0-B-2 TM space data link protocol •CCSDS 133.0-B-1 Space packet protocol •CCSDS 231.0-B-3 TC synchronization and channel coding •CCSDS 232.1-B-2 Communication operation procedure-1 •CCSDS 732.0-B-3 AOS space data link protocol 		-		
22	<ul style="list-style-type: none"> •CCSDS 415.1-B-1 DATA transmission and PN ranging protocol(optional) •CCSDS 401.0-B-28 Radio Frequency and Modulation Systems 		-		
23	<p>9.It shall house a, continuous-tone ranging system, with major tone of 100 KHz and harmonically related minor tones up to 8 Hz (ESA-100 Standard) including ESA programmable tones, USB standard, for the measurement of slant range.</p>		-		
24	<p>It shall also provide the Range rate information, by measuring the two-way Doppler shift. The range and the range rate data shall be made available on the TCP/IP bus after formatting and time tagging.</p>		-		
25	<p>10.The system shall accept 5/10 MHz external frequency reference to which all the signal sources of different functions will be phase locked.</p>		-		

26	<p>11.The system shall accept IRIG-B mod. Code or NTP/PTP for deriving time information.</p> <p>12.The system shall also have a simulation and testing function, like BER measurement with an internal base band noise source, for internal and long loop checks.</p>		-		
27	<p>13.The system shall have local and remote monitoring and control functionality through TCP/IP (1000/100 Base T or more) bus. In addition, system can be offered with inbuilt min. 8" TFT / LCD monitor with KB/mouse functionality for local control.</p>		-		
28	<p>Typical block diagram is enclosed in the attached document</p>		-		
29	<p>DETAILED SPECIFICATIONS:</p> <p>I-Telemetry Processing:</p> <p>A. RECEIVER:</p> <p>The receiver shall perform the following functions.</p> <p>1.Receives two orthogonal (Channel RCP and LCP) polarizations of IF signals at 70 MHz with independent acquisition management.</p>		-		

30	<p>2.Tracking of both IF channels using two, second / third order PLLs.</p> <p>3.Anti-sideband facility using FFT selectable.</p> <p>4.Optimal Ratio Pre-detection diversity combination of channels A and B.</p>		-		
31	<p>5.Automatic recovery of data frame lock even in case of modulation On/Off, in presence of carrier, for all kind of modulation.</p> <p>6.Doppler measurement from the best channel or combined received signal.</p>		-		
32	<p>Specifications:</p> <p>1.Input Frequency: 70 MHz \pm 4 MHz</p> <p>2.Input bandwidth: \pm18 MHz min. (3 dB)</p> <p>3.No. of IF Receivers: Minimum two (one for RHCP & LHCP signal each)</p>		-		
33	<p>4.No. of IF ports per receiver: 2 (Main and alternate)</p> <p>5.Isolation between inputs: > 60 dB</p> <p>6.Acquisition Range: Up-to \pm500 KHz Selectable</p>		-		
34	<p>7. Impedance: 50 Ohms.</p> <p>8. VSWR: \leq 1.4:1</p> <p>9. Dynamic Range: -20 dBm to -95 dBm</p> <p>10. Noise Figure: 10 dB (Typical) or better</p>		-		

35	<p>11. Noise Density: - 105 dBm/Hz Max. 12. Loop BW : 10, 30, 100, 300, 1000, 3000 Hz Selectable 13. AGC Time Constant : 1,10,100,1000 msec Selectable Should hold lock for a variation of 30 dB/sec within dynamic range.</p>				
36	<p>14. AGC Type: Non-coherent before carrier Acquisition, there after Coherent. 15. AGC Output: Analog / Digital 16. Lock in threshold (PM) : 8 dB C/N in Selected PLL BW 17. Anti side band: Using FFT technique, On/OFF Selectable</p>				
37	<p>Capable of locking correctly to carrier under the following signal dynamics and varying modulation formats, by analyzing spectral symmetry. i) Max. doppler: \pm 250 KHz. ii) Max. doppler rate: 10 KHz/sec iii) Max. Fade Rate: 20 dB/sec</p>				
38	<p>iv) Proposed TTCP shall be able to lock to a downlink signal and provide error free data with following Modulation Formats: 1.HK modulation up to 0.7 rad., alone on 32 KHz sub-carrier PSK modulated by PCM bit rate of 4000 bps.</p>				

39	<p>2.As (1) above and another 128 / 256 KHz. sub-carrier modulation up to 1.0 rad. PSK modulated by PCM bit rate of 4 / 16 / 32 kbps.</p> <p>3.As (1 & 2) above and up to 0.8 rad of 100 KHz pure tone modulation.</p>		-		
40	<p>4.Proper carrier lock to be ensured in case of direct PCM/PM (mod Index. Up-to 1.6 rad.) also.</p>		-		
41	<p>18. Threshold degradation with ASB On: <1 dB</p> <p>19. Acquisition time (with ASB on): < 1 sec</p> <p>20. Combiner Type: Optimal ratio/pre-detection combiner Combiner modes: CH-A, CH-B, Combined</p>		-		
42	<p>21. Combiner Improvement: i) Within 0.5 dB of theoretical, when diff. Between channels is less than 10 dB.</p> <p>ii) Best channel selected when S/N difference between channels exceed 10 dB, with hysteresis to avoid frequent toggling at cross-over point.</p>		-		
43	<p>22. Demodulation Modes:PM, FM, BPSK, QPSK, OQPSK, GMSK, SOQPSK</p>		-		
44	<p>23. Demodulation Frequency Response: i) Sub-carrier freq. up-to 1024 KHz.</p> <p>ii) Direct PCM/PM (Bi-L) and BPSK and QPSK/xQPSK having basic data rate of 20 Mbps. 40 Msymbols/s with Viterbi & RS coding.</p>		-		

45	24. PM demodulation index: 2 rad. Max. 25. FM Max. Deviation: 20 MHz. 26. FM Threshold: < 6 dB		-		
46	27. AFC range for FM demodulation: up to +/- 300 KHz 28. Acquisition threshold for BPSK: Eb/NO of +3 dB or better		-		
47	29. Doppler Measurement: On best channel selected or for combined signal (with hysteresis to avoid toggling) i) Resolution: 0.01 Hz. ii) Accuracy: 0.1 Hz. RSS @ -65dBc phase noise		-		
48	iii) Data Format: As per agreed ICD. iv) Time tagging Resolution: 0.1 milli sec.		-		
49	30. Group Delay Stability: <10 nsec over signal dynamic range <5 nsec over 8 hours < 15 nsec over carrier frequency < 5 nsec over temperature		-		
50	31. Outputs: Digital AGC data, 100/10 samples/sec. 8 bits. AGC for channels A,B & combined and Eb/No time tagged and logging locally.		-		

51	<p>B.PSK DEMODULATOR AND BIT SYNC.</p> <p>The PSK Demodulator and Bit Sync. Shall perform the following functions.</p> <p>1.Sub-carrier frequency, bit-rate selection and locking.</p> <p>2.Simultaneous BPSK demodulation of two sub-carriers.</p>		-		
52	<p>3.Bit synchronization (3 bit soft decision or better)</p>		-		
53	<p>4.Capable of handling a bit rate change over (one bit rate at a time) in the direct PCM modulated stream, using suitable configuration, for high rate telemetry (PCM/PM, PCM/FM) and the data made available on different ports.</p>		-		
54	<p>5.Eb/N0 Evaluation and data output with AGC.</p> <p>6.During the bit rate changeover, the data loss shall not be more than 3 telemetry frames with appropriate settings.</p>		-		
55	<p>7.The telemetry frame shall contain the data quality bit information corresponding to the frame sync pattern errors.</p>		-		

56	<p>Specifications:</p> <p>1. Type of demodulation: PCM/BPSK</p> <p>2. Code: Bi-phase (L,M,S) or NRZ (L,M,S)</p> <p>3. Sub-carrier Frequency Range: 8 KHz to 1.024 MHz in 1 Hz step</p>		-		
57	<p>4. PCM bit rate (For sub-carrier modulation): 100 bps to 256 Kbps in 1 bit step.</p>		-		
58	<p>5. PCM bit rate for direct modulation: Up-to 20 Mbps basic data rate (with Bi-phase decoding). Upto 40 M symbols/s with Viterbi & RS coding for direct PCM/PM, PCM/FM, BPSK and all variants of QPSK (I+Q) modulation.</p>		-		
59	<p>Up-to 10 Mbps (basic data rate) with Turbo Code (rate $\frac{1}{2}$).</p> <p>Up-to 40 Mbps (I+Q+C) for 8-PSK / 4D-TCM.</p> <p>Up-to 20 Mbps (basic data rate) for different variants of LDPC(optional)</p>		-		
60	<p>6. No. of sub-carrier to be processed: 2, Simultaneously</p> <p>7. Capability to handle a bit rate change over, in high rate direct PCM modulated stream and provide continuous data without break.</p> <p>8. Sub-carrier loop BW: 0.1, 0.3, 1, 3% of bit rate</p>		-		
61	<p>9. PCM loop BW: 0.01, 0.03, 0.1, 0.3, 1, 3% of bit rate</p> <p>10. Sync. Threshold: Eb/No of 0 dB or better.</p>		-		

62	11. Bit sync fly-wheeling:Should be able to hold lock for data containing 128 bits of continuous zeros or ones, with 1000 bits gap.		-		
63	12. PSK demod./ Bit sync. Performance: <1 dB of theoretical up to 10 Mbps <2 dB of theoretical up to 20 Mbps 13. Bi-phase ambiguity resolution: Automatic.		-		
64	14. De-randomizer: CCSDS Standard (Optional requirement: user defined)		-		
65	CFRAME SYNCHRONIZER The frame sync. Shall perform the following functions 1.Frame locking using dedicated sync. word by classical locking phases of Search, Check and Lock.		-		
66	2.For all kinds of modulation, the frame sync should be able to lock automatically, without the need for manual receiver re-acquisition, when the modulation is made OFF and ON in between, with the carrier being present continuously.		-		
67	3.Processing of 2 TM streams simultaneously. 4.Automatic BPSK / xQPSK ambiguity resolution. 5.CCSDS standard RS, Viterbi, LDPC(optional) and Turbo decoding & Packet Telemetry Processing.		-		

68	Specifications: 1. Bit rate: Net 100 bps-20 Mbps without coding. (With Bi-Phase Decoding). Up to 40 Msps with RS & Viterbi code Up-to 10 Mbps (basic data rate) with Turbo Code (rate 1/2).		-		
69	Up-to 40 Mbps (I+Q+C) for 8-PSK / 4D-TCM. Up-to 20 Mbps (basic data rate) for different variants of LDPC.(optional)		-		
70	. Sync. Pattern Length: 16 to 64 bits programmable.		-		
71	3. Sync. Window: 1 or 3 bits 4. Word Length: 8 to 16 bits programmable 5. Frame length: 16 to 16,000 bytes.		-		
72	6. Error parameters tolerance (Selectable): a) Search to Check: 0 to 7 b) Check to Lock: 1 to 8 c) Lock to Search: 1 to 8 7. Time tagging: Corresponds to last bit of FS code at first bit of data (user settable)		-		
73	8. Data Output: TCP/IP (100/100 base T) and UDP/IP Format: As per mutually agreed format		-		

74	<p>9. Data Decoding: 1. De-randomizer (CCSDS, option: user settable) 2. Reed-Solomon Decoder (CCSDS – 223/255 & 239/255) 3. Turbo decoder rate $\frac{1}{2}$ (CCSDS) 4. Optional: LDPC decoder (all CCSDS rates) 5. 4D-TCM for 8-PSK (all CCSDS rates)</p>		-		
75	<p>10. Data Quality Indicator: The header should contain Information on data Quality like Rx., PSK demodulator, Bit & Frame Sync lock status, FS error presence, no of uncorrected errors for coded signal etc.</p>		-		
76	<p>II. Tele-command Processing</p> <p>ATELE-COMMAND ENCODER/ IF MODULATOR</p> <p>The Tele-command Encoder/ IF Modulator shall perform the following functions.</p> <p>1. Internal CCSDS compatible command encoder.</p>		-		
77	<p>2. Provision of COP software to handle segment level and CLTU level tele-command messages.</p> <p>3. Handles externally fed or internally generated tele-command video for modulation.</p> <p>4. Carrier sweeping facilities.</p>		-		

78	5.PM/FM modulation of tones and TC video (internal or external) independently or simultaneously. 6.Internal Noise generator provision when used as simulator.		-		
79	7.Should accept external command video during real-time for PM modulation and external PCM and PCM/PSK (sub-carrier) signals during simulation for all specified modulations.		-		
80	Specifications: Tele-command Encoder 1.Command standard: CCSDS Standard 2.Modulation: PCM/PSK 3.Sub-carrier frequencies: 4-50 KHz (Selectable)		-		
81	4.Frequency accuracy: ± 1 in 10^6 or better 5.Frequency stability: ± 1 in 10^6 / Day 6.Bit rates: $4000/2^n$ where $n = 0$ to 9		-		
82	Requirement:Tele-command encoder for handling data rate up-to 2.048 Mbps with direct modulation like BPSK / xQPSK. Capable of Convolutional (1/2), CCSDS scrambling shall be available.		-		

83	<p>IF Modulator</p> <p>1. Output Frequency: 70 +/- 4 MHz.</p> <p>2. Type of Modulation: PM/FM/BPSK/QPSK/OQPSK/GMSK Selectable.</p> <p>3. Sweep Range: ±1 KHz to ±500 KHz in steps of 1 KHz, single sweep positive going. Automatic disabling of Modulation while sweeping.</p>		-		
84	<p>4. Sweep Rate (Linear): 1 Hz/s to 150 KHz/s</p> <p>5. Output Level: -70 to 0 dBm. Adjustable.</p> <p>6. Output stability over a day/ temp. range: +/- 0.5 dB</p>		-		
85	<p>7. Output impedance : 50 ohms</p> <p>8. VSWR: ≤ 1.4:1</p> <p>9. Phase Noise (PM Mode): 10 dB max. Degradation when locked to station 5 / 10 MHz reference</p>		-		
86	<p>10. Spurious: Better than -55 dBc</p> <p>11. Harmonics: Better than -55 dBc</p> <p>12. No. of External Modulation Inputs: One for connecting external TC video or External simulation signal</p>		-		
87	<p>13. Modulation Input Impedance: 50 ohms</p> <p>14. Modulation Sensitivity: 1 rad./ volt</p> <p>15. PM Modulation Index: 2.0 radians (Max) in steps of 0.1 rad. Independently adjustable for tones and TC.</p>		-		

88	<p>16. Sense: Positive 17. Doppler compensation feature to be available for IF modulator. 18. Group Delay Stability: < 5 ns over 8 hours < 10 ns over dynamic range < 15 ns over temperature < 5 ns over Doppler</p>		-		
89	<p>III.Tracking Processor ARANGING The ranging shall perform the following functions. 1.Range tone generation and sequential transmission. 2.Ambiguity resolution & Range measurement.</p>		-		
90	<p>3.Accurate Time tagging – as per timing input signal provided. 4.Internal test loop and calibration for ground station delay and phase compensation. 5.Automatic compensation of calibration and correction memory values from measured range value.</p>		-		
91	<p>6.Automatic selection of RHCP / LHCP / Combine D/L signal for Range delay measurement. 7.Unit shall have Doppler Aid capability for Range loop PLL.</p>		-		

92	<p>Specifications: 1. Tone Standard: Harmonically related Sinusoidal range tones. ESA-100 tone, ESA-like, ESA-code, USB tone. 2. i) Tone Frequencies (ESA-100) Major Tone (MRT): 100 KHz.</p>				
93	<p>Ambiguity Resolving Tones (ART): 20 KHz, 4 KHz, 800 Hz, 160 Hz, 32 Hz and 8 Hz minor tones (Continuous transmission of MRT and Sequential transmission of ARTs)</p>				
94	<p>ii) ESA Like User Specific tones : Major and minor tones (ART) user programmable. Major Tone up-to 1 MHz. Lower most minor tone till 1 Hz iii) ESA tone + code standard: Tones from 100 KHz to 1 MHz ESA Codes: 0 to 24 code length</p>				
95	<p>3. Lower tone complementation on: User specific for ESA like/USB standard. 16 KHz for ESA-100. 4. Amplitude: Settable separately for major & minor tones for M.I. up to 1.5 rad. in IF modulator</p>				

96	5. Acquisition Time duration: < 2 sec. at 40 dBHz SNDR < 5 sec for lower SNDR 6. Tone PLL BW: 0.1 to 8 Hz Adaptable to meet signal Dynamics and accuracy.		-		
97	7. Major Tone acquisition threshold: S/No \leq 13 dBHz. 8. Overall accuracy: 13m RSS at 27 dBHz SNDR with 100 KHz MRT in 1 Hz loop BW. Within 1 dB of theoretical (2 sigma). 9. Sampling rates: 0.1, 1 & 10 Samples/sec		-		
98	10. No. of measurement samples per block: 1, 10, 100 per block selectable		-		
99	11. Time tagging i) Resolution: 0.1 msec. ii) Accuracy: Within 1 microsecond of time ref. signal, iii) Instant of time tagging: Instant of sampling of received tone		-		
100	12. Data Output: Time tagged data output on TCP/IP i) Format: To be mutually agreed as per ICD. 13. Calibration loops & Delay entry: RF Calibration memory for 4 RF paths and delays.		-		

Document : Specification

2. TTCP-LDPC decoding

3. TTCP- Spread Spectrum functionality

4. TTCP- 2nd Simulator

5. TTCP-buyback cost

6. Extended Warranty

7. TTCP-user defined derandomizer

Common Specifications (Applicable for all items)

SI No	Specification	Value	Compliance	Offered Specification	Remark
1	<p>IVOthers:</p> <p>A Time and Frequency Reference:</p> <p>This unit shall perform the following functions.</p> <p>1. Distribution of reference frequency to other internal units.</p> <p>2. Demodulation of input time code.</p> <p>3. Time distribution to other internal functions.</p>		-		
2	<p>4. Shall have Leap second & leap year management.</p> <p>5. Provides time tagging information to other modules</p> <p>6. Accepts 1 pps signal for ranging time tag.</p>		-		

3	<p>Specifications:</p> <ol style="list-style-type: none"> 1. Input frequency: 5 / 10 MHz, 0 dBm +/- 5 dB 2. Impedance: 50 ohms. 3. VSWR: < 1.3:1 4. Reference frequency output: Suitable for internal distribution. 				
4	<ol style="list-style-type: none"> 5. Input time code: IRIG-B Mod Code (optional NTP/PTP) 6. Time code Input level: 0.5 volt to 5 volt p-p 7. Time tag capacity: 365 days, 23 hours, 59 minutes 59 seconds & 999 milliseconds. 				
5	<ol style="list-style-type: none"> 8. Resolution: 0.1 msec. 9. Time tag Accuracy: 0.1 msec worst case or better. 				
6	<p>BTM SIMULATOR</p> <p>The TM Simulator shall perform the following functions.</p> <ol style="list-style-type: none"> 1. Programmable sub-carrier frequency and bit rate generation. 2. PCM generation using PRN sequence / BERT or stored TM file from disk. 				

7	<p>3. Analog PSK/PCM or PCM signal output with amplitude control.</p> <p>4. BER Measurement.</p> <p>5. Internal Noise generator at 70 MHz to cover C/No range of 25 dBHz to 85 dBHz.</p> <p>6. Encoding for RS, Convolution and Turbo coding and Randomizer</p>				
8	<p>Specifications:</p> <p>1. Analog signal output level: 0.1 V to 4 V peak in 0.1 V steps.</p> <p>2. Impedance: 50 ohms</p> <p>3. Sub-carrier frequencies (Sine): 5 KHz to 1024 KHz in 1 Hz step.</p>				
9	<p>4. Bit rate: 100 bps to 256 Kbps in 1 bps step.</p> <p>Up-to 20 Mbps (basic data rate) for direct PCM Modulation</p> <p>5. PCM code: NRZ (L,M,S) and bi-phase (L,M,S)</p>				

10	<p>6. PCM sequence type: PRN / BERT pattern or stored file from HDD or LAN mode of simulation</p> <p>7. Modulation type : PCM/PSK on subcarrier, PCM/PM PCM/FM, PCM/BPSK, PCM/xQPSK, GMSK, 8-PSK</p>				
11	<p>8. BER Measurement</p> <ul style="list-style-type: none"> •Automatic delay adjustment between transmitted and received signal. •Bit to bit comparison between transmitted and received signal. 				
12	<p>9. S/N dynamic range: $+2 \text{ dB} \leq E_b/N_0 \leq 12 \text{ dB}$ or better</p> <p>10. BER measuring range: 10^3 to 10^8 and totalizer</p>				
13	<p>Optional Requirements: TTCP unit shall also be supplied with 2nd simulator (having same above specs.) for simultaneous two sub carrier simulation.</p>				

14	<p>Accessories: 1.Spectrum Analysis Display and spectral data on LAN. 2.Data Logging on internal Hard disk (Min. 500 GB) for logging time tagged TM, Range, Doppler, digital AGC and M&C data and retrieval.</p>				
15	<p>3.Display of selected words. 4.Self test sequence for locating faults including TCP/IP Ports.</p>				
16	<p>GENERAL 1. Power: 230 V±10%, 47-53 Hz, 1-Phase – Dual SMPS for high reliable operations. (mandatory) 2. Dimension: 19" Rack mountable, Max. 5U height 3. Operating Temperature: 5-45 deg.C, Max. Humidity 95%</p>				
17	<p>4. Storage Temperature: 0-55 deg.C 5. Remote M&C interface: TCP/IP (1000/100 Base T). As per Annexure-A. 6. MTBF: To be specified by party (Min. 60,000 hours desirable)</p>				

18	<p>7. MTTR: ≤ 1 Hour with spare parts available</p> <p>8. Operation & Maintenance Manual: To be provided in English.</p>				
19	<p>Other Requirements:</p> <p>Mandatory:</p> <p>In addition to the above specifications for proposed TTC Processor, ISTRAC is looking for following requirements to be met by offered product.</p>				
20	<p>1.RF front end frequency converter having following specifications:</p> <p>Frequency Down Converter Specifications:</p> <p>1.Receive frequency range of 2200 MHz to 2300 MHz.</p> <p>2.O/P IF frequency range to match internal receiver / MSP board – 70 MHz +/- 4 MHz.</p>				

21	<p>3.Main and alternate RF input selection.</p> <p>4.Option to bypass the converter circuit and use system as direct IF level i.e. 70 MHz +/- 4 MHz</p> <p>5.Input RF level dynamic range of -30 dBm up-to -105 dBm.</p>				
22	<p>6.Down Converter Gain of min. 20 dB. Adjustable in 0.5 dB step.</p> <p>7.Noise figure of 10 dB or better.</p> <p>8.Selectable Input RF / IF signal bandwidth – Low / High. Low BW typically +/- 5 MHz and High BW typically +/- 20 MHz</p>				
23	<p>9.Frequency Conversion: dual conversion without inversion</p> <p>10.Phase noise of Better than -75 dBc/Hz at 100 Hz away, -90 dBc/Hz at 1 KHz away.</p> <p>11.Phase locking to External 5/10 MHz station reference.</p>				

24	<p>Frequency Up Converter Specifications:</p> <p>1. Transmit frequency range of 2025 MHz to 2120 MHz.</p> <p>2. Input IF frequency range to match internal transmitter / modulator board – 70 MHz +/- 4 MHz</p>				
25	<p>3. Option to bypass the converter circuit and use system as direct IF level i.e. 70 MHz +/- 4 MHz</p> <p>4. O/P RF level dynamic range of -40 dBm up to +5 dBm.</p> <p>5. UP Converter Gain of adjustment of min. 20 dB. Adjustable in 0.5 dB step.</p>				
26	<p>6. Frequency step size: 1KHz</p> <p>7. Phase noise of Better than -75 dBc/Hz at 100 Hz away, -90 dBc/Hz at 1 KHz away.</p> <p>8. Phase locking to External 5/10 MHz station reference.</p> <p>9. Spurious and Harmonics: Better than -60 dBc</p>				

27	<p>2.Three independent IF / RF receivers with individual demodulators for each receiver. Supporting simultaneous three downlink frequencies (within 8 MHz range) coming from three different satellites orbiting in formation.</p>		-		
28	<p>No pre-detection combiner requirement. Each demodulator shall support following data rates & forwards error corrections.</p> <ul style="list-style-type: none"> •Basic data Rate for each modulator: 100 bps up-to 10 Mbps •Error correction: CCSDS compatible convolution and RS coding. 		-		
29	<p>3.8-PSK / 4D-TCM capabilities – all CCSDS supported variants. Max. Data Rate up-to 40 Mbps.</p>		-		

30	<p>4.High Bandwidth Tele-command encoder for supporting higher data rate for tele-command / CCSDS AOS protocol: Supporting following: •BR = 100 bps to 2.048 Mbps (500 Kbps with subcarrier)</p>		-		
31	<p>•Convolutional (1/2) encoding available. •CCSDS scrambling shall be available.</p>		-		
32	<p>Optional 5.LDPC – decoding - all CCSDS supported variants. 6.Spread Spectrum – suitable for TTC operating using SQPN type of signals: Supporting following: •CDMA based Telemetry and Tele-command Operations</p>		-		

33	<ul style="list-style-type: none"> •Spread spectrum IF modulator and associated modules (PN code generator and modulator modules) with provision to include or bypass FEC coding (Convolutional, BCH & LDPC) for CDMA Audio/TC Transmission. •Supporting SS-UQPSK (10 dB ratio), 		-		
34	<ul style="list-style-type: none"> •Code length 10 to 21 bits (Feedback and seed word should be programmable Spreading codes as specified in 451-PN CODE-SNIP). •Data - Code Combining Data Modulo-2 Added Asynchronousl y to PN Code. 		-		
35	<ul style="list-style-type: none"> •As per CCSDS blue book 415.1-B-1 •Modulo-2 added asynchronousl y to PN code. Capable of Gold codes & Max Length codes 		-		

36	<p>7.2nd simulator (having same specification like first simulator) for simultaneous two sub carrier simulation.</p> <p>Party shall quote for each above optional separately in their offer.</p>		-		
37	<p>Data Exchange Formats:</p> <p>Once order is issued, party shall provide detailed documentation on Data interface / exchange formats of the products being offered.</p>		-		
38	<p>This is applicable for all data exchange format (Telemetry Data, Doppler & Range data, TC requests, Monitoring & Control requests etc.) being used by any TT&C ground station.</p>		-		
39	<p>In case of any updation arising out in ICD due to any added functionality, Party shall provide all the relevant documents towards that to ISTRAC for review and clearance.</p>		-		

40	Based on the feedback provided by ISTRAC and with mutual agreement, party shall submit FINAL copy of the ICD to ISTRAC along with Factory Acceptance Test Results for review and clearance by ISTRAC.		-		
41	Factory Acceptance Tests: For TTC Processor, the factory acceptance tests shall be carried out before shipment, as per the standard procedures.		-		
42	The supplier shall provide the types of tests to be carried out & the test procedures for carrying out the Factory Acceptance Tests well in advance, for the approval & mutual agreement.		-		
43	The tests results shall be submitted to ISTRAC for approval, before the actual shipment of the equipment.		-		

44	<p>Buy Back Option:</p> <p>1. ISTRAC may opt for the buyback option under which ISTRAC may return 04 nos of old CRT-XL TTC processors model CRT-XL (part no F260450) units to the party against delivery of new TTCP units.</p>		-		
45	<p>ISTRAC reserves the right to opt of buyback option or not.</p>		-		
46	<p>2. Old TTCP units (CRT-XL) will be returned to the party after reception of new systems at ISTRAC Bangalore.</p>		-		
47	<p>General Conditions:</p> <p>1. This is a TWO PART tender. Vendor is required to submit their techno-commercial bid and price bid in two separate sealed covers.</p>		-		
48	<p>Any disclosure of price information in techno-commercial bid may result in to the disqualification of the offer.</p>		-		

49	2.Warranty: Minimum 3 years comprehensive warranty from OEM covering on-site support. Warranty should start from the date of acceptance of the system.		-		
50	Party shall also provide separate quote of extended warranty (up-to 2 years) after the completion of standard warranty.		-		
51	3.The bidder shall provide complete technical details of the offer with detailed explanation of the function of the system, the various options available and any other information that may be required to evaluate the offer.		-		
52	ISTRAC reserves right to reject any incomplete offer.		-		

53	4.The bidder shall bring out point-by-point technical compliance matrix against all the specifications and functional requirements. The bidder shall explicitly bring out all the points wherever the specifications are not met or exceeded.		-		
54	5.The party shall be a reputed one with min. 5 years of experience in manufacturing similar baseband equipments. Party shall have supplied min 10 nos. of TTCP systems capable of total TTC operations in last three years to different vendors.		-		
55	Towards this, party shall enclose list of customers to whom he has supplied similar products and any performance certificate from respective users.		-		

56	6.ISTRAC reserves right to ask for the fully functional demo unit for evaluation at its ground station located at Bangalore for technical evaluation during technical evaluation stage - before placement of actual order.		-		
57	In this case, party shall be ready to supply one fully functional demo unit to ISTRAC within one month of intimation from ISTRAC.		-		
58	7.The party shall be ISO 9001:2015 certified one with established Quality Assurance Plan which shall consist of periodical inspections and progressive Quality Control throughout the developmental and production cycle of the product offered.		-		
59	Party shall provide supporting documents towards that.		-		

60	8.All required interconnecting cables (if any) / accessories, CDs for Operating system / MCS software shall be provided along with each system.		-		
61	9.The system shall be considered to be accepted by ISRO only after the successful completion of the on-site acceptance tests (performed at Bangalore) duly certified by ISRO.		-		
62	Party or its local representative shall able to provide technical support at ISTRAC premises towards acceptance testing of the supplied unit.		-		
63	10.At the time of installation and commissioning of the system if it is found that some additional hardware accessories or software items with licenses are required to complete the configuration to meet the total system requirement of the configuration		-		

64	which were not included in the vendor's original list of deliverables then vendor is required to supply such items to ensure the completeness of the configuration at no extra cost.		-		
65	. Vendor should ensure completeness of the list of deliverables in the offer to avoid such discovery during installation.		-		
66	11.All the systems under this tender shall be delivered within 8 months from the reception of the confirmed order.		-		
67	12.Only original manufacturer or their authorized agents/distributor/dealers should submit quotation. If the quotation is from authorized agent/distributors/dealers, they should submit Letter of Authorization to that effect along with quotation.		-		

68	Without Authorization letter, the offer will be rejected.		-		
69	13.The bidder shall guarantee supply of spares and maintenance support for at least 10 years from the date of acceptance of the system. 14.Vendor should quote in slab of 1-5, 6-10, 11-15 and 16-25.		-		
70	15.Criteria for Defining L1: Basic equipment cost with following features: 1)S-band Uplink/downlink interface. 2)8PSK, 4D-TCM capability		-		
71	3)High bandwidth TCU, 2.048Mbps uplink and 4)All applicable taxes		-		
72	5)3 years of warranty 6)Buyback cost of 4 TTCP equipment as mentioned under buyback option.		-		
73	The vendor should be Make in India Compliant.		-		

74	The equipment should be subjected to 168 hours of burn-in test before delivery.		-		
75	Annexure-A Remote Monitoring & Control Requirements as per following table:		-		
76	1For M & C transaction should be in the decodable commands. 2All parameters monitored locally should be present on the remote interface for monitoring & commanding. 3There should be a single monitoring command to get all parameters.		-		
77	The monitoring data block should be byte oriented and of fixed length. There should be a header & trailer at fixed defined byte location. Group-wise monitoring commands and individual parameters monitoring commands may also be made available.		-		
78	The command format should be text oriented.		-		

79	8. It should be possible to chain monitoring & control commands. Chained commands & response should be delimited by defined character (: ; , etc.).		-		
80	If monitoring commands are chained & sent, it is desirable that the response should also be sent in same order.		-		
81	9.The response time for any monitoring command should be less than 300 msec. Similarly, when control command is given, the control operation should get executed immediately & must be observed in the next monitoring data.		-		
82	10It is preferred to get data from the system on polling basis. This means asynchronously sending data is not preferred.		-		

Supporting Documents required from Vendor

1. Data Sheets

2. Compliance document

5 additional documents can be uploaded by the vendor

C.2 Commercial Terms / Bid

Sl. No.	Description	Compliance	Vendor Terms
1	As per the Scope of Work attached.	Yes / No / Explain	
2	The equipment should strictly comply to the specifications.	Yes / No / Explain	
3	Payment Term SUPPLY: Our normal terms of payment is 100% within 30 days from the date of receipt and acceptance of the item at our site. EXTENDED WARRANTY: Payment towards Extended Warranty shall be made after completion of Standard Warranty on Yearly basis.	Yes / No / Explain	
4	Taxes and other costs, if any	Yes / No / Explain	
5	Delivery Period	Yes / No / Explain	
6	Delivery Term	Yes / No / Explain	
7	Security Deposit: FD or BG for 3% of PO value to be submitted after receipt of PO and valid till supply & acceptance.	Yes / No / Explain	
8	Performance Bank guarantee : BG for 3% of PO value to be submitted while claiming payment valid till end of warranty period with a claim period of 60 days.	Yes / No / Explain	
9	SD-cum-Warranty (PBG) (in lieu of SD & PBG as a single instrument): BG for 3% of PO value to be submitted after receipt of PO valid till end of warranty period with a claim period of 60 days.	Yes / No / Explain	

10	<p>DELAY IN COMPLETION / LIQUIDATED DAMAGES :If the Contractor fails to deliver the stores within the time specified in the Contract or any extension thereof, the Purchaser shall recover from the Contractor as Liquidated Damages a sum of one-half of one per cent (0.5%) of the Contract price of the undelivered stores for each calendar week of delay. The total liquidated damages shall not exceed ten percent (10%) of the contract price of the unit or units so delayed. Stores will be deemed to have been delivered only when all their component parts are also delivered. If certain components are not delivered in time, the stores will be considered as delayed until such time as the missing parts are delivered.</p>	Yes / No / Explain	
11	Warranty	Yes / No / Explain	
12	Validity	Yes / No / Explain	
13	<p>Name and Address of the company on whom purchase order to be placed (OEM if any should be added in your E-Procurement profile under Add Agent/Principal without fail). Address indicated here must be available in your profile as a Principal/Agent failing which PO will be placed on the e-procurement address available in the profile.</p>	Yes / No / Explain	
14	<p>Certificate of Undertaking: Any bidder from a country which shares a land border with India will be eligible to bid in any procurement whether of goods or services (including consultancy services and non consultancy services) or works (including turn-key projects) only if the bidder is registered with the Competent authority (i.e. DPIIT). Hence, it is mandatory to furnish Certificate of Undertaking as indicated in the tender document.</p>	Yes / No / Explain	

15	<p>Foreign vendors are not permitted to quote. 1. Only Class -I and Class-II Local suppliers as per make in India policy are eligible to participate in the bid. 2. The percentage of local content should be specifically mentioned in the offer, without which will be summarily rejected 3. Preference will be given to class-I Local Supplier and in their absence, class-II Local supplier will be considered.</p>	Yes / No / Explain	
16	<p>This tender is restricted only to Class-I and Class-II Local Suppliers as defined under DPIIT Order dtd 04/06/2020- Preference to Make in India Order-2017 Revision. Non-Local Suppliers need not quote. Foreign OEMs/Agents quoting on behalf of Foreign OEMs are not permitted to quote. High Sea Sales Quotes not permitted. The bids shall be in INR only. Purchase preference to eligible vendors are applicable as per extant notifications issued by the Government of India. The Class-I/Class-II Local suppliers, at the time of submitting their offer, shall also indicate percentage of local content and provide self certification that the item (s) offered meets the local content requirement for Class-I/Class-II Local Suppliers as the case may be. They shall also give details of location (s) at which the local value addition is made. In cases if the item(s) offered exceed Rs. 10 Crores, the Class-I/Class-II Local Suppliers shall provide a Certificate from the statutory auditor or cost auditor of the company (in case of companies) or from a practicing cost accountant or practicing chartered accountant (in respect of suppliers other than companies) giving the percentage of local content. False Declarations will be in breach of the Code of Integrity under Rule 175 (1) (i) (h) of the General Financial Rules for which a bidder or its successors can be debarred for up to two years as per Rule 151 (iii) of the General Financial Rules along with such other actions as may be permissible under law.</p>	Yes / No / Explain	
17	Percentage of local content for the quoted item.	Yes / No / Explain	

18	Details of location (s) at which the local value addition is made	Yes / No / Explain	
19	Foreign OEMs/Agents quoting on behalf of Foreign OEMs are not permitted to quote. High Sea Sales quotes not permitted. The bids shall be in INR only.	Yes / No / Explain	
20	GeM Seller ID: As per Gol OM No. 6/9/2020-PPD dated 24.08.2020 and DO No. 170/CEO-GeM/2020, sellers providing Goods and Services to Central Government Organizations shall be registered on GeM and obtain a unique GeM registered ID. Hence please get registered in GeM and furnish your GeM Seller ID.	Yes / No / Explain	
21	Any other terms	Yes / No / Explain	

C.3 Price Bid

Sl. No.	Item	Quantity	Unit Price	Currency	Total Price	Remark
1	Telemetry Tracking and Command Processor	1.0 - 5.0 Nos.		-		
		6.0 - 10.0 Nos.		-		
		11.0 - 15.0 Nos.		-		
		16.0 - 25.0 Nos.		-		
2	TTCP-LDPC decoding	1.0 - 5.0 Nos.		-		
		6.0 - 10.0 Nos.		-		
		11.0 - 15.0 Nos.		-		
		16.0 - 25.0 Nos.		-		
3	TTCP-Spread Spectrum functionality	1.0 - 5.0 Nos.		-		
		6.0 - 10.0 Nos.		-		

		11.0 - 15.0 Nos.		-		
		16.0 - 25.0 Nos.		-		
4	TTCP- 2nd Simulator	1.0 - 5.0 Nos.		-		
		6.0 - 10.0 Nos.		-		
		11.0 - 15.0 Nos.		-		
		16.0 - 25.0 Nos.		-		
5	TTCP- buyback cost	1.0 - 2.0 Nos.		-		
		3.0 - 4.0 Nos.		-		
		5.0 - 6.0 Nos.		-		
		7.0 - 8.0 Nos.		-		
6	Extended Warranty	2.00 Years		-		
7	TTCP-user defined derandomizer	1.0 - 5.0 Nos.		-		
		6.0 - 10.0 Nos.		-		
		11.0 - 15.0 Nos.		-		
		16.0 - 25.0 Nos.		-		

Common charges (Applicable for all items)

P&F Charges	
Freight Charges	
Installation Charges	
Documentation & Handling Charges	

Other Charges (If any)	
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