

**Ministry of Human
Resource
Development,
Government of India**

Public Tender

FOR SUPPLY, INSTALLATION,
COMMISSIONING AND
RUNNING OF TEACHING ENDS
AT **213** LOCATIONS

IIT MADRAS, CHENNAI

Tender Reference Number : CCE/DAVI/025/2013

Tender fee : Nil

(Tender to be downloaded from IIT Madras Website: <http://tender.iitm.ac.in>)

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A Project Overview:

The Govt. of India, on January 2, 2009, launched a **centrally Sponsored Plan Scheme, namely, the National Mission on Education through Information and Communication Technology** (NMEICT), (for the mission document visit www.sakshat.ac.in) envisaging to leverage the potential of ICT for providing high quality personalized and interactive knowledge modules over the internet/intranet to all learners in Higher Education Institutions in any-time-any-where mode. Through this mission it is intended to achieve **composite goals of ensuring access with equity and excellence in higher Education and bridging the digital divide that exists in the society today.**

1. The NMEICT „Mission Document“ inter-alia, envisages setting up of 1000 DTH channels under the NMEICT with a view to making available subject-wise relevant e-content in various languages over the DTH platform. This activity has the potential to revolutionize education delivery across the length and breadth of the country in a highly cost effective manner. For the viewers the service would be free. These channels would also enable sharing of lectures of outstanding teachers through countrywide classrooms. To begin with it has been decided to uplink about 50 DTH Channels.
2. Besides DTH delivery, the content is also intended to be streamed, on demand, to multiple devices including, PC"s, smart mobile phones, tablets, Android based „Aakash“, IP connected devices etc. through web and suitable apps using a CDN (Content Delivery Network) as the delivery platform.
3. Dept. of Space (DoS), Government of India has allotted two Ku-band transponders (2 x 36 MHz spectrum) in GSAT-8 to MHRD for NMEICT programme exclusively for uplinking the DTH channels.
4. MHRD & Prasar Bharti have agreed to work together for the success of MHRD DTH programme and be partners in this programme of National importance and have, to this effect, signed an MOU on December 19, 2013. Prasar Bharati shall apply for WPC/NOCC/SACFA clearances from the Ministry of Communications & IT on behalf of MHRD for running MHRD DTH programme under it and to uplink MHRD educational DTH content.

B. Description of a Typical Teaching End (TE)

A Teaching end (from now it will be referred to as TE) shall comprise of a studio and an associated control room. **Provisioning of physical space for housing the Studio (in semi-finished or raw form) shall be the responsibility of institutions.** The educational content shall be generated live from the TEs for 50 DTH channels. Each TE shall be equipped under this project for acquisition, recording, editing, transmitting signal and all allied e-content generation to the MHRD DTH Centre through NKN and/or NMEICT lease lines. A TE shall operate every day and the institution hosting the TE shall be responsible for generating contents for the duration of 3:00 hours a day per TE for live broadcast. The institutions shall provide technical and human resource support to teachers through „services management provider“ (SMP) (a part of the tender), for creation of content using standard software to create powerpoint, graphics, animation and other material required for live delivery. These will form aids for the teacher(s) during delivery of live lessons. After or during the programme at appropriate intervals of each such delivery, the viewers, (for example, teachers, students, self-learners etc.) across the country shall have the opportunity to interact with the teacher and ask questions live through any of the following means, namely, video conferencing (Skype & A-VIEW, etc.), mobile, landline, SMS"s, e-mails etc., and the interaction shall be made available to the teacher

in the studio and obtain suitable responses. The session will be recorded and the output will be made available through the website as video-on-demand platform.

The same contents will be used subsequently to create e-content and forums will be provided for users to continue the discussions and contribute to the content and the lectures. The TE"s shall be equipped with both manpower and software and hardware infrastructure for generating e-content. The generic list of equipment and systems/devices that a TE will contain will be chosen from the following:

- **PTZ cameras:** The cameras shall primarily be wall/ceiling mounted to capture the teacher/presenter and participating students (if there are) in the Studio. The cameras shall be equipped with tally lights; all controls will be made from a small control room located appropriately in the TE.
- **Production console / video switcher with 8 channels & audio mixer.** These are standard video-audio mixers required for generation of content from multiple video and audio sources and for live transmission.
- **Interactive touch screen panel, pen and software or an electronic white board and a personal computer.** Teachers shall use presentation software to enhance teaching and learning, along with animations, 3D visuals, short video demonstrations, etc.
- **Server for transfer of e-content to teleport end along with software and hardware** for transmitting the content at high speeds through fibre network to the Teleport end.
- **Studio intercom system** which is a communication channel between telephone operator / producer at the control room and the teacher/presenter in the studio. The studio end should be equipped with press-to-talk microphone and also an earphone based communication device for communication with teacher.
- **Microphones** in multiple (minimum three numbers) to be provided in the studio for capturing audios of Presenters/Teachers and the students participating in the classroom.
- **Teacher Presentation PC** based system to be connected to an Interactive touch-screen LCD panel or an interactive tablet: the devices shall be the presentation tools for the teacher in the studio.
- **Computer Graphics/Text** (GFX and Scroll machine)
- **Communication PC** placed in the control room to be exclusively devoted for the receiving the queries from the students in the form of video conferencing tools like (Skype), A-VIEW, e-mails and SMS"s. The output of the computer shall be available on the video switcher and audio mixer for inserting in the ongoing programme.
- **Three Non-Linear Editing Systems:** Server based NLE systems shall to be used for (i) recording/storage of the online programme and later on (ii) editing for developing the e-content for which low resolution Video (up to 2 Mbps) may be generated and (iii) generation of graphics, animation, PowerPoint, editing video clips, etc., by the teacher for use in transmission. The content developed shall be stored on the network attached storage. Some of the edited video programmes shall be played back in real time for broadcast and the system shall also be capable of transferring the video files to the servers at the earth station.
- **Studio Lighting and warning system** to illuminate the studio with sufficient light for the camera for capturing noise-free images. There shall be provision of a house lighting system (fluorescent/CFL etc.) of a typical office room when studio is not active. The warning lamps shall be installed outside the studio; control room etc. to indicate that studio is live/on-air.
- **Encoder** that would accept audio and the video outputs of the studio and send to the uplink/earth station/teleport via National Knowledge Network (IP network) after requisite encoding and compression.
- **Telephone Hybrid** connected with four telephone lines for the system to provide students an interface to interact with the teacher. Incoming calls shall be screened in the control room using a PC. The presence of the call shall be communicated to the teacher over the intercom system and on demand by the teacher, call shall be placed online for response by the

teacher. The teacher's audio should be sent to callers telephone obviating the need to listen through TV thus avoiding the audio feed back.

- **SMS, e-mails or Social networking:** Messages from viewers reaching at each of the TE's shall be received, handled and forwarded in a controlled form from Control room to the Teacher inside the studio on to a PC monitor for the Teacher to take such messages for LIVE reply. The Messages shall also be recorded for the teacher to form answer, which may be put in question answer bank in e-content form.

C. Jobs expected from the Tenderer

The tender invites the applications for the supply, installation, commission and running of Teaching Ends at [213](#) locations in leading institutions of higher education across India and create content for 50 channels, 3 hours per day, every day, at each TE. At each TE, the Tenderer will be responsible to provide the requisite equipment and staff for acquisition, recording, editing, packaging the transmitted material of the day to e-content as per Template provided by the IIT Madras and transmitting the signals to the MHRD DTH center through NKN and/or NMEICT lease line. However, (a) academic Subject Matter Experts (SME's) and (b) Co-ordinator to liaison academic activities shall be provided by the universities etc.

D. Setting up of Teaching Ends & Training Centres

Teaching Ends (TE) is a TV Studio with a Control Room from where a Teacher/ Subject Matter Expert (SME) shall visit and deliver his/her lecture mostly live and using Audio, Video, Multimedia, Text, including some content out of the material available from the archives of programmes prepared at various institutes. The number of TE's shall be between [213](#) and the location of such TE shall be at Class A, AB & B cities and some cities may have more than one TE located. The number of TE may be increased. The List of TE may not be available at the time of going to Press, but shall soon be made available to the Vendors/ Tenderers.

It is planned to provide at least 10 TE initially as Training Hubs before the Launch of DTH Telecast, however, such TE shall continue to be a normal TE on and after Launch of the Programme. The Vendors/ Tenderers shall provide equipment, human resource, installation & operation at designated location within 45 days from the date of award of contract.

However remaining TE shall be set up at locations as per plan Part B, Section I.

SECTION I: IMPORTANT INSTRUCTIONS TO BIDDERS

Part A: Composite Bid

- (i) This Request For Proposal (RFP) is for MHRD sponsored DTH Project that comprises of supply, installation, commissioning and running of teaching ends at 213 locations (the number of TE may further increase by 10%) as under and as defined in the technical section:
- (a) Deliverables of audio-video production equipment at 213 Teaching Ends
 - (b) Preparation of TE site Civil, Electrical, Acoustical, AC, Fire extinguisher etc.
 - (c) Technical programme integration at each of the 213 Teaching Ends
 - (d) Deliverables at teleport end
 - (e) Deliverables at MHRD/institute end
 - (f) Deliverables by services management provider (SMP),

The Tender is a composite bid and the Bidder is required to submit a composite Bid.

- (ii) **Consortium:** The Bidder can either be a single party or may form a consortium of two or more partners to meet the required criteria. All of them should be present in all Bid meetings. Where there is more than one partner for the overall bid, the submission of the Bid and the responsibilities for delivering the services as per the scope of work shall rest on the Lead Bidder (who on behalf of partners shall be submitting the quotation and accepted by the other partners of the bid).
- (iii) Note: Every bidder must provide all & necessary supporting documents of his/her own firm as well as for all partner firms, as proof in respect of meeting eligibility criteria mentioned above.

In case of a Consortium / Joint Venture, details for all the partners must be provided in the format below:

Name of the partner, Address, Phone, e-mail, Fax Nos.	Name of business group to which the partner belongs.	Companies under the business partner group	Primary Activity of the business partner group & No of years of experience	Annual Turnover (in Lakhs) for the past three years.

Part B: Tentative Schedule of the Tender

The Bidder & supplier shall follow the following schedule unless altered by the IIT M:

S.No	Event	Date & Time
1	Sale of tender to prospective bidders.	T0. at 06:00 am
2	Last date for availability of tender on Website.	T0+ 11 days. at 4:00 pm
3	Pre-bid meeting.	T0+ 12 days at 11:00 am
4	Amendments to the Tender (if any).	T0+ 20 days
5	Bid submission.	T0+ 30 Days at 2:00 pm
6	Technical bid opening	T0+ 30 days at 3:00 pm
7	Presentation and demonstrations of full line of equipment at IIT Delhi.	T0+ 35-40 days
8	Technical bid evaluation	T0+43-48
9	Intimation to successful bidders	T0+48

10	Commercial bid opening	T0+ 50 days
11	Negotiations with L1	T0 + 57 days
12	Order placement with (i) list of 213 TE locations	T0+ 60 days
13	Confirmed irrevocable LC	T0+ 75 days
14	Set up 10 TE's with Human resource for conduct of Training.	T0+ 95 days
15	Survey, modification of Civil Elec., Acoustics, AC at each TE	T0+ (60-132 days)
16	Supply of goods	T0+ till 132 days
17	Installation/ commissioning of equipment	T0+ till 132 days
18	Project completion date	T0+ 142 days
19	Test recording of 10 Hours of content.	T0+ 149 days
20	Handing over to head of the Institute and managing by SPM	T0+ 151 days
21	Contingency Period	14 days
22	On-air date	T0+ 165 days.

Note: (i) T0 = Date on which Tender appears in News Paper(s)/websites, whichever is later.
(ii) Any of the above activity if falling on Saturday, Sunday or Holiday, the activity shall be deemed to fall on next working day.

Part C: The following documents are required to be submitted along with technical bid by the prospective bidders after carefully studying the bid document, without which the bid shall be rejected.

- Original tender document with Lead bidder's signature and stamp on all pages.
- A clause-by-clause compliance on conditions of contract and technical specifications.
- The bidder shall submit supply records and satisfactory installation certificate of completing similar turnkey work in the past two years.
- Schedule of equipment with detailed breakup to be supplied. Supporting catalogue, brochures and technical specifications of the product to be supplied and written in English language. A soft copy of it is also to be submitted.
- Authorization letter from the principal suppliers/manufacturers as per attached sample "Authorization Form" (See Annexure 1) should be enclosed in the bid document with respect to all the major items.
- EMD in the form of FDR, Demand Draft or Bank Guarantee (See Annexure 3 for Bank Guarantee format) needs to be enclosed in the separate envelop in the Technical Bid.
- Copy of firm registration of Lead Bidder & its consortium partners, ISO Certificate, service tax registration, VAT registration certificate, annual audited report of the previous 3 years (for each year, the turnover of the company should have been more than rupees 25 Crores).

Part D: The following documents are required to be submitted along with financial bid by the bidders, without which, the bid shall be rejected.

- Bid form duly signed with date and stamped by the authorized person as per sample "Bid Form" (See Annexure 2).
- Price Schedule duly signed dated and sealed by authorized person in accordance with Annexure 5.
- Failure to produce any documents shall lead to the rejection of the bid.

Part E: Important Conditions of Contract

- Bids with any deviation in warranty requirements as given in Section IV, conditions of contract shall be rejected.
- Bids with any deviation from payment terms and conditions of contract mentioned in Section IV, shall be rejected.
- Bids with deviation in delivery period mentioned in Section IV, Clause 5, shall be rejected.
- Bids submitted later than the deadline shall be rejected.
- Bids that are not sealed shall be rejected.

Part F: Other Important Conditions

- a) The total project cost shall be compared in the financial bid as defined in Para 22.0 as under and negotiation may be held with the L1. **In case of brand equity, the decision of the technical committee for brand equivalency is final.** The bidder must specify the brand and model number of the quoted items. The cables, joints and accessories must be of standard make.
- b) Negotiations with the L1 bidder shall be held at IIT Madras Office.
- c) The representatives (up to two) from the individual bidders should have an authorization letter to attend the negotiation meeting, without which the representative would not be allowed to attend the negotiation meeting.
- d) Technical committee may insist on use of particular brand or equivalent for switches, cables and other accessories for smooth functioning of the complete system at Teaching End. The material for integration should be from reputed Brands.
- e) Since RFP is a composite bid, for supply of goods, preparation of site in terms of civil, electrical, acoustical, AC etc, supply of manpower and operations etc, and all this to happen at [213](#) locations, it is in the interest of the tender to have complete co-ordination on these activities expected from him/her at all sites and ensure (a) preparation of each site in terms of civil, electrical, acoustical, AC etc, are fairly completed at respective site before goods arrive at that particular site and (b) the operational activities expected from him are met completely every day.
- f) In case of anything that is not mentioned in the bid required to make system functional as per the bid, the same may be quoted with nomenclature, make, brand, quantity and cost.
- g) Completeness of the system is the responsibility of the bidder and he /she has to ensure that the entire system is operational within the stipulated period as per the above points of the contract.
- h) In technical bid, block diagrams, technical workflow, interface details and layout design must all be provided.

Pre-Bid Meeting:

A pre-bid meeting shall be held at IIT Madras Office on March 3, 2014 at 10:30 a.m., for entertaining any queries/clarifications by the interested bidders for the subject tender. The representatives (up to two) from the individual bidders should have an authorization letter to attend the pre-bid conference, without which the representative would not be allowed to attend the pre-bid meeting. The bidder should have submitted their queries / clarifications in written to IIT Madras Office at least 24 Hours before the Pre bid meeting. The reply to selected queries shall be put on website for public display after the pre-bid meeting.

Presentation and Demonstrations of full line of equipment:

Vendors, whose bids have qualified technically, shall have to make a presentation and demonstrate full line of equipment in working condition they have quoted to the Technical Expert Committee of IIT M/MHRD on a date and place agreed upon by the IIT Madras.

Bid Quotes:

Supply of equipment, installation and technical programme integrator shall all be from a single Bidder. However, „Services management provider“ may or may not be the supplier of the equipment & technical programme integrator, but is form a single consortium as per the laid down criteria.

SECTION II: INVITATION FOR TENDER

Ministry of Human Resource Development, through Indian Institute of Technology, Madras invites sealed global bid in single envelope from the reputed manufactures/ suppliers for **“FOR TURNKEY PROJECT (INCLUDING SUPPLY, INSTALLATION, TESTING, COMMISSIONING AND OPERATIONAL SUPPORT) FOR TEACHING ENDS AT 213 LOCATIONS ACROSS INDIA”**

1. The bid must be accompanied by an EMD or a Bank Guarantee for a sum of Rs. 2 Crores (Rs. 2,00,00,000.00) and shall accompany the Technical Bid. Bids without the EMD or the Bank Guarantee will be rejected. **The EMD should be provided in the name of IIT Madras, Chennai.**
2. Bid documents shall be submitted in **sealed single envelope with technical and financial bid** as separately sealed covers inside. EMD must be enclosed in separate envelop in the technical bid.
3. Indian Institute of Technology, Madras reserves the right of acceptance or rejection of any or all of sealed tenders wholly or partially without giving any reason whatsoever.
4. On the bid-opening day, bid shall be opened in the presence of bidders (if present), bidder's representatives or absence of both. The dates shall be announced by IIT Madras and no requests in writing or through oral communication for change of dates will be entertained. It is the Bidder's responsibility to attend the session as announced by IIT Madras.

SECTION III: INSTRUCTIONS TO BIDDERS

1.0 Cost of bidding:

The bidder shall bear all costs associated with the preparation and submission of its bid. The Ministry of Human Resource Development and Indian Institute of Technology, Madras will in no way be responsible or liable for those costs, regardless of the conduct or outcome of the bidding process.

2.1 Bidding documents:

2.2 The goods required, bidding procedures and conditions of contract are prescribed in the bidding documents.

2.3 The bidder is required to examine all instructions, commercial terms and conditions, forms, technical specifications, schedule of requirements etc. as included in the bidding documents. Failure to furnish all information required by the bidder or submission of an incomplete and/or partially quoted bid will result in the rejection of the bid altogether.

3.0 Clarification of bidding documents & Pre-bid meeting:

A prospective bidder requiring any clarification(s) of the bidding documents may discuss the same during the pre-bid meeting. Only those bidders are allowed to attend the meeting who have gone through the tender document, and those clarification(s) alone shall be taken up, which have reached IIT Madras in writing or to a designated email below, 24 hours prior to the pre bid meeting.

The e-mail address is: arpp@iitm.ac.in

4.0 Amendment of bidding document:

4.1 Ministry of Human Resource Development and Indian Institute of Technology, Madras may for any reason, whether at its own initiative or in response to a clarification requested by a prospective bidder, may issue clarification and corrections within 7 days after the pre-bid meeting.

4.2 Such clarifications and corrections will be notified on website / via email to all prospective bidders who have purchased the bidding documents. Such clarification and corrections will be binding on all bidders.

5.0 Composition of bid document:

The bid documents shall comprise documents and forms duly filled with date and signed by authorized person as mentioned in the Section I: **'Important notice to bidders'**.

5.1 **The following documents and forms are essential, without which the bid shall be rejected.**

- (a) Bid form accordance (See Annexure 2) duly filled with date and signed by authorized person.
- (b) EMD or Bank Guarantee for a sum of Rs. 2 Crores (Rs. 2,00,00,000).
- (c) Price schedule in accordance with Annexure 5 duly filled with date, signed and stamped by authorized person.
- (d) Authorization letter from the manufacturer/ supplier.
- (e) Detailed description of the good's essential technical and performance characteristics.

- (f) Clause-by-clause compliance on conditions of contract and technical specifications.
- (g) ISO certificate.

5.2 FORMAT OF SIGNING OF THE BID

- a) The bidder shall prepare two copies of the bid clearly marking one copy as "Original" and the other as "Copy" & also provide softcopy of Technical Bid on CD/DVD in MS-Word /pdf format.
- b) In the event of any discrepancy between them, the original paper copy shall be considered as the bid.
- c) The original copy of the bid shall be typed and shall be signed by the bidder or a person duly authorized by the bidder. The letter of authorization shall be written by the Power of Attorney and must accompany the bid.
- d) All pages of the original bid except printed literature shall be initialed by the person signing the bid.
- e) The bid shall contain no interlineations, erasures or overwriting except as necessary to correct errors made by the bidder in which case such corrections shall be initialed by the bidder signing the bid.

6.0 **Bid Price & Bid Currency:**

The bidder shall indicate unit prices and total bid prices of each of the goods he/she proposes to supply under the contract as per the format specified in Annexure 5. All customs and local clearances shall be made by the Supplier against customs exemption certificates issued by the IIT Madras. For the items to be procured locally in India, all freight and insurance up to 213 Teaching End Locations as per the list provided shall be done by the supplier. For the items to be imported, all freight & insurance up to 213 Teaching End Location as per the list provided may be included in the quoted price. **The prices shall be fixed based on the prevailing currency rate on the date of tender opening date and will not be subjected to any variation. Ministry of Human Resource Development and Indian Institute of Technology, Madras will provide the details related to teaching end locations to the prospective bidders much before closing date for the tender.**

7.0 **EMD:**

- 7.1 Pursuant to clause the bidders shall furnish as part of its bid an EMD or a Bank Guarantee for a sum of Rs. 2 Crores (Rs. 2,00,00,000.00). The Bank Guarantee shall be issued by a reputed commercial bank in India. **The EMD can be deposited in the form of FDR, Demand Draft or Bank Guarantee (See Annexure 3 for Bank Guarantee format).**
- 7.2 **Bid Security shall remain valid up to 120 days from the date of opening of the tender.**
- 7.3 **Any bid not secured in accordance with clauses 7.1 and 7.2 shall be rejected.**
- 7.4 The bid security is required to protect Ministry of Human Resource Development and Indian Institute of Technology, Madras against the risk of bidder's non-performance.
- 7.5 The bid securities of all the bidders shall be discharged upon signing of the contract and furnishing the performance security by the successful bidder, pursuant to Annexure 4.
- 7.6 **The bid security shall be forfeited:**
 - a. If a bidder withdraws its bid during the period of bid validity specified by the bidder on the bid form, or
 - b. in the case of a successful bidder, if the bidder fails to sign the contract within seven days from the date of acknowledgement of intent and furnish the performance security in accordance with clause 4.0 of section IV.

8.0 Period of Validity of bids:

8.1 **Bids shall remain valid up to 120 days from the opening of tender.** Bids, not valid until the date mentioned above, **shall be rejected.**

8.2 In exceptional circumstances, Ministry of Human Resource Development and Indian Institute of Technology, Madras may solicit the bidder's consent to The request and the responses shall be made in writing. The bid security provided under clause 7 shall also be suitably extended. **A bidder granting the request will be requested to do so in writing and will not be permitted to modify his/her bid for the above reason.**

9.0 Format, Sealing, Marking and signing of bid:

9.1 The bidders are required to submit the bids in **separate wax sealed envelopes with technical and financial bid each sealed separately.** Any pricing mentioned in technical bid relating to the items will make the whole bid null and void. EMD must be enclosed in a separate envelope along with the technical bid.

9.2 The original of the bid shall be typed or written in indelible ink and shall be signed by the bidder or a person or persons duly authorized to bind the bidder to the contract. All pages of the bid, except for un-amended printed literature, shall be initialed by the person or persons signing the bid.

9.3 Any interlineations, erasures, or overwriting shall be valid only if they are initialed by the person or persons signing the bid.

9.4 The envelope shall be addressed to Indian Institute of Technology, Madras and delivered to I The purchase Section, Industrial Consultancy and Sponsored Research, IIT Madras, Chennai 600036, Tamil Nadu, India.

(b) Bearing "Invitation for bids tender No. "FOR TURNKEY PROJECT (INCLUDING SUPPLY, INSTALLATION, TESTING, COMMISSIONING AND OPERATIONAL SUPPORT) FOR TEACHING ENDS AT **213** LOCATIONS ACROSS INDIA" and the words "DO NOT OPEN BEFORE THE OPENING DATE"

(c) Indicate the name and address of the bidder to enable the bid to be returned unopened in case it is declared "Late".

9.5 If the outer envelope is not sealed and marked as required by clauses 9.1 and 9.4, the Ministry of Human Resource Development and Indian Institute of Technology, Madras will assume no responsibility for the bid's misplacement or premature opening.

10.1 Deadline for submission of bids:

10.2 Bids must be received by Indian Institute of Technology, Madras at the address specified under clause 9.4 not later than 2:00 P.M. on April 4, 2014.

10.3 Ministry of Human Resource Development and Indian Institute of Technology, Madras may, at its discretion, extend this deadline for the submission of bids by amending the bidding documents in accordance with clause 4.

11.0 Late Bids:

Any bid received by Indian Institute of Technology, Madras after the last date of submission of bids pursuant to Clause 10, shall be rejected.

12.0 Amendment to RFP:

At any time, but three working days prior to the last date for submission of tenders, IIT Madras may modify the RFP and such modified RFP will be made available in web site IIT Madras & www.sakshat.ac.in and such modification shall be binding on all concerned. IIT Madras, at its discretion, may extend the last date for submission of tenders.

13.0 Opening of bids by Ministry of Human Resource Development and Indian Institute of Technology, Madras:

13.1 Indian Institute of Technology, Madras will open the bids in the presence of bidders or their representatives who choose to attend at **3 P.M. on the last day of the submission of bid** in Indian Institute of Technology, Madras.

13.2 The bidder's name, bid prices, modifications, bid withdrawals and the presence or absence of the requisite bid security and such other details as Ministry of Human Resource Development and Indian Institute of Technology Madras at its discretion may consider appropriate, will be announced at the opening.

13.3 Indian Institute of Technology Madras shall prepare minutes of the meeting of bid opening.

14.0 Delivery & Installation Schedule & Project Completion:

Delivery of all the goods shall be made by the supplier to the head of the institute at each location as per purchase order and address supplied within 72 Days from the date of order placement.

14.1 About 10 TE as Training Hubs shall be commissioned with human resource within 45 days from the date of award of contract.

14.2 Partial shipment shall be allowed, however care may be taken to supply all goods at a location in a single supply.

14.3 The supplier should ensure that the Site is fully ready after completion of civil work before goods reach an individual Teaching End / Site. This has to be ensured for all sites.

15.1 Technical Programme Integrator:

The equipment supplier shall also be „Technical Programme Integrator“ whose job shall also include the following:

1. Overall project management at each TE.
2. Prepare plan for modification of existing rooms provided by the Institute for conversion to media studio (Teaching End) and IT enabled classrooms rooms at each TE and seek approval of the Head of the Institute for work estimate & execution as per standard rates quoted in the tender.
3. Get the rooms functional as Teaching End, as per standard requirements and get Civil, Electrical, Modification, Acoustic Treatment, Air conditioners, Fire detector, alarm, extinguishers, proper Earthing (Copper 12X12" 4mm) (< 2 volt between earth & neutral) etc. jobs implemented at each Teaching End within rates quoted in the tender.
4. Provide installation materials and installation of equipment.
5. System Integration: - To follow system design, drawing, block schematic, layout plan (LOP) etc. for equipment and power supply system.
6. Testing and commissioning of the TE assigned.
7. Test recording of 10 hours of content.
8. Training - induction training for operation and maintenance staff.
9. Completion certificate of equipment supplied by the supplier and its successful working is to be duly signed by the supplier, Head of the Institute and the „service management provider“.

10. After having successfully tested, the setup is to be handed over to the Head of the Institute and the set-up run by the services management provider.

The Technical programme integrator has to complete the job as above within 73 days from the day purchase order is awarded at each location.

16.1. Services Management Provider (SMP).

The SMP should have demonstrated experience in providing managed services of similar nature and should have completed projects worth of at least Rs.25 Crores in the past three years.

Scope:

Quote rates, to provide following services initially for three years and for subsequent years. MHRD and IIT Madras will reserve the right to apply pro rata for less than two years initially.

1. Managed Services include, for each day, engagement of well qualified, professional personal to perform jobs defined as under and numbering: 18 man-hours of professional engineering responsibilities, 18 man-hours of editing/assisting faculty for multimedia production, 9 man-hours of production/management of the centre and 9 man-hours of attendant duties. The Agency shall only engage proportionate staffs who have worked on similar equipment for at least three years.

2. DURATION OF OPERATION: The system installed at each TE is required to operate uninterrupted 9 hrs x 7 days throughout the year. The SMP is therefore required to depute site staff to cater to the requirement of 9 hours manning per day.

3. SCHEDULE OF WORK: Smooth and uninterrupted operation of the teaching end, for 9 hours on all days in a year, for (i) live content telecast, (ii) live interaction, (iii) provide assistance to Subject matter Experts (SMEs) in development of graphics, animations etc. that may be used during live telecast and (iv) development of e-content each day from the transmitted media of the day and other material provided by the SME and packaging it into the Template provided by IIT Madras. The SMP is expected to provide the services as under:

3.1 The SMP Should depute experienced service personnel on-site, on the basis of 9 hrs x 7 days for troubleshooting and assisting in operation of various elements of production system such as vision mixing, audio mixing, recording and encoding, storing and forwarding of file etc..

3.2 The service personnel should be well versed with the overall system which includes multiple disciplines. The SMP will have to provide the minimum details/qualifications of such staff including their work experience for consideration by MHRD and may have to provide multiple site engineers in one shift in case of personnel not being multitasking.

3.3 The SMP may be required to depute additional engineer(s) or other staff during special events and unforeseen events/activities.

3.4 The SMP will provide daily, weekly, monthly and other periodical maintenance details for approval. The SMP will carry out these maintenance schedules strictly under the supervision of in-charge without affecting the production and other activities and submit the details of such maintenance works to the authorized representative of TE site within 24 hours.

3.5 The SMP will maintain records and log books of various works done and maintenance schedule followed. The SMP will coordinate these activities with the on-site

in-charge as

identified by the head of the Institute (TE). The SMP will maintain the stock register of critical and essential spares of all equipment on-site to keep the downtime to minimum.

3.6 The SMP will be responsible for all transport and forwarding charges for bringing the maintenance equipment or spare parts from the dealer to the office, and for taking the defective equipment to the dealer for special repairs and for bringing them back to the TE.

3.7 The SMP will arrange all tools and testing equipment for maintaining the system in perfect working condition.

3.8 The SMP will take care of safety of his /her staff while they are working on any system and will provide them all safety gadgets. The production system will have to be installed in a protected and restricted area. The SMP shall therefore supply bio-data of all staff and provide validated identity cards as well as entry passes for all having access to the TE.

3.9 It is the responsibility of the SMP to ensure the personnel engaged at each TE reach in time and work as expected and do not leave before the duty allocation period.

3.10 The personnel engaged at each of the TE being the responsibility of the SMP, it shall be the responsibility of the SMP to provide all facilities to each of the personnel engaged including that of ESI, bonus, insurance, etc. at each of the TE.

3.11 The SMP and his/her staff shall observe security and other rules as per the security officer in-charge for permission of entry within TE. The log books and records maintained as mentioned above shall be subject to the scrutiny of the department and shall be the property of TE.

3.12 Proper records of complaint received and attended shall be maintained by the SMP. All complaints are to be attended promptly and any delay shall be viewed as lapse on the part of the SMP and a penalty will be levied as per the clause.

3.13 Conduct Training Workshops regularly for the staff.

16.1 Deficiency in Quality of Service:

It shall be the responsibility of the SMP to provide professional & well managed services at all the TE locations in the country without any disruption of the transmission. In case of fall in quality of services, a penalty for such verifiable lack of quality in first instance may be levied to a value of 5% on the due payable amount in that month at that location. The penalty shall be 7.5% for second and 10% for subsequent instances of deficiencies reported in the month out of the payment due at that particular TE. A mechanism would be put in place for all TE"s to maintain a service quality deemed acceptable to all.

16.2 Period of Contract of SMP:

The RFP is a turnkey project, that includes supply, installation, testing, commissioning and operational support for TEs at 213 locations across India, the successful bidder shall sign a bond with the IIT Madras to provide SMP services at all the 213 locations as per terms & conditions, for a period of three years, which shall be extended mutually for subsequent year(s) with an annual enhanced payment of 10%. The extension of the contract shall be signed six months prior to the last date of the contract in force. Notice period for termination of SMP services by either party cannot be less than six months.

16.3 Monthly Payment for SMP Services:

The monthly payment bill for having successfully provided the SMP services shall be raised by the bidder by the 2nd day of the succeeding month and the payment shall be released by the IIT Madras by 10th day of the same month (on receipt of confirmation from the Head of the Institutes or from the designated offices of the Institutes that the service have been as per contract) and after deduction of Tax & other Government levies admissible on such payments.

17.1 Annual Maintenance Contract

All equipment quoted should be provided with warranty at site for a period of TWO years and more, from the date of commissioning of equipment. However, the bidder has to:

- (i) Quote AMC charges on a year-to-year basis for each of the equipment, at least for a period of FIVE years after the expiry of the warranty period. A quotation of equipment submitted by the bidder, without submission of AMC beyond warranty period as desired above, shall be rejected. **The AMC shall also be considered towards the total cost of the project and also in evaluating lowest bidder.**
- (ii) Submit an undertaking that the bidder and the purchaser may further enter into AMC of the equipment supplied by the bidder, beyond the expiry of the five year period, at a rate agreed mutually at that time.
- (iii) Submit an undertaking provided by the manufacturer that the manufacturer shall further supply spare parts to MHRD or a designated office/institute communicated by the MHRD at that time, of the equipment supplied by the bidder for a further period of (one to five) years beyond expiry of five year period of AMC period as mentioned under Para (i) above at a cost agreed upon from time-to-time by both parties.

18.1 Documentation

Successful bidder shall have to supply one set of the following documents in hard & soft copy form:

- a) Technical solution
- b) Equipment description
- c) Installation & testing procedures
- d) Operation & maintenance procedures
- e) Acceptance test procedures
- f) Testing methodology to ensure SLA conditions

18.2 Warranty:

Bid with any deviation in warranty period as mentioned in Section IV, Clause 6.0 of the conditions of contract shall be rejected.

19.0 Payment:

Bid with any deviation in payment term as mentioned in Section IV, Clause 7.0 of the conditions of contract shall be rejected.

20.0 Authorization letters

Non-submission of authorization letters to cover warranty period from the manufacturers/suppliers shall result in rejection of bid.

21.0 Bid evaluation and award criteria:

- 21.1 Ministry of Human Resource Development and Indian Institute of Technology, Madras shall consider only one main offer from each tender for evaluation purpose. No more than one offer per tenderer shall be entertained.
- 21.2 Preliminary Examination
- 21.2.1 Ministry of Human Resource Development and Indian Institute of Technology, Madras will examine the bids to determine whether they are complete, whether any computational errors have been made, whether required sureties have been furnished, whether the documents have been properly signed and whether the bids are generally in order.
- 21.2.2 Arithmetical errors will be rectified on the following basis. If there is a discrepancy between the unit price and the total price that is obtained by multiplying the unit price and quantity, the unit price shall prevail, and the total price shall be corrected. If there is a discrepancy between words and figures, the amount in words will prevail. If the supplier does not accept the correction of the errors, the bid will be rejected, and the bid security shall be forfeited.
- 21.2.3 Ministry of Human Resource Development and Indian Institute of Technology, Madras may waive any minor informality, nonconformity, or irregularity in a bid which does not constitute a material deviation, provided such waiver does not prejudice or affect the relative ranking of any bidder.
- 21.2.4 Prior to the detailed evaluation, Ministry of Human Resource Development and Indian Institute of Technology, Madras will determine the substantial responsiveness of each bid to the bidding documents. For the purpose of these clauses, a substantially responsive bid is defined to be the one, which conforms to all the terms and conditions of the bidding documents without material deviations. Deviations from, or objections or reservations to critical provisions, such as those concerning bid security, applicable law and taxes and duties, will be deemed to be a material deviation. The decision by the Ministry of Human Resource Development and Indian Institute of Technology, Madras on a bid's responsiveness will be based on the contents of the bid itself without recourse to extrinsic evidence and will be deemed final. Bid evaluation will be done in two stages, namely technical evaluation followed by financial evaluation.
- 21.2.5 If a bid is assessed to be not substantially responsive technically, it will be rejected by Ministry of Human Resource Development and Indian Institute of Technology, Madras and shall not subsequently be made responsive by the bidder by correction of the nonconformity. It is in the interests of the bidder to provide all technical details in the first instance of submission of technical bid. Only those responses to specific queries raised by the technical evaluation committee shall be permitted to be added as annexures/supplements to the bidder's technical bid. The committee however reserves the right to reject all such bids which it decides are grossly incomplete.

22.0 Guidelines to Evaluate the Commercial Bid

- 22.1 The following sections in the commercial bid from each bidder shall form the criteria for evaluating the commercial bid. Accordingly the bidder should fill in the data in the following form in the, Commercial section of the two bid system, before submitting them. (This is purely for arriving at the calculations and should not be constituted as order):

S.N	Section	Total Price	Remarks
1.	Deliverables of all audio-video production & other equipment at one TE		

1.1	Deliverables of all audio-video production & other equipment at one TE	X	Refer to explanation
2.	Technical programme integration at each TE		
2.1	Installation material	Y	Refer explanation below
2.2	Civil modification, electrical, acoustics, AC, Fire prevention etc.		
2.3	Installation of equipment		
2.4	Furniture for housing technical components compactly		
3.	Deliverables at teleport end		
3.1	Data delivery framework: Core server with server management S/w along with data delivery server H/w with storage of 8TB, receive system for store & forward content (at teleport end) software. quantity: 2 lots. (item C 1 & (B) 1)	Z	
4.	Deliverables at MHRD/Institute End		
4.1	Reception and monitoring of 50 Channel DTH reception on 5X46"multiviewer quantity: 1 lot. (item (d))	A	
5	Services Management Provider (SMP)		
5.1	Services by SMP (emoluments for personnel, 2 Technical + 2 Editors + 1 Manager at each TE per month, to be calculated for a period of one year)	B	
6.	AMC after Warranty Period		
6.1	<u>AMC charges for next 5 Years on a year-to-year basis</u>	<u>C</u>	
	TOTAL BID PRICE "P"	"P" = 0.55X + 0.06Y + 0.02Z + 0.02A + 0.3B + 0.05 C	

Explanation for 1 above

Refer, SECTION I, SCHEDULE OF REQUIREMENT

(A) Deliverables of audio-video production equipment at **213** TEs

S.N.	Item	Quantity for 1 Teaching End	Unit Price	Total Price
1	Integrated broadcast (PTZ) camera with remote control	3		
2	Production console / Video switcher 8 channel	1		
!	!	!		
22	Server for transfer of e-content to teleport end	1		
Total price for deliverables of audio-video production & other equipment from S. No 1- 22 (all) at one Teaching End as per page No. 33-34.				X

Explanation for 2 above:

From (B) (C) Deliverables at DTH End & Technical programme integrator at each of the **213** TEs

(refer to pages 34 & 35)

S.No.	Item	Quantity	Unit Price	Total Price
1	Data delivery framework Page no.47	2		
2	Supply of material & construction of 240 sq.ft wall 230 mm thick (item 1.1 to 1.10), Page no.47	1 Lot		
3	False ceiling 900 square feet (item 2.1 to 2.3) Page no.47	1 Lot		
4	Flooring vinyl per square 100 S feet (item 3.1) Page no.47	1 Lot		
5	Supply & installation of acoustic material (item 4.1) Page no.47	7000 Sq.ft		
6	Soundproof doors & glass windows (item 5.1 & 5.2) Page no. 48	1 Lot		
7	Supply & installation of electrical items (item 1 to 26) Page no. 48-51	1 Lot		
8	Supply & installation Split AC (item B III g 1.5 T + 1.7 T + 2 T) Page no. 51	4 Nos each		
9	50 Channel Monitoring Setup Page no. 51	1 Lot		
10	Installation of equipment (item No B I 1) Page 34	1 Lot		
11	Technical furniture (item No B II 1) Page 34	1 Lot		
12	Fire detector, alarm, fire extinguishers etc. (Item No BIII, I) Page 35	1 Lot		
Total Price for Technical Programme Integration at each of the 1 Teaching End				Y

22.2 During the evaluation of SMP, following will be considered:

- Type of manpower provided by the SMP
- Backup plan by the SMP.
- Facilities like ESI, bonus, insurance etc. provided by SMP to the manpower

23. **Ministry of Human Resource Development and Indian Institute of Technology, Madras reserve the rights to accept or reject any or all bids:**

Notwithstanding Clause 17, Ministry of Human Resource Development and Indian Institute of Technology, Madras reserve the rights to accept or reject any bid, and to null the bidding process and reject all bids, at any time prior to award of contract, without thereby incurring any liability to the affected bidder, or bidders or any obligation to inform the affected bidder or bidders of the grounds for Ministry of Human Resource Development and Indian Institute of Technology, Madras action.

24. **Ministry of Human Resource Development and Indian Institute of Technology, Madras reserve the rights to vary quantities at the time of the award of the tender. However, if the decrease or increase is more than 15 percent and where bulk pricing is involved, all technically qualified bidders will be given the same amount of time to submit a modified commercial bid only, not exceeding two weeks from the date of announcement of such variation.**

Ministry of Human Resource Development and Indian Institute of Technology, Madras reserve the rights at the time of awarding the contract to increase or decrease by 15%, the quantity of goods without any modification of commercial bid permitted and services specified in the Schedule of requirements and without any change in unit price or other terms and conditions.

25. **Signing of Contract:**

Within fifteen (15) days of receipt of the notification of award from Ministry of Human Resource Development and Indian Institute of Technology, Madras, the successful (L1)

bidder shall furnish a performance security in the form of bank guarantee for 5% of the amount of the Contract. The successful bidder then shall sign the contract and return it to the Ministry of Human Resource Development and II Madras. Failing this, the offer on this shall be passed on to the L2 bidder.

26. Warranty:

- a) The equipment shall be under warranty against any manufacturing defects for a period of two years from the date of delivery or more as provided by the manufacturer.
- b) Any part(s) failing during the warranty period shall be repaired/replaced free of charge by the supplier at site i.e. no transportation charges would be paid by MHRD/ IITM for transporting the defective / repaired items if required to be removed from the site during the warranty period.
- c) Warranty period is to be extended corresponding to the outage period if the failure rectification takes more than 15 days time.

27. Spares:

- a) Necessary spares required for the maintenance of the equipment offered should be quoted separately. The cost of spares shall not be taken into account for deciding lowest bidder (L1).
- b) A complete recommended spare parts list should be offered, along with the bid as a separate quote inside the commercial bid.
- c) Supplier should give a certificate for providing spares and maintaining support for this system for the next five years.

28. Accessories:

All **essential** accessories like **cables, connectors, power cords**, etc., needed for working and integration of the equipment should be included in the offer. Optional accessories should be quoted separately.

29 Inspection:

All equipment must be supplied against the order for this tender and shall be subjected to inspection by a team, at a site where major equipment are Manufactured or integrated at or on site or integrator's facility, decided and deputed by MHRD/IIT Madras. The inspection of equipment must be conducted as per the following schedule:

- i. **Site acceptance test:** All the equipment supplied against the order for this tender shall be subjected to inspection at each of the TE (where equipment is to be supplied/ installed) based on ATP (accepted test procedures) approved by MHRD/IIT Madras. A draft ATP for the system should be provided by the firm 15 days in advance of the proposed date of inspection of the system to obtain MHRD/IIT Madras approval. The approved ATP will be followed by MHRD/ IIT Madras inspection team for acceptance and commission the system.
- ii. The firm which gives ATP at site will provide all necessary facilities to the inspection officer/ inspection team for the purpose of including all the testing equipment required for inspection.

30 Necessary Requirement

- a) The offer should indicate the time frame for completing the activities (in all TEs) up to the commissioning of the set-up on a bar chart starting from date of issue of purchase order (P.O.).
- b) All the essential items, which the manufacturer feels are necessary to complete the equipment/chain for the full exploitation of all the features of the equipment offered, may also be quoted.
- c) Equipment from renowned and well-known firms of the industry with proven track record only will be accepted. The bidder should enclose a list of organizations to which similar equipment to those quoted in this tender has been supplied.

- d) System/equipment should be offered along with its frame/housing and other accessories which are necessary to meet the specifications/requirement and for the full exploitation of the equipment.
- e) Cost of all the equipment which are necessary to complete the configuration and meet the specifications/requirement should be clearly specified and will be included for commercial evaluation.
- f) The system offered by the Vendor should be complete in all respects even if a component or two were missed out in MHRD/IIT M RFP/specification.
- g) The offer incomplete in any respect will be rejected.
- h) A demonstration of successful technical bidders will be required to show the end-to-end production and successful recording at a site announced by the Committee. One set of sample of system/sub system complete in all respects along-with operators & technical manuals must be made available for committee and other invited specialists to attend and study the demo.
- i) One soft copy of the bill of material having make & model numbers of all equipment, in the same sequence and keeping the same serial numbers, should be provided along-with the quote.
- j) There should be a separate technical offer (separate BOM) for each combination of offered subsystems. The commercial quotes must be provided against each such BOM in the same commercial bid by proper identification.
- k) The bidder must identify his/her local office/ authorized representative/ dealers in India for after-sales support. The local office/ local authorized representative/ dealer will be the nodal point for resolving issues, related to installation, commissioning and after-sales support. Any module of TE equipment or other equipment requiring repairs will be handed over to the local office/ local authorized representative/ dealer who will arrange for repairs locally or export the defective modules to the OEM and re-import after repairs. It is the responsibility of local office/ authorized representative/ dealer of the bidder to arrange the repair/ replacement of faulty items for MHRD/IIT Madras
- l) After-sales service support for the repairs/ maintenance of equipment at each TE upto five years after the completion of guarantee/ warranty period shall also be provided by the OEM either directly or through his/her representative in India. A certificate, on the letterhead, in this regard, duly signed by the OEM must be submitted with offer.

SECTION IV: CONDITIONS OF CONTRACT (COC)

Clause No.	Particulars of Requirement by the Ministry of Human Resource Development and IIT Madras	Bidder's Response including deviations if any
1.0	Definitions In this contract the following terms shall be interpreted as indicated.	
A.	"The Contract" means the agreement entered into between IIT Madras and the supplier, as recorded in the contract form signed by the parties, including all amendments and appendices thereto and all documents incorporated by reference therein.	
B.	"The Contract Price" means the price payable to the supplier under the contract.	
C.	"The Goods" means all of the equipment and services, which the supplier is required to supply at each Teaching End under the contract.	
D.	"The Supplier" means the individual or firm supplying the goods under this contract.	
2.0	Country of Origin All goods supplied under the contract shall have their country of origin mentioned.	
3.0	Standards The goods supplied under this contract shall conform to the standards mentioned in the technical specifications.	
4.0	Performance Security	
4.1	The successful bidder shall submit a bank guarantee equivalent to 5% of the contract amount as performance security at the time of signing of contract as per Annexure 4 enclosed in the bid document. The currency of the bank guarantee shall be in currency of contract. The validity of the bank guarantee shall cover the warranty period as mentioned in the warranty clause. The performance security shall be issued by a reputed commercial bank located in India.	
4.2	The proceeds of the performance security shall be payable to the IIT Madras as compensation for any loss resulting from the supplier's failure to complete its obligations under the contract.	
4.3	The performance security will be discharged by IIT Madras not later than thirty (30) days following the date of completion of the supplier's performance obligations, including any warranty obligations, under the contract.	
5.0	Delivery: It is the responsibility of the bidder to deliver all materials to each TE and have the Head of the Institute certifies the receipt of all in the BOM from all TEs in 60 days from the opening of the LC.	
5.1	Port of Entry: The goods may be dispatched in one or more than one consignments through one or more than one Port of Entry in India.	
6.0	Warranty:	
6.1.	Full warranty shall be provided on the goods supplied. The warranty shall remain valid for at least the period of twenty Four (24) Months from the date of delivery of goods at the TE. This may lead to slight variations in dates for each TE but will be certified by the head of the TE jointly with the bidder and submitted for IIT Madras and MHRD records. Bidder must quote AMC charges for next 5 Years on a year-to-year basis and this would be part of commercial bid to evaluate lowest bidder. Also the bidder	

	must specify any extended warranty offered by the OEM.	
6.2.	Head of the Institute at a TE or IIT Madras shall promptly notify the supplier in writing of any claims arising under this warranty. Upon receipt of such notice, the supplier shall, with all reasonable speed, repair or replace the defective goods or parts to that particular TE and intimation to the IIT Madras. Manufacturer's Standard Warranty terms will be applicable in the contract.	
7.0	Payment	
7.1	Payment upto 90% value in account of Civil, Electrical, Modification, Acoustic Treatment, Air conditioners, Fire detector, alarm, extinguishers etc jobs as per the Tender Quotes and on the recommendations of the Head TE Institute or his nominee shall be paid to the vendor within 40 days on submission of satisfactory completion certificate of the jobs as above by the Institute. Balance 10% payment on this shall be made within 30 days on satisfactory completion of the job.	
7.2	Payment for the goods shall be made in the following manner:	
	For Items to be procured locally in India:	
	i. Against Delivery: Ninety (90%) percent of the price of the goods delivered will be paid through Demand Draft.	
	ii. Balance: The remaining balance ten (10%) percent payments of the goods will be made within ten (10) days of the satisfactory installation or one month from the date of receipt of all materials in all TEs, whichever is earlier..	
	For Items to be Imported in India:	
	iii. 90% payment will be made through irrevocable and Confirmed Letter of Credit at Sight. The remaining 10% of the LC to be released after installation or one month from the date of receipt of all materials in all TEs, whichever is earlier.	
8.0	Contract amendments No variation in or modification of the terms of the contract shall be made except by written amendment signed by the both parties.	
9.0	Assignment: The supplier shall not assign, in whole or in part, his/her obligations to another party to perform under this contract, except with prior written consent of IIT Madras..	
10.0	Applicable Law: The contract shall be interpreted in accordance with the prevailing laws of Government of India.	
11.0	Taxes and Duties:	
11.1	Supplier shall be entirely responsible for all taxes, stamp duties, license fees and other such levies imposed. Taxes/duties applicable at the port of entry in India will be borne by the supplier. Ministry of Human Resource Development or IIT Madras will provide the customs duty exemption certificate to the successful bidder who shall supply goods.	
12.0	Force Majeure:	
12.1.	The supplier shall not be liable for forfeiture of his/her performance security, liquidated damages or termination for default, if and to the extent that, it is the delay in performance or other failure to perform all obligations under the contract due to the result of an event of Force Majeure.	
12.2	For purposes of the above clause, " <i>Force Majeure</i> " means an event beyond the control of the supplier and not involving the supplier's fault or negligence. Such events may include, but are not restricted to, acts to IIT Madras either in its sovereign or contractual capacity, wars or revolutions, fires, floods,	

	epidemics, quarantine restrictions and freight embargos.	
12.3	If a Force Majeure situation arises, the supplier shall promptly notify IIT Madras in writing of such condition and the cause thereof. Unless otherwise directed by IIT Madras in writing, the supplier shall continue to perform his/her obligations under the contract as far as is reasonably practical, and shall seek all reasonable alternative means for performance not prevented by the Force Majeure event.	

AUTHORISATION FORM

To: [Name of Purchaser]

WHEREAS [name of the Manufacturer] who are established and reputable manufacturers of [name and or description of the Goods] having factories at [address of factory]

do hereby authorize [name and address of Agents] to submit a bid, and subsequently negotiate and sign the contract with you against Tender No. [Reference of the Invitation to bid] for the above goods manufactured by us.

We hereby extend our full guarantee and warranty for the goods offered for supply by the above firm against this Invitation for bids.

[Signature for and on behalf of Manufacturer]

Note: The letter of authority shall be on the letterhead of the manufacturer.

BID FORM

Tender No:“FOR TURNKEY PROJECT (INCLUDING SUPPLY, INSTALLATION, TESTING AND COMMISSIONING) FOR TEACHING ENDS AT 213 LOCATIONS ACROSS INDIA”

To: The Special Officer, Project Purchase
Purchase Section
Industrial Consultancy and Sponsored Research
Indian Institute of Technology Madras
Chennai 600036, Tamil Nadu, India

Gentlemen and/or Ladies:

Having examined the bidding documents including addenda's if any, the receipt of which is hereby duly acknowledged, we, the undersigned, offer for **TURNKEY PROJECT (INCLUDING SUPPLY, INSTALLATION, TESTING AND COMMISSIONING) FOR TEACHING ENDS AT 213 LOCATIONS ACROSS INDIA** in conformity with the said bidding documents for the sum of (total bid amount in figure: _____)

In Words: (_____)

or ,such other sums as may be ascertained in accordance with the schedule of prices attached herewith and made part of this bid.

We undertake, if our bid is accepted, to complete delivery of all the items specified in the contract **within (_____) days calculated from the date of receipt of order placement**

If our bid is accepted we will obtain the guarantee of a bank in a sum not exceeding **five (5)% of the contract sum for the due performance of the contract.**

Our bid is **valid up to _____, 2014** and it shall remain binding upon us and may be accepted at any time before the expiration of this validity.

Until a formal contract is prepared and executed, this bid, together with your written acceptance thereof in your notification of award shall constitute a binding contract between us.

We understand that you are not bound to accept the lowest or any bid you may receive.

Dated: this day of 2014

Signature _____

Name:

duly authorized to sign
the bid for and on behalf of
(In the capacity of), seal:

Note: This bid form should be duly filled, signed and dated and sealed. Bid form not duly filled will not be considered for evaluation.

BID SECURITY FORM

Whereas [name of the bidder] (hereinafter called "the bidder") has submitted a bid dated [date of submission of list] **"FOR TURNKEY PROJECT (INCLUDING SUPPLY, INSTALLATION, TESTING AND COMMISSIONING) FOR TEACHING ENDS AT 213 LOCATIONS ACROSS INDIA"** (hereinafter called "the bid").

Know all people by these presents that we [name of bank] of [name of country], having our registered office at [address of bank] (hereinafter called "the bank"), are bound unto **Indian Institute of Technology, Madras, (hereinafter called "the purchaser")** in the sum of for which payment well and truly to be made to the said purchaser, the bank binds itself, its successors, and assigns by these presents .Sealed with the common seal of the said bank this _____ day of _____ 2014.

THE CONDITIONS of this obligation are:

1. If the bidder withdraws the bid during the period of bid validity specified by bidder on the bid Form;
OR
2. If the bidder, having been notified of the acceptance of the bid by the purchaser during the period of bid validity:
 - (a) Fails or refuses to execute the contract form, if required; or
 - (b) Fails or refuses to furnish the Performance Security, in accordance with the Instructions to bidder:

We undertake to pay to the purchaser up to the above amount upon receipt of the first written demand, without the purchaser having to substantiate the demand, provided that in the demand the purchaser will note that the amount claimed and is due owing to the occurrence of one or both of the two conditions, specifying the occurred condition or conditions.

This guarantee will remain in force up to _____, 2014, and any demand in respect thereof should reach the bank not later than the above date.

[Signature of the Bank]

Note: This bid security shall be issued by a reputed commercial bank in India. The bid security issued by a finance company shall be rejected.

PERFORMANCE SECURITY FORM

To: **Indian Institute of Technology, Madras**

WHEREAS [Name of Supplier] (hereinafter called "the Supplier") has undertaken, in pursuance of Contract No. [reference] number of the Contract] dated _____ 2014 _____ to **"FOR TURNKEY PROJECT (INCLUDING SUPPLY, INSTALLATION, TESTING AND COMMISSIONING) FOR TEACHING ENDS AT 213 LOCATIONS ACROSS INDIA"** hereinafter called " the contract").

And whereas it has been stipulated by you in the said contract that the supplier shall furnish you with a bank guarantee by a reputable bank for the sum specified therein as security for compliance with the supplier's performance obligations in accordance with the contract.

And whereas we have agreed to give the supplier a guarantee:

Therefore we hereby affirm that we are guarantors and responsible to you, on behalf of the supplier, up to a total of [amount of the Guarantee in words and figures], and we undertake to pay you, upon your first written demand declaring the supplier to be in default under the contract and without cavil or argument, any sum or sums within the limits of [amount of guarantee] as aforesaid, without your needing to prove or to show grounds or reasons for your demand or the sum specified therein.

This guarantee is valid until the _____ day of _____ 2014.

Signature and seal of the guarantors

[Date]

[Address]

Note: This Performance security shall be issued by the reputed commercial bank located in India. The Performance security issued by finance company shall be rejected.

PRICE SCHEDULE

S.No	Make & Model	Description	Qty for 1 TE*	Qty for <u>213</u> TE*	Unit Price (FOB, In USD)	Total Price (FOB, In USD)	Unit Price (for items to be procured in India) (in INR)	Total Price (for items to be procured in India) (in INR)	Tax (on items to be procured in India) (in %)

*TE: Teaching End

(Technical Section)

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SECTION I: SCHEDULE OF REQUIREMENT

(A) Deliverables of Audio Video Production Equipment at 213 Teaching Ends

S.No.	Item	Quantity for 1 Teaching End	Qty for 213 Teaching End	Details Ref. Page no.	Quote per unit
1	Integrated Broadcast (PTZ) Camera with Remote Control	3	639	38	
2	Production Console / Video Switcher 8 Channel	1	213	38	
3	Audio Mixer.	1	213	39	
4	46" Flat Panel Display Device (LCD/ LED)	1	213	39	
5	42"LCD/LED for Teacher/Studio Flat Panel Display Device LCD/LED	1	213	40	
6	Microphones			40	
6(a)	UHF Wireless Lavalier / Collar diversity microphone with minimum of 8 selectable channels as per Indian region	2	426	40	
6 (b)	Wired Lapel Microphone with standard accessories	2	426	40	
6 (c)	UHF, Wireless Handheld diversity microphone with metal casing with minimum 8 selectable channels as per Indian region.	2	426	40	
7(a)	Interactive Touch Screen Panel with required computer, Pen and software	1	213	41	
7(b)	22" Tablet Interactive PC podium mounted with Pen	1	213	41	
8	GFX and Scroll machine (Hardware and Software)			41	
8(a)	CG Software	1	213	41	
8 (b)	Hardware	1	213	42	
9	Server Based AV Non-Linear Editing			42	
9(a)	Editing Software for 3 NLE"s	1	213	42	
9(b)	Editing Units Hardware.	3	639	42	
9(c)	Network Attached Storage	1	213	42	
10	Laptops 2 Nos PCs 2 Nos.	1 Lot	426 426	43	
11.	8 Port LAN Switch.	2	426		
12	Encoder AVC	1	213	44	
13	IP to Fiber Managed Switch	1	213	45	
14	Telephone Hybrid, SMS, e-Mail etc	2 Set	426	45	
15	Active Speaker pair (2 way) with Wall Mount Bracket * (Modified)	2 sets	426	46	
16	Headphones	3	639	46	
17	Tel Land lines 2 Toll Free + 1 Land Line & Broadband Internet (2) to be sought with the assistance from Institute.	1 Set	213 sets		

18	Cool Lights	1 set	213 sets	46	
19	UPS	1 set	213 sets	46	
20	DTH STB	2 set	426 Sets	47	
21	Intercom System.	1 set	213 sets	47	
22	Tally Light	1 set	213 Sets		

(B) Technical Programme Integrator at each of the 213 Teaching End:

S.No.	Item	Quantity
1	Overall project management at each TE.	One Lot at each TE
2	Prepare plan for modification of existing rooms provided by the Institute for conversion to Media Studio (Teaching End) and IT enabled classrooms at each of the TE and seek approval of the Head of the Institute for work estimate & execution as per standard rates quoted in the Tender and per parameters provided.	
3	Get the rooms functional as Teaching End, as per standard requirements and get Modification of Civil, Electrical, Acoustic Treatment, Air conditioning, Fire and Smoke detectors, alarm, extinguishers etc., within rates quoted in the Tender.	
4	Provide Installation Materials and Installation of equipment.	
5	System Integration: - To follow System Design, Drawing, Block Schematic, Lay out Plan (LOP) etc. for equipments and power supply system.	
6	Testing and commissioning of the TE assigned.	
7.	Test recording of 10 Hours of content.	
8.	Training - Induction Training for operation and maintenance staff.	
9	Completion Certificate of Equipment supplied by the Supplier and its successful working is to be duly signed by the Supplier, Head of the Institute and the „Service Management Provider“.	
10.	After having successfully tested, the setup is to be handed over to the Head of the Institute and the set-up run by the Services Management Provider.	
I	Installation Material for Teaching End Equipment	
1	Installation Material – Racks, Cables and Connectors, Ceiling mount Telescopic rod / suspension arrangement for Pan Tilt camera along with required mounting plates. Brand names for cables, connectors, power cords etc., are: Belden, Fischer, Canaray (cables), Nutric, Fischer, Canaray (connectors), or equivalent in specification and performance. Rod should be of extendable up to 6 feet. Also conduits / harnessing for all wires and cables. Rack mounted power distribution boards with indicator, fuse, switch and sockets and also spare sockets.	One Lot at each TE
II	Technical Furniture at each of the Teaching End	

1	Aesthetically Designed Technical Furniture, Fixtures for Studio & Control Room: 1 x Monitoring Wall, 1x PCR Console (for Audio and Video Mixers/PTZ Control/1x Recording Console etc. including Chairs for Operators, Teacher & <u>20</u> Students (quote for one chair each). <u>Venetian vertical blinds of about 12" x 8" and curtains 12" x 8" for backdrops.</u>	One Lot at each TE
III	Civil and Electrical works At Each of the Teaching End.	
1.	<p>There may be some Civil and Electric works involved at the site. System Integrator may specify the following which will be chargeable on per unit basis as per the site condition prevailing at the location.</p> <p>Civil modifications</p> <ol style="list-style-type: none"> Necessary partitioning and paneling within Room False ceiling per square feet Flooring Vinyl per square feet Acoustic treatment on wall Painting and finishing Air-Conditioning along with the installation and commissioning, Should quote the prices for various cooling capacities A/C such as 1.5T, 1.7 T & 2T, etc. Split units. 5 star energy efficient A/C from reputed companies will only be acceptable with two years warranty. The A/C supplied should comply to studio noise level requirements. Electrical Items as per the list mentioned in the Technical Specification. <ol style="list-style-type: none"> Fire detector, alarm, fire extinguishers etc in each room and as per fire safety norms. <p>The space provided by the host Institute is to be Converted to a Teaching End (Studio) by the Tenderer, out of the quoted items in his tender, so to achieve the following parameters:</p> <ol style="list-style-type: none"> Reverberation time (RT60) : ≤ 0.4 seconds Noise Criteria : ≤ 30 db Door/windows isolation : ≥ 50 db Temperature : 18-25 degree Celsius 	One lot at each TE
IV	Installation , Commissioning and training charges	IV

(C) Deliverables at Teleport End:

S.No.	Item	Quantity
1	<p>Data Delivery Frame work Core server with Server Management S/w along with data delivery server H/w with storage of 8TB, receive system for store & forward Content (at Teleport End) software.</p> <p>High transfer speed, reliability and security to network mesh topologies with parallel transfer capabilities, and intuitive IM-style client interface, comprehensive management tools, and robust architecture.</p> <p>Should support full mesh topology connections between any number of nodes in the mesh, with each connection supporting multiple parallel data transfers and simultaneous send/receive. Each individual transfer should be encrypted, ensuring safe and secure transfers with high performance and reliability for every node and user in the mesh. Network transfer mesh should be ideal for content owners delivering media or data to multiple redistribution points, offering superior remote contribution and collaboration efficiency.</p>	2

- (D) **Deliverables at MHRD/Institute End:** Qty One System. Details at page No. 48
Reception & Monitoring of 55 Channel DTH receptions on 5X46"Multiviewer (including five buffer channel)

SITC for DTH Reception and Remote Monitoring Setup of Uplinked DTH Channel. The System should include:

- I. Reception of 55 MHRD DTH Channels
- II. Monitoring wall with Multiviewer on 5 Numbers of 46 " LCD for 55 Channels.
- III. Closed AV monitoring of selected DTH channel.
- IV. Installation Material for the Monitoring Setup.

(E) **Deliverables by Services Management Provider (SMP).**

The SMP should have experience in providing Managed Services of similar nature and should have procured at least two Projects worth of Rs.25 Crores in past three years.

Scope:

Quote rates, to provide following services initially for three years and for subsequent years. MHRD and IIT Madras will reserve the right to apply pro rata for less than two years initially.

1. Managed Services include, for each day, engagement of well qualified, professional personal to perform jobs defined as under and numbering: 18 man-hours of professional engineering responsibilities, 18 man-hours of editing/assisting faculty for multimedia production, 9 man hours of production/management of the centre and 9 man-hours of attendant duties. The Agency shall only engage proportionate staffs who have worked on similar equipment for at least three years.

2. DURATION OF OPERATION: The system installed at each TE is required to operate uninterrupted 9 hrs x 7 days throughout the year. The SMP is therefore required to depute site staff to cater to the requirement of 9 hours manning per day.

3. SCHEDULE OF WORK: Smooth and uninterrupted operation of the teaching end, for 9 hours on all days in a year, for (i) live content telecast, (ii) live interaction, (iii) provide assistance to Subject matter Experts (SMEs) in development of graphics, animations etc. that may be used during live telecast and (iv) development of e-content each day from the transmitted media of the day and other material provided by the SME and packaging it into the Template provided by IIT Madras. The SMP is expected to provide the services as under:

3.1 The SMP Should depute experienced service personnel on-site, on the basis of 9 hrs x 7 days for troubleshooting and assisting in operation of various elements of production system such as vision mixing, audio mixing, recording and encoding, storing and forwarding of file etc..

3.2 The service personnel should be well versed with the overall system which includes multiple disciplines. The SMP will have to provide the minimum details/qualifications of such staff including their work experience for consideration by MHRD and may have to provide multiple site engineers in one shift in case of personnel not being multitasking.

3.3 The SMP may be required to depute additional engineer(s) or other staff during special events and unforeseen events/activities.

3.4 The SMP will provide daily, weekly, monthly and other periodical maintenance details for approval. The SMP will carry out these maintenance schedules strictly under the supervision of

in-charge without affecting the production and other activities and submit the details of such maintenance works to the authorized representative of TE site within 24 hours.

3.5 The SMP will maintain records and log books of various works done and maintenance schedule followed. The SMP will coordinate these activities with the on-site in-charge as identified by the head of the Institute (TE). The SMP will maintain the stock register of critical and essential spares of all equipment on-site to keep the downtime to minimum.

3.6 The SMP will be responsible for all transport and forwarding charges for bringing the maintenance equipment or spare parts from the dealer to the office, and for taking the defective equipment to the dealer for special repairs and for bringing them back to the TE.

3.7 The SMP will arrange all tools and testing equipment for maintaining the system in perfect working condition.

3.8 The SMP will take care of safety of his /her staff while they are working on any system and will provide them all safety gadgets. The production system will have to be installed in a protected and restricted area. The SMP shall therefore supply bio-data of all staff and provide validated identity cards as well as entry passes for all having access to the TE.

3.9 It is the responsibility of the SMP to ensure the personnel engaged at each TE reach in time and work as expected and do not leave before the duty allocation period.

3.10 The personnel engaged at each of the TE being the responsibility of the SMP, it shall be the responsibility of the SMP to provide all facilities to each of the personnel engaged including that of ESI, bonus, insurance, etc. at each of the TE.

3.11 The SMP and his/her staff shall observe security and other rules as per the security officer in-charge for permission of entry within TE. The log books and records maintained as mentioned above shall be subject to the scrutiny of the department and shall be the property of TE.

3.12 Proper records of complaint received and attended shall be maintained by the SMP. All complaints are to be attended promptly and any delay shall be viewed as lapse on the part of the SMP and a penalty will be levied as per the clause.

3.13 Conduct Training Workshops regularly for the staff.

SECTION II: DETAILED TECHNICAL SPECIFICATIONS

(A) Technical specifications (as under or better) of equipment to be delivered at each of the 213 Teaching End:

1. Integrated Broadcast (PTZ) Camera with Remote Control:

Integrated (PTZ) camera. wall / ceiling mount, remote operations.	
Imagesensors:	Sensor size: 1/3" & above, 3-•-CCD/3-•-CMOS/ <u>3-•-MOS</u> , effective pixels: 1920 x 1080
Lens:	14x Optical zoom or better Minimum focal length: 6 mm or less
Focussystem:	Auto / Manual
Horizontal resolution:	1000 TV Lines
SNR:	50dB
Outputformat:	1080/50i,576/50i
Pan/Tiltoperation speed:	Up to 60°/sec.
Pan range / angle:	±170° or better
Tilting range:	-•-30° to 90°
Presetpositions:	More than 10
Control interface:	<u>Compatible with the control panel below</u>
Video outputs:	HD-•-SDI and SD-•-SDI, analog composite
Synchronization:	Internal/External
Power requirements:	To operate at 230 V ±10%, 50 Hz AC (with or without power adaptor)
Remote control panel for camera	
Protocol and interface:	Compatible with camera
Adjustment functions in control panel :	Pan/Tilt, zoom, focus, iris, gain, pedestal, shutter, white balance, pan/tilt & zoom on joy stick(s), focus knobs / slider etc.
	<u>Wall /Ceiling / pole with adjustable length up to 6 feet</u>
Presetmemory:	More than 10.
TALLY and GPI:	Tally input x 5 channels (compatible with vision mixer provided) GPI input & output x 4 channels (compatible with vision mix provided).
Powersupply:	To operate at 230 V ±10%, 50 Hz AC.

2. Production console / Video switcher:

Production console / Video switcher 8 channel	
Video format:	HD: 1080/50i SD: 576/50i
Video / signal processing:	4: 2: 2

Video inputs:	Should have minimum following Inputs: (to match with camera & other video sources provided) 4 x BNC HD/SD – SDI, 4 x DVI / HDMI
Video outputs:	Should have minimum following Outputs 1 x BNC HD/SD–SDI. 1X DVI /HDMI
Multiviewer output:	1X DVI /HDMI Minimum 1 set with up to 10 windows in various combinations and sizes, connecting through DVI/ HDMI/SDI (compatible with multiviewer LCD monitor)
Frame Sync/Scaler inputs:	All inputs should be frame synchronized
Reference/Sync in	Yes
Number of Keyers:	Minimum 1 chroma/ luma Keyer Selectable
Transition/DVE	Cut, mix, wipe etc.
Number of picture-in-picture:	1 or more.
Control/ Tally / GPI Interface	Compatible with camera & control unit
Control surface	Hardware Type
Power supply	To operate at 230 V ±10%, 50 Hz AC.

3. Audio mixer:

Audio Mixer (Table top)	
Input channels:	8 Mono channels with minimum 6 Mic/Line selectable inputs.
I/O interface:	XLR / Phono, (balanced/un-balanced).
Input sensitivity	Mic -60 db or better , Line 0 db
Audio frequency response	≤ 20 Hz - ≥ 20 KHz
Total harmonic distortion & noise	≤ 0.1 %
S/N ratio	Better than 100 dB
EQ bands:	3 (HF, MF & LF)
Variable send (aux) buses:	Minimum 2
Returns:	Minimum 2
Other features:	<ul style="list-style-type: none"> • True, professional +48V phantom power (min 2 I/P) for condenser microphones. • Linear / Slider fader. • RCA / Phono playback inputs and record outputs. • Signal present and peak LEDs on all input channels. • Mute and PFL on all input channels. • Output metering.

4. 46" flat panel display device (LCD/LED) For multi-viewer output of vision mixer

46" Flat Panel Display Device (LCD/ LED)	
Visible screen size (diagonal):	46 +/- 2 inches
Panel:	LCD/LED

HDTV display capability:	1080i (Full HD), 576i
Display resolution:	1,920 (W) x 1,080 (H)
Multiviewer video input:	1 compatible with multi-viewer out from V mixer.
Other video inputs:	USB, HDMI, composite, component video input, PC input.
Power supply:	To operate at 230 V \pm 10%, 50 Hz AC.

5. 42" picture display panel for teacher/studio

42" LCD/LED for teacher/studio flat panel display device LCD/LED	
Visible screen size (diagonal):	42" +/- 1"
Panel:	LCD/ LED
HDTV display capability:	1080i (Full HD), 576i
Display resolution:	1,920 (W) x 1,080 (H)
Video inputs:	USB, composite, component video input, HDMI, PC input, at least one compatible with vision mixer prog., output
Power supply:	To operate at 230 V \pm 10%, 50 Hz AC.

6. Microphones:

6(a)

UHF wireless Lavalier / collar diversity microphone with minimum of 8 selectable channels as per Indian region	
THD	\leq 1 %
Signal/Noise ratio	\geq 100 dB
Rf output	\geq 30 mW
Battery life (operating time)	Min. 6 hours (2AA Batteries)
Polar pattern	Supercardioid / Hypercardioid / Cardioid
Mic type	Electret /Condenser / permanent Polarised
Frequency range	\leq 100 Hz to \geq 15 kHz
Interface	XLR (Balanced)

6(b)

Wired lapel microphone with standard accessories
Microphone Type : Electret /Condenser/permanent polarised
Frequency response: 100-15,000Hz or better
Pattern: Omni-directional
Sensitivity: -43dB (7mV) at 1KHz. or better
Impedance: Less than 600 Ohm.
Max SPL input level: 100dB SPL (1kHz at 1% T.H.D.) or more
Power: Phantom supply.
Interface: XLR

6(c)

UHF, wireless handheld diversity microphone with metal casing with minimum 8 selectable channels as per Indian region.	
THD	≤ 1%
signal/Noise ratio	≥ 100 dB
Battery life (operating time)	Min. 6 hours (2AA Batteries)
RF output	≥ 20 mW
Polar pattern	Supercardioid / Hypercardioid / Cardioid
Frequency range	≤ 70 Hz and ≥ 15 kHz
Interface	XLR ; Balanced

7. Interactive touch screen panel with required computer, pen and software

7(a)

Interactive touch screen panel with required computer, pen and software	
LCD Panel:	60 – inch widescreen <u>+/- 2 inches</u>
Max resolution:	1920 x 1080
Brightness:	350 cd/m ² or more
Contrast ratio:	3,000:1 or better
Response time:	6 ms <u>or better</u>
PC connection port for touch screen:	USB (1.1 standard) x 1
Driver:	OS: Windows / Linux
Touch pen button:	2 function buttons
Video input:	<u>compatible with the computer</u>
Video outputs:	<u>Compatible with the computer</u>
Other I/O ports	Audio I/O, LAN Port
Power supply:	To operate at 230 V ±10%, 50 Hz AC.
Please note:	
1. The interactive panel system should be provided with: a computer having at least one HDMI output port, one DVI-D output port, two USB ports and a trolley stand.	
2. <u>PC should be Windows 64 bit with MS Office suite latest version installed.</u>	
3. Any digital peripheral / glues / distribution amplifier required with the system should be quoted as per the offered workflow design.	

7(b)

22 +/- 2" tablet interactive PC podium mounted with pen
<ul style="list-style-type: none"> • Data port: USB • Native resolution: 1920 x 1080 • Pressure levels: More than 200 • Contrast ratio: 700:1 or better. • Video I/O: VGA & DVI • Stand adjustability: 15° - 72° incline • Completely flat textured, anti-glare surface.

8. GFX and scroll machine (hardware and software):

8 (a) Software
<ul style="list-style-type: none"> • HD/SD CG • To work on the fly or run programmed events

<ul style="list-style-type: none"> • Support BMP, JPG, GIF, PCX, TIF and TGA image formats • 16,777,216 colors with 256 levels of transparency (24-bit color with 8-bit alpha). • Color adjustment through RGB or HLS levels. • Advanced color gradients - create smooth gradients between any 2 colors in the characters, edges, shadows, and shapes. • Dynamic logos - Up to 16 full-color logos can fine-positioned, overlapped, sized, etc. just like characters. • Supports single- or multi-line (up to 1000 lines) titling text on a single page. Multiple pages in one document. • 1000 layers - text, logos, and shapes can be placed on multiple layers, each independent of the others. Layers can be named. • Features analogue & digital clocks and language spell checker. • Built-in downstream keyer • Dual channel with HD, SD and key outputs.
8 (b) Hardware
<ul style="list-style-type: none"> • Dual, 2 x Intel Xeon E5-2609 2.40Ghz minimum 10MB 1066 4C 2nd CPU • 16GB DDR3-1600 (8x2GB) 2CPU RAM • 1TB 7200 RPM SATA 1st Hard Drive • Microsoft Windows 7 Ultimate or later • 16X Super multi DVDRW • NVIDIA Quadro 2000 1GB GFX special • 21" monitor, keyboard and mouse • CG compatible capture card need to be included in the system.

9. Server based AV non-linear editing

9 (a) Editing software
<ul style="list-style-type: none"> • Integrated file based broadcast quality editing, recorder, content generation, content streaming in HD/SD formats for multiple inputs and multiple outputs under a single platform Mac / Windows compatible.
9 (b) Hardware
<ul style="list-style-type: none"> • Dual, 2 x Intel Xeon, 2.4 GHz or better, 8/10/12 cores per processor. • Minimum of 16GB DDR3-1600 (8x2GB) per CPU; 2CPU RAM • Minimum of 4 TB 7200 RPM SATA, provision for additional Internal HDD • A suitable 64bit OS • 16X Super Multi DVDRW • HD Graphics & accelerator card with 4 GB RAM. With DVI-I, DVI-D, DP, 3pin stereo interface • 21-26" LCD/LED monitor two, • I/O Ports; FireWire, 3.0 USB, LAN (1GigE). • Keyboard and mouse. • HD/SD audio-video capture, record and output: Video inputs & output: HD-SDI / SD-SDI, Analog, HDMI. Audio inputs & outputs: AES & analog
9 (c) Network attached storage
<ul style="list-style-type: none"> • 12-bay rack-mountable unified network storage with 10 Gigabit networking • Redundant power supplies, built-in replication, integrated backup, and offsite options for data protection • Cross-platform support for Windows®, Macintosh® and UNIX®/Linux systems • Support for both database and server virtualization applications

- Setup wizard and easy browser-based interface

Technical specifications.

- Intel Xeon multi-core processor
- Minimum 6 GB ECC memory
- 12 Serial ATA channels
- Two 10/100/1000 Ethernet ports
- Minimum 2 USB 2.0 / 3.0 ports.
- Multiple volume support for RAID 0, 1, 5,6
- Hotswap disks.
- 12-24 TB storage;

Network security modes

- Shares
- Local users
- Active directory/Windows domain support
- Encrypted network logins
- Secure Sockets Layer (SSL)
- CHAP authentication for iSCSI LUN

Network Services

- DHCP or static IP address assignment
- DHCP server
- WINS server

Power Input:

- 230VAC, +_10% 50Hz

Optional spare parts

- Hot swappable SATA disk tray

10. Laptop and PC (total 2 PCs & two laptops)

Laptop and PC

- Processor: Intel® Core™ i7 processor or better, 2.40 GHz or more.
- Operating system: Windows 64bit.
- Display: 14.0" or 15.0" (For PC, 21" HD Display HDMI/DVI, Keyboard & mouse)
- Memory: 6GB (4GB x1 for the laptop) DDR3 1600Mhz or more.
- Hard drive: 500GB 5400RPM for laptop (1TB or more, 7200 RPM for PC), SATA hard drive.
- Graphic accelerator for dual monitors, 1GB or more memory,
- MS Office suite latest version
- Optical drive
- Wi-Fi, LAN, bluetooth.
- Built-in speakers for laptop and ampli-speakers for the PCs
- Ports: network connector RJ45, VGA, HDMI, (3) USB 2.0/3.0, headphone jack, microphone jack, SD card reader.
- Battery capacity 4 hours or more continuous use (for the laptops)
- To operate at 230 V ±10%, 50 Hz AC.

12. Encoder AVC

12 Encoder HD/SD

An interface between audio video to feed VPN of NKN/NMEICT.

Features

:

- Simultaneous outputs via IP, DVB-ASI.
- Audio and video test pattern generator.
- Management via embedded web server and local front panel.

Technical Specifications

- MPEG-4 AVC HD/SD encoding.
- Video compression and bitrates:
 - SD MPEG-4 AVC MP@L3, 0.5-10 Mbps
 - HD MPEG-4 AVC HP@L4 or MP@L4, 1-20 Mbps or better for both the options
- HD Resolutions:
 - 1080i x 1920, 1440, 1280, 960 pixels
- HD Formats:
 - 1080i: 25 Hz
- SD Resolutions:
 - Horizontal: 720, 704, 640, 544, 352 pixels
 - Vertical: 576, 288 lines (PAL)
- MPEG-4 AVC Video Processing:
 - De-blocking filter
- Number of audio channels: minimum 2 channels analog
- Audio formats:
- MPEG-1 layer II, digital (AC-3) MPEG-4 HE-AAC,
- Sampling frequencies:
 - 32 kHz, 44.1 kHz, 48 kHz
- Video inputs:
 - SD-SDI (SMPTE 259M),
 - HD-SDI (SMPTE 292M)
 - Video loop-through
- Audio Inputs :
 - Minimum 2 balanced XLR inputs.
- Outputs:
 - DVB-ASI
 - IP output: ASI over IP, Dual GbE IP output, RJ-45, auto-negotiation, UDP/RTP, TOS, TTL configurable values
 - To operate at 230 V $\pm 10\%$, 50 Hz AC.

13. IP to fibre managed switch: Bidder should quote an IP to fibre managed switch which can convert the IP signal from the encoder to the fibre. The fibre out of the switch will be given as an input to the National Knowledge Network (NKN) fibre connectivity. Some of the basic features of the switch are:

1. **Supported data transfer rates:** Upto 1 Gb/s
2. **Switch type:** Managed
3. **Multicast support:** Required
4. **Web based management:** Required.

14. Telephone hybrid mixer and handling of SMS's, e-mails, Skype & social media networks

(i) Telephone hybrid
<p>Features</p> <ul style="list-style-type: none"> • Digital echo canceller, AGC & expander for each channel • Pretalk function: Up to four handsets or headsets can be connected • PC software with screening function. • Keypad for remote operation without PC software • Analog and digital audio interfaces (configurable) <p>Technical specifications:</p> <ul style="list-style-type: none"> • Line interfaces : 4 x POTS, LAN-1 • Pre-talk/audio interfaces: 4 x handset/headset • Audio input & output : 2 channel analog; 2 channel digital • Frequency response : $\geq 300\text{Hz} \dots 3000\text{Hz}$ • Dialing devices : Front keypad, PC, external keypad, telephone • Power supply: 230 V $\pm 10\%$, 50 Hz AC. <p>Accessories:</p> <ul style="list-style-type: none"> • External keyboard/keypad <p>Options:</p> <ul style="list-style-type: none"> • GSM adapter (for future expandability) • Extension for voice-over-IP hybrid (future expandability) <p>Studio inputs: 1 Studio outputs: 2 Program-on-hold: 1</p>

(ii) Handling of SMS's, e-mails, Skype & Social Media Networks
<p>The Bidder has to provide necessary equipment, hardware and software solution(s) to:</p> <ol style="list-style-type: none"> (i) Receive & interact video conferencing calls from Viewers using Skype, A-View (developed under NMEICT & shall be provided without any charge), etc.; forward it to the teacher's console and integrate it with the vision mixer & audio mixer to broadcast the interaction live. (ii) Receive SMS's from the viewers, forward it to the teacher's console and integrate it with the vision mixer to broadcast the interaction. (iii) Receive e-mails from the viewers, forward it to the teacher's console and integrate it with the vision mixer to broadcast the interaction. (iv) Receive social media messages, forward it to the teacher's console and integrate it with the vision mixer to broadcast the messages.

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15.

Active speaker (2 way) with wall-mount bracket	
Type	Active
Low/mid driver dimensions:	6" or more
Tweeter dimensions (mm)	25 mm to 50 mm
RMS: (Both LF + HF)	≥ 40 watt
Frequency response	≤85 Hz - ≥ 15000 Hz
Max. SPL	≥ 100 dB
Protection circuits:	Overload
Controls:	Treble, volume, mic gain, bass, mains switch (on/off)
Line inputs:	Minimum 1
Line inputs connectors:	XLR & 6.3 mm Jack
Line outputs:	Minimum 1
Line outputs connectors:	6.3 mm Jack & XLR
Operating voltage:	230 V A C ± 10% , 50 Hz
Cabinet material:	ABS/ Polypropylene / MDF

16.

Headphones	
• Type of transducer	Dynamic
• Nominal impedance:	≤ 65 Ohms
• Sound pressure level (SPL):	≥ 100 dB
• Ear coupling:	Circumaural
• Jack plug:	3,5 / 6,3 mm stereo
• Connection cable:	Coiled cable (> 1m)
• Frequency response (headphones):	≤40 Hz - ≥ 15 KHz
• Power handling capability	≥ 500 mw

18. Cool Lights: Should be quoted as per the design. Basic layout plan would be provided to the prospective buyers. All accessories and grid need to be quoted with the light.

Recommended down lighter LEDs 18watt/ 24 watt with 6500°K minimum 250 lux required for students and for the teacher 50 watt down lighters with 6500°K, 450 lux required. The efficiency of the lights should be more than 78 %. Frosted glass filters should be used on the lights.

19. UPS: Approved brands company ISO 9001. Bidder should quote the UPS with 30 minutes backup. Sealed maintenance free VRLA Battery. If more wattage UPS is required, bidder should justify the same by submitting the Power Load requirement of the equipment. Some of the features required in UPS are:

- Single Phase IN and Single Phase OUT
- Wattage:5 KVA
- Type:(On-line) IGBT
- Input power factor: ≥ 0.98
- Output power factor: 0.8 or better
- Input power supply: 160 V - 270 V 50HzAC.

- Output 230 V \pm 1%, 50 Hz AC.

20. DTH STB - Bidder should quote branded STB for free-to-air reception along with antenna, LNBC and 21" LCD/LED TV.

- Input RF freq band: Ku
- DVB Std.: DVB-S2-QPSK, 8PSK
- Video coding: MPEG-4 Part 10 (AVC)
- Symbol rate: Upto 30 Msps

21 (a) Intercom system (IP network):

Bidder should quote Talk-back on VoIP with following features:

- It should connect upto 220 Teaching ends and the Earth Station through VoIP.
- The central system should be expandable beyond 250 locations and have redundancy offering uninterrupted service.
- Provides two-way, full -duplex voice communications over an IP network
- The user station should have the configurable Press to talk buttons for communication with other locations (TEs)
- User station should be able to access all the locations if required
- Integrated speaker and microphone with option of using either headset or microphone

21 (b) Studio Intercom System

The system shall be a communication channel between programme producer at the control room and the teacher/presenter and floor manager in the studio. The communication system should have the following features:

- Provide at least two channels of two-way communication.
- On one channel, the producer should be able to communicate with Floor manager in Studio through belt-pack and earphone/headphone.
- On the other channel the producer/phone operator should be able to communicate with teacher/presenter through headphone and/or a compact ampli-speaker mounted under teacher's table.

Technical specifications for deliverables at DTH end:

1. Data delivery framework core server with server management S/w along with data delivery H/w with 8TB storage, receive system for store & forward content delivery to CDN.

S.No	Data Delivery Frame
1	<p>The data delivery framework provides near-wire speed transfer of large media and data files between contribution, collaboration and distribution points. Includes management server software, licensed server software, 2 engines, includes 1st year full maintenance.</p> <p>Data delivery hardware 2 Nos. x engine hardware with 12TB storage capacity</p>

(C) Technical specifications for deliverables by service provider (specifications common for both teaching end and DTH):

- 1. Installation material:** All installation materials including racks, power cables, interconnection cables, connectors and other accessories (including nuts, bolts, screws etc.) required for installation of the complete system at all TE shall be provided by the bidder.

Completeness of the system will be responsibility of the bidder. If any material is found short during installation because of which equipment is inoperable, it will be responsibility of the bidder to complete the system.

Completion certificate will be issued on the account of the operating complete system.

- 2. System Integrator (SI) should submit the detailed Drawing / Specifications of the Technical Furniture for the approval.**

Civil, Electrical, Acoustical & Air-conditioning works At Each of the Teaching End.				
S.No.	Description	Unit	Qty	Price
1	Civil Modifications			
1a	Construction of Acoustically treated aesthetically finished Video Recording Room of dimension of minimum 30 feet in length, 25 feet in breadth and 15 feet in height using Brick, concrete, Steel, Paint Acoustic wooden partition for Production Control Room of dimension 20 feet length and 9 feet in breadth with raised basement of 2 feet and vision panel of 4 feet in height and 5 feet in length			
1.1	Site Clearance & Cartage	Lot		
1.2	Brick Wall, 115 mm	Sqm		
1.3	Brick Wall, 230 mm	Sqm		
1.4	Cement Plaster	Sqm		
1.5	POP Puning	Sqm		
1.6	Enamel Paint	Sqm		
1.7	Emulsion Paint	Sqm		
1.8	Two Tone Paint	Sqm		
1.9	Duco Paint	Sqm		
1.10	Spectrum Paint	Sqm		
2	False ceiling per square feet			
2.1	Fire and water retardant Acoustic Board false Ceiling	Sqm		
2.2	Metal Tile Grid Ceiling	Sqm		
2.3	Open Cell Grid Ceiling	Sqm		
3	Flooring Vinyl per square feet			
3.1	Providing & fixing 1.5mm thick PVC flooring both for the studio & PCR	Sqft		
4	Acoustic treatment on wall			
4.1	Provision & fixing of pre fabricated, water resistant and Fire retardant acoustic panels for the walls inside the studio topped with suitable fabric giving an aesthetic finish	Sqft		
5	Sound proof doors & glass windows			

5.1	Acoustic doors of size : door size 4 x7' Provision & fixing of frame and sound proof casement door with multipoint locking system and both side handle with locking arrangement with vision panel for studio main door and control room door	One number		
5.2	Provision & Fixing of Sound Proof Casement Window hermitically sealed with Glass Type 6mm CLT + 12mm AirGap + 6mm CLT with Profile colour as White (Window Size 3'X5')	One number		

3. Electrical items that may be required at teaching end:

S.No.	Description	Unit	Qty	Price
1	Supplying and wiring adopting loop system in existing PVC Conduit /casing capping using copper PVC insulated multi strand 2x1.5Sqmm copper wire without switch, the other end of the wires shall be terminated with sufficient loose length in a wood/PVC round block complete for each outlet.			
1.1	Long point above 6Mtr up to 10Mtr from tapping point to outlet via switch box	Pts	1	
2	Supplying heavy gauge PVC conduit pipe conforming to IS 2509 with suitable size bends, junction boxes, adhesive paste etc., and fixing using inverted wood plugs in case of RCC ceiling and RCC wall stone structure or rawl plugs in case of brick walls and cement plastering damaged portion using heavy gauge saddles at an interval of 300 mm using NF screws Make - Avon Plast, Universal, VIP.			
2.1	20mm dia 2 mm thick.	Mtr	1	
2.2	25mm dia 2 mm thick.	Mtr	1	
3	Supplying and flush mounting powder coated metal box suitable for mounting modular switch plates. The box should be firmly flush mounted after due groove cutting in Brick/Stone/C.C wall			
3.1	1 - 3 Way	No	1	
3.2	4-5 Way	No	1	
3.3	6-8 Way	No	1	
4	Supplying and fixing of modular switch/ socket/stepped electronic fan regulator/ dimmer/telephone socket etc on existing modular switch plate. Make: Anchor Woods/Legrand/ABB			
4.1	6 Amps one way	No	1	
4.2	16 Amps one way switch	No	1	
4.3	6 Amps Bell push with indicator	No	1	
4.4	RJ 45/I.O. Outlet	No	1	
4.5	6 Amps 3 way socket	No	1	
4.6	6/16 Amps universal socket.	No	1	
5	Supplying and drawing each PVC insulated 650/ 1100V multi strand copper grade wire in the conduit (open or concealed system of wiring) Make - Finolex/Anchor/Havells			
5.1	1.0 Sqmm	No	1	
5.2	1.5 Sqmm	No	1	
5.3	2.5 Sqmm	No	1	
5.4	4.0 Sqmm	No	1	

5.5	6.0 Sqmm	No	1	
6	Supplying 25mm dia 2 mm thick PVC/GI flexible conduit pipe 25mm dia fixing on surface over inverted tapered wooden plugs or phill plugs or rawl plugs and clamped using heavy gauge saddles at an interval of 300mm using NF screws and the either end of the pipe terminated completely.	Mtr	1	
7.1	Supplying of 2x18 Watts recessed mount down light luminary made out of single piece powder coated CRCA sheet steel accommodating all electrical accessories like VPIT 18W copper ballast suitable to operate on 230V 50Hz AC supply with 18Watts PLL-compact fluorescent lamp, pre-wired up to terminal block with super aluminum textured reflector & P5 paralite louvers with spring loaded dropped glass complete. Make: Philips/GE/Thorn/Wipro	No	1	
7.2	Supplying of 3x36Watts recessed/surface mount aesthetic 2'x2' modular luminaries made out of single piece powder coated CRCA sheet steel accommodating all electrical accessories like VPIT 36W copper ballast suitable to operate on 230V 50Hz AC supply with 2x36Watts PLL-compact fluorescent lamp, pre-wired up to terminal block with bright anodized aluminum reflector & P5 paralite louvers with spring loaded plastic toggles complete. Make: Philips/GE/Thorn/Wipro	No	1	
8	Supplying and fixing 300mm x 50mm 2mm thick perforated cable tray with powder coated paint on existing MS angle support using necessary GI bolts, nuts, and washers as required Make: Legrand/MK/L&T	Mtr	1	
9	Supply and laying of below mentioned 1.1 KV grade XLPE insulated armoured copper conductor cables laid in Excavated Trench. The rate shall include excavation of trenches in soft rock of minimum 0.6 meter deep from finished surface and back filling of trenches as per final direction and approval of Engineer-in-charge. Make: Universal/Gloster/KEI			
9.1	4 Core x 50 Sqmm, Copper Cable	Mtr	1	
9.2	4 Core x 16 Sqmm, Copper Cable	Mtr	1	
9.3	4 Core x 10 Sqmm, Copper Cable	Mtr	1	
10	Fixing all types and all capacities fluorescent/false ceiling/spot light/CFL fittings indoor on the wall / ceiling/ rafters / girders using 23/0.0076" twin twisted PVC insulated wires, required nos of round blocks and clamps (if required) Using necessary length of G.I. chain	No	1	
11	Supplying and fixing 8 Way TP &N regular MCB double door distribution boards on wall / wood board / flush mounting using required clamps, bolts, nuts etc., with provision for fixing suitable type capacity MCB's single phase / 3 phase / single door with powder coated painting etc., complete Make: ABB/Siemens/Legrand	No	1	
12	Supplying and fixing miniature circuit breakers on existing MCB distribution boards using necessary fixing materials and wiring complete as required. Make: ABB/Siemens/Legrand			

12.1	5 to 32 Amps MCB D.P	No	1	
12.2	5-32Amps TPN	No	1	
12.3	40 to 63 Amps MCB TP & N.	No	1	
13	Supplying and Fixing RACEWAY 1 1/4" X 6" Digging laying with Powder Coating 14 Guage sheet metal. When it comes to Cable Management Systems our cable raceways can help you organize all those cables you just dont know what to do with. Our cable raceways provide you with the solution for organizing the cables for your Office, Entertainment Center, Classroom , Computer or IT center. Metal perimeter raceway is an excellent choice for locating--or relocating--wires and cables. Metal raceways are easily accessible and offer design features for a multitude of power and communications requirements. And even though it has been around almost as long as electrical wiring itself, metal raceway remains the system of choice where toughness, durability and ease of installation are important criteria.	No	1	
14	Supply & fixing of downlighter CCAD226 with DSI dimmable ballasts. Downlighter suitable for 4 pin 26w CFL lamps complete with all accessories lamps.	No	1	
15	Supply & fixing of Cinqueline FCIR414T-5 recessed mounting luminaire with DSI dimmable HF ballast and lamps.	No	1	
16	Supply & fixing of Nomad Wall washer CNOR1365 recessed mounting luminaire with DSI dimmable. HF ballast and lamps.	No	1	
17	Supply & fixing of Sensa Mod 3 DIG.	No	1	
18	Supply & fixing of SensaX Mulit Sensor.	No	1	
19	Supply & fixing of SensaX Control.	No	1	
20	Supply & fixing of Sensax Scene Plate.	No	1	
21	Supply & fixing of R Box ST for Scene controller.	No	1	
22	Supplying, fixing and wiring earth electrode for grounding of lifts, transformers, DG sets etc using 40mm dia, 2.9 mm thick 2.5 mtrs long GI pipe with GI funnel with mesh and suitable size reducer fixed on top of the earth electrode. The funnel should be enclosed in CC chamber of 400x400x400mm with a cast iron cover. The earth electrode shall have staggered holes of 12mm dia and the earth electrode should be covered 150mm alround with alternate layers of salt charcoal from the bottom of the CC chamber. The connection from electrode is to be established through GI strip using Gi bolts and nuts.	Each	1	
23	Supplying and running 600x600x3mm copper plate for grounding connections, using necessary fixing materials as required.	Each	1	
24	Supplying and running 8 SWG Copper wire for grounding along with other wires in conduit system of wiring) using necessary suitable size clamps, nails, guttas/spacers etc	Mtr	1	
25	Rodent Repellent System:	No	1	

26.1	Analog addressable fire alarm system: Addressable fire alarm control panel with battery back-up make: GE/Siemens	No	1	
26.2	Analogue addressable multicriteria smoke detector make: GE/Siemens	No	1	
26.3	Addressable manual call point	No	1	

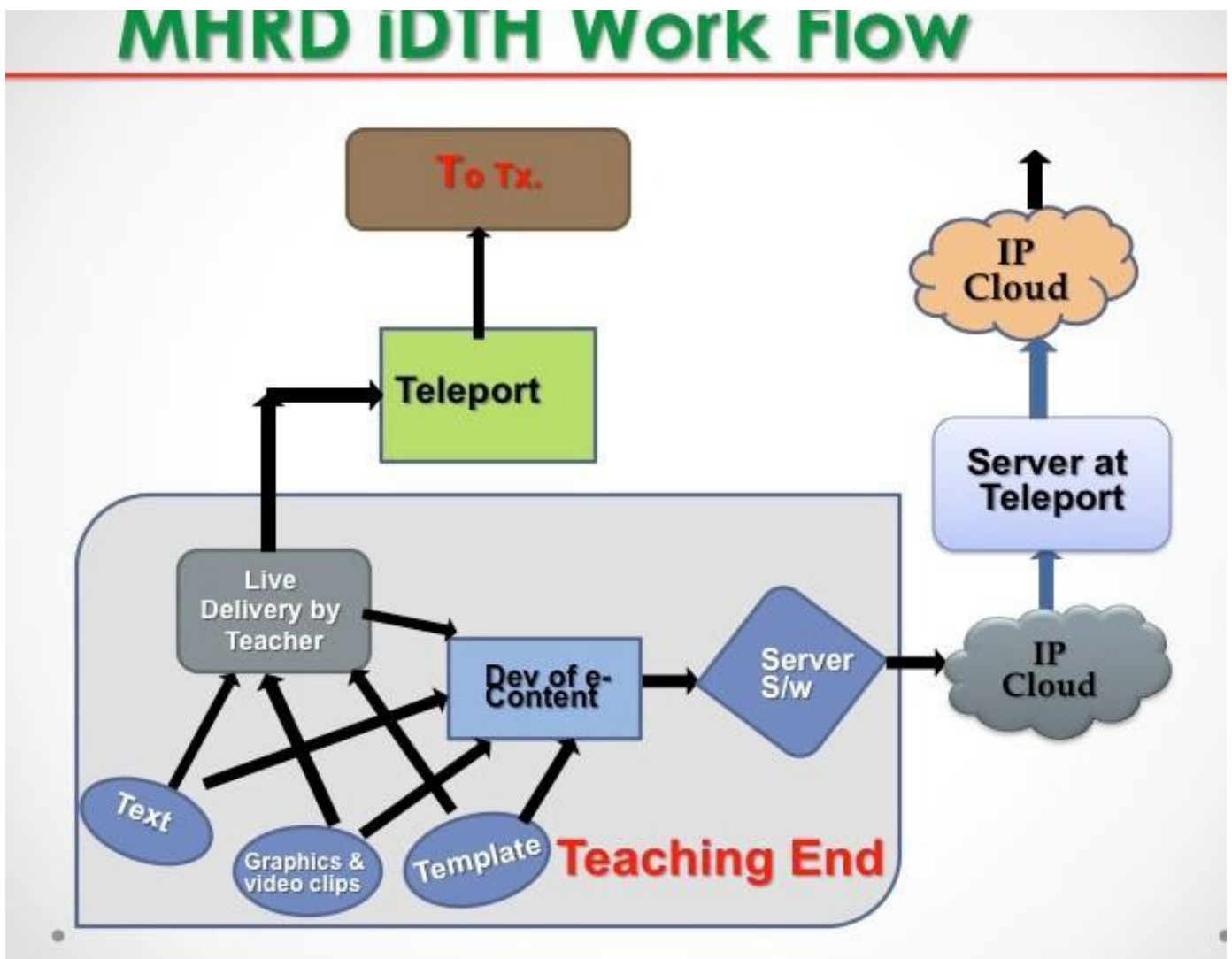
Split AC Technical Specifications, Refer (B) III, 1 g, above.

Description	Value
Tonnage Class	1.5T, 1.7T & 2.0T
Star rating	5
Compressor	Rotarary
Rated cooling capacity	18,000/19,400/25,500 BTU/Hr
Sound level (IDU)	30-35 dB
EER	11.7/12.9/12.10
Remote control	Wireless LCD

(D) Technical Specifications for deliverables of 55 channel monitoring setup:

46" (+-2) LCD LED Multi Viewer Display (HDMI Ports).	
Complete 55 channel satellite video receiver and monitoring system: with 4 Nos. of 16-Channel video multiplexer split screen PIP processor video mixer, 4 Nos. of 46" (+-2") LCD/LED full HD display, one antenna, L-band distribution amplifier/splitter and required Nos. single video output or multiple video output STBs/IRDs and 55:1 A-V Switcher.	
RF Input	Ku band
Modulation	DVB-S2 – QPSK, 8PSK
Video coding	MPEG-4
Symbol rate	Up to 30 Msps or more
Video multiplexer PIP processor with configurable display windows	Up to 16 CVBS SD inputs, minimum 1 CVBS output (1 HDMI HD output desirable)
Audio-monitoring	<u>Audio bar display with each video</u>
Display screen size (diagonal)	46" (+- 1")
Display panel	LCD, LED
Display resolution/capability	1080i / 50(1,920 x 1,080 full HD)
Video input	1 (minimum) compatible with video multiplexer PIP Processor output
Other inputs	USB, HDMI, composite video input, PC input
Power supply	Total system to operate at 230 V ±10%, 50 Hz AC.
Mechanical	<ol style="list-style-type: none"> <u>1.All equipment except monitors to be mounted in a suitable enclosure / rack with proper ventilation and cooling lines.</u> <u>2. All monitors to be mounted and tiltable.</u>

Bidder should (i) also quote for any other equipment, sub-equipment to complete the total integration of the system, like distribution amplifiers etc, and (ii) ensure the system works independently.



Teaching End System Diagram

