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Subject: Draft Specification for Supply of Encoders and IRDs at 11 Earth Stations.

The Draft specification of the upcoming tenders is enclosed herewith to offer comments, if any by due date at e-mail address ddpurchase401@yahoo.co.in or on following Address:

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Specification For: Draft Specification for Supply of Encoders and IRDs at 11 Earth Stations.

Specification no: SATD/Enc IRDs/11 Nos./Feb_2019 Dated: 05.02.2019.

Due Date to offer Comments: **01.03.2019**

Encl.: As above


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Specification for "Supply of Encoders and IRDs at 11 Earth Stations"

**Specification No.: SATD/Enc_IRDs/11 Nos./Feb_2019
Date: 05/02/2019**

Specification No.: SATD/Encoders_IRDs/11 Nos./Feb_2019

Technical Specification for Supply of Encoders and IRDs for Earth Station at 11 Locations (Jalandhar, Shimla, Ahmadabad, Bhopal, Bhubaneswar, Chennai, Jaipur, Jammu, Kolkata, Lucknow, Thiruvananthapuram)

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1. Introduction:

- 1.1 This document lays down technical specifications for Supply of Encoders and IRDs for Earth Stations at 11 Locations namely, Jalandhar, Shimla, Ahmadabad, Bhopal, Bhubaneswar, Chennai, Jaipur, Jammu, Kolkata, Lucknow and Thiruvananthapuram.

2. Scope:

- 2.1 The scope of the tender shall include:

- 2.1.1 "Supply of Encoders 44 nos. consisting of MPEG-2 and H.264/MPEG-4 AVC Encoders, one set each, at Jalandhar, Shimla, Ahmadabad, Bhopal, Bhubaneswar, Chennai, Jaipur, Jammu, Kolkata, Lucknow and Thiruvananthapuram for use in existing chain of Input equipment at each of the 11 Earth Stations".
- 2.1.2 "Supply of IRDs (with L band input) 44 nos. for the purpose of monitoring of uplink and downlink signal." Supply of equipment other than IRDs in monitoring chain is not in the scope of this tender.
- 2.1.3 "Supply of IRDs (with ASI input) 22 nos. for the purpose of monitoring of output of encoders." Supply of equipment other than IRDs in monitoring chain is not in the scope of this tender.
- 2.1.4 "Supply of IRDs (with L band input) 102 nos. for Punjab and 16 for Himachal Pradesh for the purpose of monitoring of uplink and downlink signal." Supply of equipment other than IRDs in monitoring chain is not in the scope of this tender.

- 2.2 The offered system shall meet the International standards for digital television broadcasting.

- 2.3 The offered system would also include the standard accessories, requisite licenses supplied by the Manufacturer alongwith the MPEG-2 and H.264/MPEG-4 AVC Encoders and IRDs (L Band input, ASI input).

3. Eligibility Criteria:

- 3.1 The bidder should be the original equipment manufacturer (OEM) of MPEG-2 and H.264/MPEG-4 AVC Encoders and IRDs or their authorized representative/dealer in India.
- 3.2 Bidders shall offer MPEG-2 and H.264/MPEG-4 AVC Encoders and IRDs of only those OEMs who are having past experience of at least Five years of manufacturing and supplying similar Encoders and IRDs.

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3.3 In addition of offered equipment OEM should meet the following eligibility criteria:

3.3.1 The OEM must have experience of Supplying at least 100 numbers or more of offered Encoders and IRDs for the Compression Chain of DTT or DVB-C or C/Ku Band Digital Earth Station/DSNGs in the past five years.

3.3.2 Copies of supply order and receipt certificates/delivery challans/dispatch certificates in respect of above said quantities of Encoders and IRDs in the preceding past five years should essentially be submitted along with the bid document.

3.4 In case bidder is the authorized representative/dealer of Encoders and IRDs, it should be in the business of sales and supply of Broadcast Equipment for at least past three years. Copies of orders and completion certificates/delivery challans/dispatch certificates to support this must be provided.

3.5 The bidder must have his local office/authorized representative/dealer in India for after sales support.

3.6 The cutoff date for the experience shall be the date of NIT.

4. General requirement for completing the offer:

4.1 The bidder shall submit only one solution (Single BOM) for the offered equipment. Bid with multiple options against any requirement is liable to be rejected.

4.2 The offered equipment and accessories including software should be from internationally reputed manufacturer and the quoted model should be of high class, high MTBF, field proven and in use by leading broadcasters/organizations in various continents of the World. Any customized product which is not field proven in the industry will not be acceptable.

4.3 All software being offered, are to be licensed to Doordarshan on perpetual basis without specifying any time limit or without specifying any end of life of the software. Software upgrades within warrantee period will have to be supplied free of cost.

4.4 For facilitating maintenance issues, successful bidder must also submit firm's self certified copies of Bill of Entry/Custom Invoice of all imported items to DG: DD for release of PBG.

4.5 The installation, testing and commissioning of the equipment supplied at site will be done by Doordarshan as per procedure laid down in the installation manual of respective equipment. The installation manual should also include list of Do's & Don'ts and step by step procedure for configuration etc. Bidder must submit copy of the installation manual alongwith the bid.

4.6 The local office/authorized representative/dealer in India will be nodal point for resolving issues, related to installation, integration, configuration, testing, commissioning and after sales support. Details of OEM office and its location are to be provided along with bid.

4.7 Testing and Commissioning at site: Site Acceptance Test (SAT)

4.7.1 The Encoders and IRDs shall be installed, configured, tested and commissioned at site by Doordarshan as per the instructions contained in the manufacturer's installation manual.

4.7.2 However, the local representative of the OEM/bidder shall be responsible for resolving any issues related with installation, configuration, testing and commissioning of the Encoders and IRDs. If required, local representative of the OEM/bidder may also arrange the visit of OEM Engineer at site.

4.8 In the process of technical evaluation Doordarshan can ask for any clarification/query as required through e-mail/FAX/Post etc, which shall be treated as a part of tender and invariably attended and replied by the bidder within the time stipulated therein.

4.9 Bidder may have to demonstrate the features of equipment offered as and when asked as part of technical evaluation of Tender. However it will not bestow any right of acceptance of the bid.

4.10 Cross reference in respect of supporting documents, should be given with proper page number and volume no. etc. If required Doordarshan may also ask for any other supporting document to ascertain the claim of bidder and their OEM.

5. Technical Specifications of Equipment:

5.1 Specification for SDTV and HDTV MPEG-2 and MPEG-4 Encoder

a) Essential Features:

(i) The offered encoder should be a standalone unit having capability of MPEG-2 and H.264/MPEG-4 AVC compression with ease to use front panel control.

(ii) Encoders will be used in 1+1 redundant mode.

- (iii) The encoder should have facility to support BISS -I and BISS-E encryption mode. The hardware and software for encryption should be provided in all the encoders.
- (iv) The encoder shall have the facility of 4 stereo/4 AES audio with MPEG-1 Layer-II, HE AAC v1 & v2 and Dolby Digital (AC-3) 5.1 audio along with one MPEG-1 Layer-II encoding. It shall also have the facility of Dolby E pass-through.
- (v) The encoder shall be capable of transmission of broadcast data signals along with video and audio.
- (vi) Facility for PSI generation should be there in the encoder.
- (vii) It should have Ethernet interface for Remote Control.
- (viii) On loss of Video input, it should have option to auto switch to pre-recorded video frame or freeze frame or test pattern. There should however be a facility to configure the encoder for no output on the loss of video input.
- (ix) The encoder should have capability for linear bit rate change and change in the configuration of the encoder without rebooting of the encoder.
- (x) It should also have the preprocessing hardware and software facility for the efficient encoding process viz. noise reduction.
- (xi) The encoder should support 10 bit encoding in 4:2:2 mode for better video quality.
- (xii) It should have multi-pass encoding hardware and software.
- (xiii) The Encoder shall have audio loudness control for maintaining uniform audio level in spite of changes from different input feeds and programs meeting the ITU-1770-2 standard for loudness control.
- (xiv) The Encoder shall have facility for auxiliary data input like closed captioning with EIA 608/708, DVB-subtitling and digital program insertion with SCTE35 insertion via SCTE104 triggers without any limitation or upgradation by way of hardware or software licenses.

- (xv) The output of chassis should be MPEG-2 TS over IP on RJ45 connector and MPEG-2 TS on BNC connector.
- (xvi) The encoder should be capable of generating alarm and control signal on GPI port for compression chain redundancy and IF redundancy which shall be controlled by existing IF redundancy switch.

b) Video Inputs

- (i) The Encoder shall be capable of accepting HD/SD-SDI and HD/SD-SDI with embedded audio Inputs with a facility to select between different inputs through front panel keys and through browser on remote computer.

c) Serial Digital Input Specifications

Sl. No.	Parameters	Specification
1	Video Inputs	SD-SDI & HD-SDI with embedded audio, DVB-ASI
2	Serial Interface	i) SMPTE 292M, 1485 Mb/s (10 bit) with embedded audio ii) SMPTE 259M, 270 Mb/s (10 bit) with embedded audio
3	Format	ITU(R)-601/ITU709
4	Connector	BNC female, 75 ohm
5	Input Level	800 mV p-p nominal $\pm 10\%$
6	Return Loss	Better than 15 dB, 5 MHz - 1.5 GHz / 10 - 1485 Mbps
7	No. of Inputs	2 Nos

d) IP Transport Stream Input Specifications

Sl.	Parameter	Specification
1	Type	Gigabit Ethernet
2	MPEG Format	MPEG 2 TS over IP (SPTS & MPTS)
3	Decoding of Video from TS	i) MPEG-2 ii) H.264/MPEG-4-AVC iii) H.265/HEVC Main 10
4	Decoding of Audio from TS	i) MPEG-1 Layer-II ii) HE AAC V1 & V2 5.1 Audio iii) Dolby Digital AC-3 5.1 Audio iv) Dolby Digital Plus 5.1 E-AC-3 Audio
5	No of Ports dedicated for IP Input source	Minimum two nos. independent ports and configurable in redundant mode

6	Port Speed	1000 Mbps or better per port
7	Ethernet Interface	1000 base T or better
8	Ethernet Connectors	RJ 45

e) Video Compression Parameters

Sl. No.	Parameters	Specification
1	Video Resolutions (PAL)	For SDTV : 720 x 576, 704 x 576, 544 x 576, 480 x 576 For HDTV : 1920 x 1080, 1440 X 1080, 1280 X 1080, 960 X 1080
2	Profiles and Levels	a) SD MPEG-2 MP@ML, 4:2:0, 8 bit b) SD MPEG-2 Hi422P@ML, 4:2:2, 8 bit c) SD H.264 MP@L3.0/HiP@L3.0 4:2:0, 8 bit d) SD H.264 Hi422P@L3.0/Hi422PL3.1, 4:2:2, 8 bit e) SD H.264 Hi4:2:2P@L3.1, 4:2:2, 10 bit f) HD H.264 HIP@L4.0, 4:2:0, 8 bit g) HD H.264 Hi422P@L4.0 / Hi422P@L4.1, 4:2:2, 10 bit
3	Video Bit-rate	1.5 to 20 Mbps for SD MPEG 2 4:2:2 profile 1.5 to 15 Mbps for SD MPEG 2 4:2:0 profile 1.0 to 12.5 Mbps for SD MPEG 4 4:2:0 profile 1.0 to 25 Mbps for SD MPEG 4 4:2:2, profile 1.0 to 25 Mbps for HD MPEG 4 4:2:0, profile 1.0 to 80 Mbps for HD MPEG 4 4:2:2, profile
4	Temporal Processing	Dynamic GOP structure support such as IP, IBP, IBBP, IBBBP etc.
5	Coding of Interlaced Video	Adaptive field & frame Processing support
6	Spatial Redundancy	Discrete Cosine Transform (DCT) Reduction
7	Chrominance Format	4:2:2 and 4:2:0 for SDTV and HDTV
8	Aspect Ratio	4:3 and 16:9

f) Embedded Serial Digital Audio Input specifications

Sl. No.	Parameters	Specification
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1	Serial Interface	SMPTE 299M, 1485Mbps and 272M, 270 Mbps (20 bit)
2	Format	AES/EBU, 8 channels (should be configurable as 8 x mono, 2 x Stereo and 4 mono, 4 stereo)
3	Connector	BNC female

g) Audio Compression Technique

Sl. No.	Parameters	Specification
1	Audio Encoding Method	i) MPEG-1 layer II ii) HE-AAC (MPEG-4) v1 & v2, 5.1 audio iii) Dolby Digital 5.1 AC-3 audio
2	Audio decoding Method	i) Dolby Digital 5.1 AC-3 audio ii) Dolby E
3	Audio Pass through	i) Dolby Digital 5.1 AC-3 audio ii) Dolby Digital plus 5.1 E-AC-3 audio iii) Dolby E iv) Linear PCM audio
4	Data rate	i) 64-192 kbps (MPEG-1, layer II) ii) 128-160 kbps (MPEG-4, HE AAC v1 & v2, 5.1 audio encoding) iii) 384-640 kbit/s (Dolby Digital 5.1 (AC-3) audio encoding)

h) Encoder Output

Sl. No.	Parameter	Specification
1. IP Transport Stream		
(a)	Format	MPEG-2 TS over IP
(b)	Output	Minimum two nos. independent ports and configurable in redundant mode
(c)	Connector Type	Gigabit Ethernet, RJ 45
(d)	Addressing	Unicast and Multi cast (at a time only one).
2. DVB-ASI		
(a)	Format	MPEG-2 TS/DVB-ASI
(b)	Output	2 no per chassis (min)
(c)	Connector Type	BNC, Female

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i) Control

Sl. No.	Parameter	Specification
i)	Control port	Min. 1 no. 10/100/1000 Base-T Ethernet port

5.2 Specifications for IRD with L-band Input

A. Essential Features :

- i. The professional IRDs should receive the L band input and provide analog base band (Video and audio), digital (HD-SDI, SD-SDI, HD-SDI embedded, SD-SDI Embedded, AES/EBU) , ASI outputs and MPEG-2 TS over IP output with service filtering facility.
- ii. IRD should be able to carry out multi service filtering on IP output port.
- iii. The IRD should support direct IP multicasting/unicasting of the Transport Streams.
- iv. IRD should have a front panel display to enter or edit all the parameters for a perfect reception of the signals.
- v. There should be at least one vacant slot (CI slot) for conditional Access System for descrambling all MPEG-2 & MPEG-4 and DVB-S & DVB S2 services.
- vi. There shall be a provision for observing BER & signal level or C/N & C/N margin or E_b/N_0 & Link Margin for DVB-S mode of operation and PER & signal level or C/N & C/N margin or E_b/N_0 & Link Margin for DVB-S2 mode of operation on the front display panel.
- vii. IRD should be able to descramble BISS mode 1 and BISS-E signals. Provision for multi-service decryption in BISS mode is also required.
- viii. There should be direct decompression of ASI to SDI i.e. not through analog to Digital conversion.
- ix. The IRD should be able to store at least 10 preset configurations in its memory.

- x. IRD should have facility to decode opportunistic data and pass ancillary data like closed captioning EIA 608/708, DVB-Teletext, DVB- subtitle, DPI SCTE-35 etc.
- xi. One SD-SDI down converted output of HD-SDI should also be available.

B. Technical Specifications:

Sl. No.	Parameters	Specifications
I. RF Parameter		
1	Input Frequency Range	950 - 1750 MHz
2	No. of Inputs	2
3	Tuning Step Size	125 kHz, Max.
4	Satellite Frequency Band	C-Band & Ku-Band, Selectable
5	Input Impedance	75 Ohms
6	Input Connector	F-Type female
7	Input Power Range	-30 to -60 dBm per carrier
8	Image Rejection	>30 dB
9	Input Return Loss	9 dB, Min.
10	Noise Figure	15 dB, Max.
11	AFC Tuning Range	± 5 MHz
12	De-Modulation Method	DVB-S QPSK, DVB-S2 QPSK and DVB-S2 8PSK demodulation
13	Variable Symbol Rates	1.0 to 40 M symbol/sec for DVB-S 1.0 to 40 M symbol/sec for DVB-S2
14	Convolution Inner FEC Selectable	R= 1/2, 2/3, 3/4, 5/6, 7/8 (DVB-S, QPSK), R= 1/2, 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10 (DVB-S2, QPSK) R= 3/5, 2/3, 3/4, 5/6, 8/9, 9/10 (DVB-S2, 8PSK)
15	IF Filter Bandwidth	Automatic Selection (dependent on Symbol Rate)

II. Audio and Video Decompression Parameters:		
1	Video Resolution (all resolutions shall be capable of I, P & B frame decoding, other standard resolution should be selectable)	For SDTV : 720 x 576, 704 x 576, 544 x 576, 480 x 576, 354x288 For HDTV : 1920 x 1080, 1440 X1080, 1280 X 1080, 960 X 1080
2	Video Decompression Type	a) SD MPEG-2 MP@ML, 4:2:0, 8 bit b) SD MPEG-2 Hi422P@ML, 4:2:2, 8 bit c) SD H.264 MP@L3.0/Hip@L3.0 4:2:0, 8 bit d) SD H.264 Hi422P@L3.0/Hi422PL3.1, 4:2:2, 8 bit e) SD H.264 Hi4:2:2P@L3.1, 4:2:2, 10 bit f) HD H.264 HHP@L4.0, 4:2:0, 8 bit g) HD H.264 HI422P@L4.0 / HI422P@L4.1, 4:2:2, 10 bit
3	Television Standard	PAL-B (EN50083-9)
4	Audio Decompression Type	i) MPEG-4 Layer-II audio ii) HE AAC (MPEG 4) v1 & v2, 5.1 audio iii) Dolby Digital (AC-3) 5.1 audio iv) Dolby Digital plus 5.1 (E-AC-3) (Pass through) v) Linear PCM (Pass-through) vi) Dolby E (Pass-through)
III. Transport Stream O/P:		
1	Format	i) MPEG-2 TS over ASI on BNC ii) MPEG-2 TS over IP on Ethernet with service filtering facility including opportunistic data.
2	Quantity	i) Minimum one no. on BNC ii) Minimum two no. on RJ 45
IV. Video Output Specifications		
1	Connector Type	BNC (75 Ohm)
2	Video Output Format	Composite video, SD-SDI and HD-SDI
3	Video Outputs	Composite video output- One No. HD/SD-SDI Output- Two Nos.

4	Analog Video O/P Level	1.0 V p-p \pm 5%
5	SD-SDI and HD-SDI O/P Serial Interface	SMPTE 292M-1485 Mbps SMPTE 259M-(10 bit) 270 Mbps
6	SD-SDI with Embedded Audio	SMPTE 272M
7	HD-SDI with Embedded Audio	SMPTE 299 M
8	Digital Video O/P Level	800 mV p-p for SDI As per ITU-R BT.601 (part A)
9	Gen lock Input	One
V. Analogue Video Performance Specifications		
1	Frequency Response	within 2 dB at 5 MHz
2	Chroma-Luma Delay	\pm 30 ns, maximum
3	Differential Gain	< 4%
4	Differential Phase	< 2°
5	Signal to Noise Ratio	>55 dB (luminance weighted)
VI. VBI Signal Reinsertion Specifications		
1	VBI Formats Supported	WST & VITC
2	Range of VBI Lines	Field 1 lines 7 to 22 (PAL) and corresponding lines of Field 2
3	Synchronization with video	Within \pm 1 frame
4	Preservation of line numbering	VBI data shall be reinserted on the original line number
VII. Analog Audio Output Specifications		
1	Load Impedance	600 Ω (balanced)
2	Number of Outputs	4, configurable as Stereo, Joint Stereo Single mono, Dual mono, on XLR
VIII. Audio Performance Specifications		
1	Peak Output Level	\geq +17 dBm into 600 Ω balanced
2	Clipping Level	S/W Selectable to be provided or any preset value between +17 dBm to +24 dBm
3	Sampling Rates	48 KHz

4	Frequency Response	$< \pm 1.0$ dB (20Hz-20KHz)
5	THD + N	< 0.3 % at 1 kHz
6	Dynamic range	80 dB (ITU-R/Arm weighting)
7	Cross talk at 1 kHz	≥ 60 dB
8	Signal to noise ratio	55 B (min) at 0 dBm
IX. Digital Audio Output Specifications		
Sl.	Parameters	Specification
1	Output Format	i) AES/EBU or AES3 id ii) HE AAC(MPEG 4) v1 & v2, 5.1 audio iii) Dolby Digital (AC-3) 5.1 audio iv) Dolby Digital Plus 5.1(E-AC-3)(Pass-through) v) Linear PCM (pass-through) vi) Dolby E (Pass-through)
2	Load Impedance	110 Ohms
3	Connector Type	XLR male Socket or with suitable XLR adapter (i.e. no terminal block)
4	Number of Output	4 Stereo Channels
X. LNB Power Supply & Control		
1	LNB Voltage	Off, 13 V, 18 V
2	Over Current & Short Circuit protection	Should be provided
3	LNB Control (Low/High Band)	22 \pm 2 KHz Tone
XI. Mount		
1	Mount	19" Rack Mount

5.3 Specifications for IRD with ASI Input

A) Essential Features :

- (i) The professional IRDs should receive the **ASI Input** and provide analog base band (Video and audio), digital HD-SDI, SD-SDI, HD-SDI embedded audio, SD-SDI with embedded audio, AES/EBU , ASI and MPEG-2 TS over IP output.
- (ii) IRD should be able to carry out multi service filtering on IP output port.

- (iii) IRD should have a front panel display to enter or edit all the parameters for a perfect reception of the signals.
- (iv) There should be at least one vacant slot (CI slot) for conditional Access System for descrambling all MPEG-2 & MPEG 4 and DVB-S & DVB S2 services.
- (v) IRD should be compliant for closed captioning, DVB-Teletext and DVB-subtitle etc.
- (vi) There should be direct decompression of ASI to SDI i.e. not through analog to Digital conversion.
- (vii) The IRD should be able to store at least 10 preset configurations in its memory.
- (viii) IRD should be able to descramble BISS mode 1 and BISS-E signals.
- (ix) IRD should have facility to decode opportunistic data and pass ancillary data like closed captioning EIA 608/708, DVB-Teletext, DVB- subtitle, DPI SCTE-35 etc.
- (x) One SD-SDI down converted output of HD-SDI should be available.

B) Technical Specifications:

Sr. No.	Parameters	Specifications
I. Transport stream I/P		
1	Format	MPEG-2 DVB-ASI on BNC
II. Audio and Video Decompression Parameters:		
1	Video Resolution (all resolutions shall be capable of I, P & B frame decoding, other standard resolution should be selectable)	For SDTV : 720 x 576, 704 x 576, 544 x 576, 480 x 576, 354x288 For HDTV : 1920 x 1080, 1440 X1080, 1280 X 1080, 960 X 1080
2	Video Decompression Type	a) SD MPEG-2 MP@ML, 4:2:0, 8 bit b) SD MPEG-2 Hi422P@ML, 4:2:2, 8 bit c) SD H.264 MP@L3.0/Hip@L3.0

		4:2:0, 8 bit d) SD H.264 Hi422P@L3.0/Hi422PL3.1, 4:2:2, 8 bit e) SD H.264 Hi4:2:2P@L3.1, 4:2:2, 10 bit f) HD H.264 HIP@L4.0, 4:2:0, 8 bit g) HD H.264 Hi422P@L4.0 / Hi422P@L4.1, 4:2:2, 10 bit
3	Television Standard	PAL-B (EN50083-9)
4	Audio Decompression Type	i) MPEG-1 Layer-II audio ii) HE AAC (MPEG-4) v1 & v2, 5.1 audio iii) Dolby Digital (AC-3) 5.1 audio iv) Dolby Digital plus 5.1 (E-AC-3) (Pass through) v) Linear PCM (Pass-through) vi) Dolby E (Pass-through)
III. Transport Stream O/P:		
1	Format	MPEG-2 TS over ASI on BNC ii) MPEG-2 TS over IP on Ethernet with service filtering facility including opportunistic data.
2	Quantity	i) Minimum one no. on BNC ii) Minimum one no. on RJ 45
IV. Video Output Specifications		
1	Connector Type	BNC (75 Ohm)
2	Video Outputs	Composite video output- One No. HD/SD-SDI Output- Two Nos.
3	Analogue Video O/P Level	1.0 V p-p +/- 5%
4	SD-SDI and HD-SDI O/P Serial Interface	SMPTE 292M-1485 Mbps SMPTE 259M-(10 bit) 270 Mbps
5	SD-SDI with Embedded Audio	SMPTE 272M
6	HD-SDI with Embedded Audio	SMPTE 299 M
7	Digital Video O/P Level	800 mV p-p for SDI As per ITU-R BT.601 (part A)
8	Genlock Input	One
V. Analogue Video Performance Specifications		
1	Frequency Response	within 2 dB at 5 MHz
2	Chroma-Luma Delay	±30 ns, maximum

3	Differential Gain	< 4%
4	Differential Phase	< 2°
5	Signal to Noise Ratio	>55 dB (luminance weighted)
VI. VBI Signal Reinsertion Specifications		
1	VBI Formats Supported	WST & VTTC
2	Range of VBI Lines	Field 1 lines 7 to 22 (PAL) and corresponding lines of Field 2
3	Synchronization with video	Within ± 1 frame
4	Preservation of line numbering	VBI data shall be reinserted on the original line number
VII. Analog Audio Output Specifications		
1	Load Impedance	600 Ω (balanced)
2	Number of Outputs	4, configurable as Stereo, Joint Stereo, Single mono, Dual mono, on XLR.
VIII. Audio Performance Specifications		
1	Peak Output Level	≥ +17 dBm into 600 Ω balanced
2	Clipping Level	S/W Selectable to be provided or any preset value between +17 dBm to +24 dBm
3	Sampling Rates	48 KHz
4	Frequency Response	< ± 1.0 dB (20Hz-20KHz)
5	THD + N	< 0.3 % at 1 kHz
6	Dynamic range	80 dB (ITU-R/Arm weighting)
7	Cross talk at 1 kHz	≥ 60 dB
8	Signal to noise ratio	55 dB (min) at 0 dBm
IX. Digital Audio Output Specifications		
Sl.	Parameters	Specification
1	Output Format	i) AES/EBU or AES3 id ii) HE AAC(MPEG 4) v1 & v2 iii) Dolby Digital (AC-3) & Dolby Digital Plus (Pass-through) iv) Linear PCM & Dolby E (Pass-through)
2	Load Impedance	110 Ohms

3	Connector Type	XLR male Socket or with suitable XLR adapter (i.e. no terminal block)
4	Number of Output	4 Stereo Channels
X. Mount		
1	Mount	19" Rack Mount

6. Physical, Environmental & Mechanical Specifications

The following specifications are to be followed if not mentioned elsewhere in this document:

6.1 Power Supply

Equipment shall operate from a wide range of power supply voltages without interruption or damage.

Parameter	Specification
(a) Voltage Range	220/240 V AC nominal
(b) Frequency	48-52 Hz

6.2 Environmental Specifications

Parameter	Specification
(a) Operating Temperature (Indoor)	0°C to 45°C
(b) Storage Temperature	- 20°C to 70°C
(c) Humidity (Indoor) non-condensing	0 to 85%
(d) Altitude	0 to 1000 m

6.3 Mechanical Specifications

Offered equipment shall be rack mounted.

Parameter	Specification
(a) Construction	Modular approach, EIA RS-310C, 19" rack-mount

7. Complement of Equipment:

- 7.1 The quantity, make and model/part no. of all the equipment should be clearly mentioned in the offered Bill of Material (BoM).
- 7.2 The suggestive Bill of Material (BOM) has been provided in **Annexure-I**. The bidder is required to provide the complete list of equipment, software and accessories etc. offered to meet the specifications requirement. The quantity of

each item including sub-module etc. are to be specified clearly and compulsorily, failing which the bid is liable to be rejected summarily.

- 7.3 Any substandard equipment included in the offer may result into the rejection of complete offer with the sole responsibility of bidder.
- 7.4 The offer should also include the detailed technical brochure and technical manual containing all the technical specifications of all the offered equipment, accessories, and software etc.
- 7.5 General specifications applicable to the equipment have been given in Clause No. 5.

8. General

8.1 Compliance and Authorization:

- 8.1.1 The bidder must submit a point-by-point compliance statement in respect of all the points, sub-points and clauses laid down in this specification from page 1 onwards along with the offer.
- 8.1.2 In addition to the above, compliance from the OEM of Encoders and IRDs on their letter head should necessarily be given, with reference to the points, sub-points and clauses laid down in the technical specifications.
- 8.1.3 The OEM's authorization (not from representative) should also be given on their letter head along with bid in the format prescribed in Annexure - II.
- 8.1.4 Mere signature on a copy of Doordarshan specifications shall not be accepted as a compliance statement.
- 8.1.5 Compliance statement in the format as indicated below shall only be accepted.

Sr. No. of DD specs.	DD Specs.	Compliance (Yes/No)	Performance fig. of equipment offered.	Deviations, in case of non-compliance	Optional items if any required to make the system Compliant to DD specs.	Features in the system offered Which exceed DD specs.	Page No.	Remarks
1								
2								

8.1.6 The manufacturer should also record the performance figures of the equipment offered in the quote for which the compliance statement is enclosed.

8.1.7 The compliance statement should be supported by highlighted record of these in the technical literature/data sheets enclosed with the tender and a clear reference to the attached supporting document should be given in the remarks column against each & every specs. Any offer without proper supporting document of each & every specs and containing only a commercial hand out/pamphlet is liable to be rejected.

8.1.8 Data sheets/relevant technical literature should be submitted in respect of all offered equipment. Any deviation from the specification detailed in the compliance statement is to be highlighted separately. Page no. of location of data sheet should be given in page no. column above.

8.1.9 Offers without proper & duly completed compliance statement are likely to be rejected with the sole responsibility of bidder and no further claim/ correspondence will be entertained.

8.2 Documentation

8.2.1 One set of technical manuals/relevant technical literature from the OEM, for the offered equipment are to be provided along with the tender to facilitate the technical evaluation, otherwise the tender is liable to be ignored.

8.2.2 The Technical manuals would include Installation Manual and Operation & Maintenance manual.

- 8.2.3 The successful bidder will have to supply set of printed technical manuals along with factory test report of the offered equipment.
- 8.2.4 Technical Manual for all equipments should also be supplied on CD/DVDs with search facility.
- 8.2.5 All offered software should be in the name of Doordarshan and should have perpetual validity. All software backups should also be supplied on CD/DVDs.

8.3 Guarantee

- 8.3.1 The manufacturer shall guarantee satisfactory working of the offered Encoders and IRDs without any fault and defect for three years from the date of receipt of last accepted consignment at respective consignee's premises.
- 8.3.2 Any defect or failure of any module/equipment during the guarantee period shall be repaired/replaced free of charge by the successful bidder at site. For repairing of any defective module/equipment during guarantee period, the defective module or equipment requiring repairs will be handed over to local office/local authorized representative dealer who will arrange repairs locally at site or send/export the defective modules to OEM factory and re-import/send back after repairs.
- 8.3.3 It is the responsibility of local office/ Authorized representative/ dealer of the bidder to arrange the repair/ replacement of faulty items for Doordarshan i.e. transportation charges would not be paid by DD for transporting the defective/ repaired items, if required to be removed from site, during the guarantee period.
- 8.3.4 Guarantee period is to be extended corresponding to the outage period if the failure rectification takes more than 15 days time.
- 8.3.5 Bidder shall provide the guarantee/warranty through the OEM. A certificate duly signed by the OEM on the OEM's letterhead, in this regard of offered Encoders and IRDs must be submitted with the offer by the bidder in the format as prescribed in Annexure III.
- 8.3.6 After sales service support for additional 2 (TWO) years for the repairs/maintenance of offered equipment after the completion of guarantee/warranty period shall also be provided by the OEM of the Encoders

and IRDs either directly or through his representative in India. In this regard a certificate, duly signed by the OEM on the letterhead, must be submitted with the offer by the bidder.

8.3.7 The successful bidder will be responsible for providing after sales service support of all the offered equipment for Five years from the date of receipt of last accepted consignment at respective consignee's premises including three (3) years warranty period. The bidder must submit undertaking for providing after sales service support for additional Two (2) years after the end of warranty period along with bid.

8.3.8 If bidder is not the OEM of the offered equipment, then after sales service support for the repairs/maintenance for 3 years warranty period and for 2 years after the completion of guarantee/warranty period shall also be provided by the OEM either directly or through its representative in India. A certificate, on the letterhead, in this regard duly signed by the OEM must be submitted with offer by the bidder in the format as prescribed in Annexure V.

8.4 Inspection:

8.4.1 All the equipment to be supplied against the supply order for this tender shall be subjected to pre-dispatch inspection in India by Doordarshan. The successful bidder should produce the factory test reports of all the offered equipment to facilitate inspection.

8.4.2 The inspection of equipment will be carried out at site by a team of Doordarshan authorized by Doordarshan Directorate. A draft copy of ATP (Acceptance Test Procedure) must be submitted by the bidder within one month of issue of AT. ATP should describe the standard test procedure of individual equipment and of the integrated system chain. The factory test report will not be treated as ATP. The accepted ATP with or without changes shall be sent back to the successful bidder and it will also be used for inspection and commissioning of equipment by DD Engineer(s) at site.

8.5 Delivery Period

Four months from the date of issue of purchase order.

8.6 Pre-bid Conference

8.6.1 A pre bid conference on technical Specifications and other issues shall be held on date and time specified in the NIT. All prospective bidders may attend the pre bid conference to discuss their queries and suggestions.

- 8.6.2 All the queries and suggestions should be sent to Doordarshan at least 2 days before the date of pre bid conference. No queries/ suggestions shall be entertained after pre bid conference.
- 8.6.3 Amendments subsequent to the pre bid conference shall be sent to prospective bidders, who have purchased tender document, by e-mail/fax/ post.
- 8.6.4 It shall be bidder's responsibility to check for any amendments/addendum on the website before submitting their duly completed bids.

8.7 Check List and Enclosures

The bidders may ensure the following check list while submitting the bid including some important list of enclosures for ease of technical evaluation.

- 8.7.1 Whether documents related to fulfilment of the eligibility criteria as per Clause 3 have been submitted.
- 8.7.2 Whether point-by-point compliance statement of the bidder in respect of all the points, sub-points and clauses laid down in this specification from page 1 onwards along with the offer as given in Clause 8.1.1 has been included.
- 8.7.3 Whether point-by-point compliance statement of OEM in respect of all the points, sub-points and clauses as laid down in the specification of respective equipment and their authorization mentioned in Clause 8.1.2 have been included. Authorization and Compliance Statement from OEMs will only be acceptable and not from the authorized dealer of the OEMs.
- 8.7.4 Whether the authorisation has been submitted in the prescribed format as given in Clause 8.1.3
- 8.7.5 Ensure that all equipment and accessories as given in the Suggestive bill of material have been included in the offered BOM.
- 8.7.6 Whether the page numbers of the relevant enclosed technical data sheet/manual against each parameter of the specifications have been given in the compliance statements.
- 8.7.7 Whether the requisite undertakings for after sales support by OEMs and bidder have been submitted.
- 8.7.8 Ensure that no alternate item has been offered.

- 8.7.9 Ensure that the installation manual, relevant technical brochures containing all the parameters of technical specifications of all the offered equipment and accessories have been included with proper indexing for ease of identification.
- 8.7.10 Ensure that the Un-priced BOM has been included.
- 8.7.11 Any other item mentioned elsewhere in the tender.

DRAFT

Annexure-I

Suggestive Bill of Material (BOM)

For Providing Encoders and IRDs at

11 Earth Stations Locations

(Jalandhar, Shimla, Ahmedabad, Bhopal, Bhubaneswar, Chennai, Jaipur, Jammu, Kolkata, Lucknow, and Thiruvananthapuram)

Sr. No.	Description of Item as per Specification (Suggestive BOM)	Description of Item as offered by Bidder	Qty. per site	Total Qty. as per suggestive BOM	Make	Model	Remarks
1.	MPEG 2 & MPEG 4 Encoders in (1+1) redundancy configuration consisting of:						
a)	Digital Encoder operating in 4:2:0 and 4:2:2 mode with MPEG-4 & MPEG-2 compression (Noise reduction hardware/ software for encoders BISS-1 & BISS-E Software for Encoders Internal Remux Option, Audio options Auxiliary data input option etc as per specs).		4 Nos.	44 Nos.			
2.	Prof. IRDs (with L-band inputs and with DVB-ASI, MPEG-2 TS over IP with service filter, SD-SDI, HD-SDI, AES/EBU, SD & HD SDI embedded stereo, Dolby digital (AC-3) 5.1 audio and Dolby Digital Plus 5.1 Audio) along with MPEG-2, 4:2:0 and MPEG-4, 4:2:0, 4:2:2 decoding and Common Interface slot hardware and BISS mode -1 & BISS-E decryption facility.		4 Nos.	44 Nos.			
3.	Prof. IRDs (with L-band inputs and with DVB-ASI, MPEG-2 TS over IP with service filter,			118 Nos.			

	SD-SDI, HD-SDI, AES/EBU, SD & HD SDI embedded stereo, Dolby digital (AC-3) 5.1 audio and Dolby Digital Plus 5.1 Audio) along with MPEG-2,4:2:0 and MPEG-4, 4:2:0, 4:2:2 decoding and Common Interface slot hardware and BISS mode -1 & BISS-E decryption facility. These IRDs will be delivered at D6 Godown of O/o ADG(E)(NZ), New Delhi.					
4.	Prof. IRDs (with ASI input and with DVB-ASI, MPEG-2 TS over IP with service filter, SD-SDI, HD-SDI AES/EBU, SD & HD-SDI embedded stereo, Dolby digital (AC-3) 5.1 audio and Dolby Digital Plus 5.1 Audio) along with MPEG-2,4:2:0 and MPEG-4, 4:2:0, 4:2:2 decoding and Common Interface slot hardware and BISS mode -1 & BISS-E decryption facility.	2 Nos.	22 Nos.			
5.	Equipment manuals consisting of:		1 Lot			
a)	Installation, Operation/User Manuals. Hard copies and Soft copies on CDs with Search facility for all the supplied equipment. (2 Sets for each Kendra, 1 Set for DG-DD and 1 Set each for ADG(NZ), ADG(SZ), ADG(EZ) and ADG(WZ))					
b)	All software backups are to be supplied on CDs.					
6.	Training					

a)	In India: One day on site training (including Theoretical (alongwith basic study material) & Practical training, hands on experience) on Encoders and IRDs for Doordarshan personnel at each site. (Note: Training will not be treated as part of the delivery period)		1 Lot	11 Lots			
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DRAFT

OEM's LETTER HEAD

CERTIFICATE FOR AUTHORIZATION

Date:

Tender No. :

We, M/s <Name
and Address of the OEM>, do hereby authorize
M/s..... <Bidder's name> having its office at
..... <Bidder's address> to
submit the bid and sign the contract with Deodharshan for the equipment/product offered
by us against the above tender.

Signature
Name & Designation of authorized signatory of the OEM
Name of the OEM
Stamp of the OEM

OEM's LETTER HEAD

CERTIFICATE FOR GUARANTEE

Date:

Tender No.:

We, M/s<Name and address of the OEM>, do hereby confirm that:

1. The offered Encoders and IRDs shall be guaranteed for satisfactory working without any fault and defect for three years from the date of receipt of last accepted consignment at respective consignee's premises.
2. Any defect or failure of any module/equipment during the guarantee period shall be repaired/replaced free of charge at site. For repairing of any defective module/equipment during guarantee period, the defective module or equipment requiring repairs will be handed over to M/s<Name of local office/local authorized representative/dealer> who will arrange repairs locally at site or send/export the defective modules to our factory and re-import/send back after repairs.
3. It is the responsibility of M/s<Name of local office/local authorized representative/dealer> to arrange the repair/ replacement of faulty items for Doordarshan i.e. transportation charges are not to be paid by DD for transporting the defective/ repaired items, if required to be removed from site, during the guarantee period.
4. Guarantee period of the equipment would be extended corresponding to the outage period if the failure rectification takes more than 15 days time.
5. After sales service support for additional 2 (TWO) years for the repairs/maintenance of Earth Station equipment after the completion of guarantee/warranty period shall also be provided by M/s<Name of the OEM of the Encoders and IRDs > either directly or through M/s<Name of OEM's representative in India>. In this regard a certificate, duly signed by the OEM on the letterhead, must be submitted with the offer by the bidder.
6. All offered software will be licensed to Doordarshan on perpetual basis without specifying any time limit or without specifying end of life of the software. Software upgrades within warranty period will be supplied free of cost.

Signature
Name & Designation of authorized signatory.....
Name of the OEM -
Stamp of the OEM

OEM's LETTER HEAD

CERTIFICATE FOR AFTER SALES SERVICE SUPPORT**Date:****Tender No. :**

We, M/s <Name and address of the OEM>, do hereby confirm that after sales service support for additional Two (2) years for the repairs/maintenance of offered products after the completion of three (3) Years guarantee/ warranty period shall be provided through our representatives/authorized dealer/service provider for the offered equipment and accessories in India as mentioned below:

S. No.	Name of the authorized person	After sales & support office address	Telephone/ Fax	Email of concerned personnel
1				

Signature

Name & Designation of authorized signatory of the OEM.....

Name of the OEM

Stamp of the OEM

BIDDER's LETTER HEAD

DECLARATION BY THE BIDDER

1. Bill of Material (BOM) [Yes/No]
2. Bidder's compliance (As per specs clause no. 8.1.1) [Yes/No]
3. The copy of Dealer Possession License in case of possession of RF equipment (as per clause no. 3.5) [Yes/No]
4. OEM Compliance for following equipment from respective OEMs (as per clause no. 8.1.2):

S. No.	Name of equipment	Name of OEM	OEM compliance submitted (Yes/ No)
i.	MPEG-2 and H.264/MPEG-4 AVC Encoders		
ii.	IRDs (with L band input)		
iii.	IRDs (with ASI input)		

5. Certificate for Authorization for following equipment from their respective OEMs:

S.No.	Name of equipment	Name of OEM	Authorization certificate submitted (Yes/ No)
i.	MPEG-2 and H.264/MPEG-4 AVC Encoders		
ii.	IRDs (with L band input)		
iii.	IRDs (with ASI input)		

6. Certificate for Guarantee for following equipment from their respective OEMs:

S.No.	Name of equipment	Name of OEM	Guarantee certificate submitted (Yes/ No)
i.	MPEG-2 and H.264/MPEG-4 AVC Encoders		
ii.	IRDs (with L band input)		
iii.	IRDs (with ASI input)		

7. Certificate for After sales service support for following equipment from their respective OEMs:

S.No.	Name of equipment	Name of OEM	After sales service support certificate submitted (Yes/ No)
i.	MPEG-2 and H.264/MPEG-4 AVC Encoders		
ii.	IRDs (with L band input)		
iii.	IRDs (with ASI input)		

8. Datasheets/Technical Literature for the offered equipment: [Yes/No]
- i.
- ii.
- iii.

Signature

Name & Designation of authorized signatory of the bidder.....

Name of the Bidder.....

Stamp of the bidder