**Through website**

**PRASAR BHARTI**
**(India's Public Service Broadcaster)**
**Directorate general of Doordarshan**
**Doordarshan Bhawan, Copernicus Marg**
**New Delhi -110001.**

**Dated: 31/03/2022**

**Subject:** Draft Technical specification for SITC of DD DTH Expansion by Up-gradation of existing four Compression Chain and Monitoring System at DD DTH Earth Station Todapur, Delhi.

The Draft specification of the upcoming tender is enclosed herewith to offer comments, if any, by prospective bidders/Firms/OEMs.

2. Bidders/Firms/OEMs are also requested to provide information about available local content in respect of items listed in suggestive BOM along with budgetary quote.

3. Bidders may please submit the above detail on or before due date by e-mail to ddpurchase401@yahoo.co.in or at following Address:

Assistant Engineer
Room No. 403,
Directorate General: Doordarshan,
Doordarshan Bhawan, Copernicus Marg,
New Delhi -110001 (India)
Telephone: **011- 2311 4401**

**Specification For:** Draft Technical specification for SITC of DD DTH Expansion by Up-gradation of existing four Compression Chain and Monitoring System at DD DTH Earth Station Todapur, Delhi.

**Specification No.:** SATD/DTH Expansion_Compression Upgradation/March 2022 Dated: 26.03.2022

**Due Date:** 13.04.2022

Encl.: As above (102 Pages)

Signed by Narendra Kumar Choursiya
Date: 31-03-2022 16:53:57
Reason: Approved

N.K. Chaurasia
Assistant Engineer
Doordarshan Directorate, Doordarshan

Prasar Bharati
(India's Public Service Broadcaster)
DIRECTORATE GENERAL: DOORDARSHAN

# SPECIFICATIONS
# FOR
# SITC OF DD DTH EXPANSION BY UPGRADATION OF EXISTING FOUR COMPRESSION CHAIN AND MONITORING SYSTEM
# AT
# DTH EARTH STATION TODAPUR
# DELHI

Specification No.: SATD/DTH Expansion_Compression Upgradation/March 2022

Dated: 24/03/2022

479568/2022/Sat. Design Section - DG DD

# SPECIFICATIONS FOR SITC OF DD DTH EXPANSION BY UPGRADATION OF EXISTING FOUR COMPRESSION CHAIN AND MONITORING SYSTEM AT DTH EARTH STATION TODAPUR DELHI

## INDEX

# 1. Introduction

This project envisages expansion of Doordarshan's present DTH platform "DD Free Dish". Presently, DTH Platform is up-linking 94 TV channels & 40 Radio channels in MPEG-2, DVB-S standard in free to air mode by using 5 transponders and 22 TV channels(21 SD + 1 HD) & 8 Radio channels in MPEG-4, DVB-S2 standard with DVB-CAS (Namely iCAS) compliant headend in one transponder.

DD DTH platform is proposed to be expanded by upgradation of existing four compression chains i.e. three streams of MPEG-2 and one stream of MPEG-4 compression standard. It is also envisaged to have provision for HDTV channels in the proposed upgraded compression system which shall be used alternatively in place of the SDTV channels. Inclusion of each HDTV channel in H.265/HEVC will result in a loss of few SDTV channels.

## 1.1 Proposed Expansion
## Compression Configuration (Encoders, IP Encapsulater / Mux and NMS)

| Existing Stream | Proposed System | | | | |
|---|---|---|---|---|---|
| | Configuration of TV & Radio Encoder Chassis | | DVB-CAS | Compression Standard | Uplink Standard |
| 1 | (X+2) SDTV & HDTV | 8 Radio Channel | Yes | i) SD-MPEG-2 & MPEG-4<br>ii) HD-MPEG-4 & HEVC | DVB-S & DVB-S2 |
| 2 | (X+2) SDTV& HDTV | 8 Radio Channel | Yes | i) SD-MPEG-2 & MPEG-4<br>ii) HD-MPEG-4 & HEVC | DVB-S & DVB-S2 |
| 3 | (X+2) SDTV & HDTV | 8 Radio Channel | Yes | i) SD-MPEG-2 & MPEG-4<br>ii) HD-MPEG-4 & HEVC | DVB-S & DVB-S2 |
| 6 | (X+2) SDTV& HDTV | 8 Radio Channel | Yes | i) SD-MPEG-2 & MPEG-4<br>ii) HD-MPEG-4 & HEVC | DVB-S & DVB-S2 |

Note: X= No. of Encoder chassis required as per technical specification of Compression system for SDTV & HDTV channels and Radio Channel.

Doordarshan has implemented Indian Conditional Access System (iCAS), an initiative by Government of India for making an Indian CAS, in DD Free Dish Platform. All the offered equipment shall be Indian Conditional Access System (iCAS) compliant for encryption & decryption of all services. Services like DVB-CSA (V-1 & V-2) supported DVB-CAS with simulcrypt encryption, Subtitling , Audio descriptor, EPG, closed captioning etc will be carried by the DD free Dish DTH platform and the equipment offered by the bidder shall be capable of carrying these services without any limitation or requiring upgradation by way of hardware and software. The offered Compression System shall also be Video on Demand (VoD) & NVoD compliant, however Storage server, Playout system, GSM or IP based network for return path are not in the scope of this tender.

# 2 Scope of Work

The scope of this project includes Supply, Installation, Testing and Commissioning (SITC) of four new compression chain including monitoring system for Ku-Band DTH Platform at Todapur, Delhi and associated works consisting of but not limited to Input System, Digital Compression System, Monitoring System, Measuring System and Power Supply System etc. The nomenclature of these four SDTV streams shall be 1N, 2N, 3N and 6N stream. All equipment of these streams shall also be capable to take HDTV channel without any limitation or requiring any upgradation by way of hardware and software. These equipment will be used as an alternative to upgrade the SDTV channels to HDTV. Broadly the scope of the project consists of:

2.1.1 Bidder shall supply, install, test and commission (SITC) 2 sets of L Band OFC link system for carrying L band signal received from Receive Only Antenna to L band Router to be installed in New Compression room. Each OFC link system consists of 20 nos. OFC link to carry independent L band signal.

2.1.2 Bidder shall supply, install, test and commission (SITC) 3 sets of L band Line amplifier (One set to be installed in Porta cabin and two sets in Old compression room) and laying and interconnecting with L band Cables between Porta cabin and existing L band splitter in old compression room; also in between existing L band splitter installed near existing L band Router in old Compression room and new L band Router in new Compression room.

2.1.3 Bidder shall supply, install, test and commission (SITC) 2 sets of L Band Router including minimum 64x192 L-Band Input & Output ports, X-Y/Router control panel with cable, dual redundant power supply and accessories.

2.1.4 Bidder shall supply, install, test and commission (SITC) IRDs in 4x(28+4) configuration for SDTV and HDTV channel. However, IRD racks shall be wired for 4x(30+4) configuration.

2.1.5 Bidder shall supply, install, test and commission (SITC) 4 sets of SD/HD-SDI Router which consist of minimum 64x64 HD-SDI Input & Output ports with X-Y remote control panel and single bus remote control panel. All 64x64 HD-SDI Input & Output ports shall also be capable to take SD-SDI signal without any limitation or upgradation/downgrading by way of hardware and software.

2.1.6 Bidder shall supply, install, test and commission (SITC) 4 sets of IP data switch in (1+1) configuration. Each set of IP data switch in (1+1) configuration shall be used for feeding IP input (Audio/Video Content) to the Encoders of one compression system.

2.1.7 Bidder shall supply, install, test and commission (SITC) 4 sets of compression system having H.264/MPEG-4 and H.265/HEVC compliant Encoders in (X+2) chassis configuration where "X" is no. of chassis comprising of atleast 16 HDTV Encoders with SDI input per stream. "X" no. of these encoder chassis shall also be capable to take atleast 40 SDTV signal with SDI input and compress them to MPEG-2 and H.264/MPEG-4 compression format without any limitation or requiring upgradation /downgrading by way of hardware and software.

Further, all the above encoder chassis of compression system shall also be capable to take MPEG-2 TS over IP input with decoding of MPEG-2, H.264/MPEG-4-AVC and H.265/HEVC Main 10 compressed contents to baseband signal format. Each encoder chassis with MPEG-2 TS over IP input shall be capable to encode minimum 4 HDTV channel in H.264/MPEG-4-AVC & H.265/HEVC Main 10 (at a time anyone standard) and minimum 16 SDTV channel in MPEG-2 & H.264/MPEG-4 (at a time anyone standard) as tabulated in technical specification without any limitation or requiring upgradation/downgrading by way of hardware and software. The encoding combination of SD & HD Channel is tabulated in encoder specification section.

2.1.8 Bidder shall supply, install, test and commission (SITC) 4 sets of IP data switch in (1+1) configuration. Each set of IP data switch in (1+1) configuration shall be used for feeding IP input (Audio/Video Content) to one set of (1+1) IP Encapsulator system.

2.1.9 Bidder shall supply, install, test and commission (SITC) 4 sets of IP Encapsulator in (1+1) configuration. Each set of (1+1) IP Encapsulator shall be used for transmission of one transport stream.

2.1.10 Bidder shall supply, install, test & commission (SITC) 4 sets of Compression Network Management System (NMS) in (1+1) configuration to control and monitor new streams i.e. 1N, 2N, 3N and 6N streams. Each set of (1+1) Compression Network Management System (NMS) shall control and monitor all compression equipment (i.e. IRDs, SDI Router, Encoders, Multiplexers, ASI Router, IP Switch etc) of one transport stream.

2.1.11 Bidder shall supply, install, test & commission (SITC) 4 sets of 8 x 8 or better matrix ASI router with dual redundant power supply, X-Y remote panel and single Bus panel.

2.1.12 Bidder shall supply, install, test & commission (SITC) 1 set of EPG and PSI/SI Generator/Server in (1+1) configuration with hot swappable dual redundant power supply.

2.1.13 Bidder shall supply, install, test & commission (SITC) 2 sets of IP Router with hot swappable dual redundant Power supply.

2.1.14 Bidder shall supply, install, test and commission (SITC) 1 set of IP data switch in (1+1) configuration. IP data switch in (1+1) configuration shall be connected to IP Router and used for IP streaming (Audio/Video Content, Data) for broadcast.

2.1.15 Bidder shall supply, install, test & commission (SITC) 2x1 sets of NTP server with hot swappable dual redundant power supply.

2.1.16 Bidder shall supply, install, test & commission (SITC) 6 sets of 4.5 to 4.8 mtr manually tracked motorized Receive PDA.

2.1.17 Bidder shall supply, install, test & commission (SITC) Power Distribution Panel(PDP), Sub Distribution Boards (SDBs) fitted with industrial type MCCBs & MCBs in new compression room and Monitoring Room for each source of power supply which caters the load of all new equipment in the respective room.

2.1.18 Bidder shall supply, install, test & commission (SITC) Power Supply cables (Minimum 70 Sqmm , 4 core copper Multi strand) between output of UPS PDPs to above said PDPs installed in new compression room including power supply cables from PDPs installed in new compression room to all SDBs.

2.1.19 Bidder shall supply, install, test & commission (SITC) 1 set of 42 RU, 19",1000 mm (depth) equipment ventilated racks for installation of all offered equipment. The suggestive number of equipment racks is approx 27 however may increase as per the solution offered. All the racks are to be provided with two nos. single phase MDUs and one no. single phase automatic power transfer/static switch connected between two sources of power supply routed through physically isolated routes. Please refer drawing no.13.

2.1.20 Bidder shall supply, install, test & commission (SITC) cable trays on top of all equipment racks and as per approved layout of all equipment, all inter cone cting cables (Audio/video, RF, power supply , control , data , earthing, sensor cables etc) shall be laid on cable tray and routed from top of racks.

2.1.21 The bidder shall provide minimum 16 sets of earth pits for this DTH set up. Please refer drawing no 15.

2.1.22 Bidder shall supply and install one set of measuring equipment as per BOM.

2.1.23 The bidder shall supply, install, test & commission (SITC) 1 set of 64x32 SD-SDI & HD-SDI/ASI compatible router with dual redundant power supply, X-Y remote panel and single Bus panel for confidence level monitoring.

2.1.24 Bidder shall supply, install, test & commission (SITC) 1 set of confidence level monitoring system.

2.1.25 Bidder shall supply, install, test & commission (SITC) 8 sets of multi-viewer display system (For monitoring of Input source, Ku band DTH Downlink signal). Each set of Multi Viewer display system shall display minimum 40 SDTV channels including 16 HDTV channels.

2.1.26 Bidder shall provide furniture for installation of various offered monitoring equipment in monitoring and control room matching with existing furniture.

# 3 Eligibility Criteria

The Bidder shall have to meet the following eligibility criteria:-

## 3.1 Input and Baseband System

3.1.1.1 Bidder shall offer L band Router/Matrix of only those OEMs who are having past experience of at least five years of manufacturing and supplying of similar L band Router. List of past supply record of OEM of such equipment to various organizations must be provided.

3.1.1.2 OEM of the offered equipment must have manufactured and supplied the offered equipment to the leading broadcaster as mentioned in the table below in immediate preceding past five years:

| S. No. | Offered Equipment | Qty |
|---|---|---|
| 1 | L band Router/Matrix | 5 Nos. |

3.1.1.3 Copies of supply order and receipt certificate/Factory dispatch document/delivery challan/Copy of invoice of above said quantity of L band Router/Matrix provided in para 3.1.1.2 to various organizations in preceding past five year should essentially be submitted along with the bid document.

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

## 3.2 Compression System

3.2.1.1 Bidder should have a proven track record of carrying out similar compression system projects in the past. The list of such projects successfully completed by the bidder in the preceding past five years should be submitted with the bid.

3.2.1.2 Bidder should have successfully completed two or more SITC of compression chains/streams in (m + n) redundancy mode (where m ≥1 & n ≥1 ) for DTH/ Digital Earth Station/ DTT/DVB-C platform in the immediate preceding past five years.

3.2.1.3 Copies of work order and successful completion certificate of the above two SITC provided at para 3.2.1.2 to various organizations in preceding past five year should essentially be submitted along with the bid document.

3.2.2.1 Bidder shall offer compression system of only those OEMs who are having past experience of at least five years of manufacturing and supplying of similar compression equipment. List of past supply record of OEM of such equipment to various organizations must be provided.

3.2.2.2

a) OEM of the offered equipment must have manufactured and supplied the offered equipment to the leading broadcaster as mentioned in the table below in preceding past five years.

| S. No. | Offered Equipment | Quantity |
|---|---|---|
| 1 | Professional IRDs | 100 Nos. |
| 2 | IP Encapsulator | 10 Nos. |

b) OEM of the offered equipment must have manufactured and supplied the offered equipment to the leading broadcaster as mentioned in the table below in post year 2020.

| S. No. | Offered Equipment | Quantity |
|---|---|---|
| 1 | Encoder Chassis* | 12 Nos. |

*Out of 12 Nos of Encoder chassis, atleast 6 nos. of Encoder chassis should have been supplied for DTH/Earth Station compression system for Broadcast Purpose.

3.2.2.3 Copies of supply order and receipt certificate/Factory dispatch document/delivery challan/Copy of invoice in respect of above said quantity of professional IRDs and IP Encapsulators provided in para 3.2.2.2 (a) in preceding past five years; and in respect of above said quantity of Encoders Chassis provided in para 3.2.2.2 (b) in post year 2020 to various organizations should essentially be submitted along with the bid document.

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

## 3.3 Monitoring System

3.3.1.1 Bidder shall offer Multi-viewer of only those OEMs who are having past experience of at least five years of manufacturing and supplying of similar Multi-viewer. List of past supply record of OEM of such equipment to various organizations must be provided.

3.3.1.2 OEM of the offered equipment must have manufactured and supplied the offered equipment to the leading broadcaster as mentioned in the table below in immediate preceding past five years:

| S. No. | Offered Equipment | Quantity |
|---|---|---|
| 1 | Multi-viewer | 10 Nos. |

3.3.1.3 Copies of supply order and receipt certificate/Factory dispatch document/delivery challan/Copy of invoice of above said quantity of Multi Viewer provided in para 3.3.1.2 to various organizations in preceding past five year should essentially be submitted along with the bid document.

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

## 3.4 Receive Antenna

3.4.1.1 Bidder shall offer Receive Parabolic Dish Antenna of only those OEMs who are having past experience of at least five years of manufacturing and supplying of similar Uplink/Receive Antenna. List of past supply record of OEM of such equipment to various organizations must be provided.

3.4.1.2 OEM of the offered Receive Parabolic Dish Antenna must have manufactured and supplied the offered Receive Parabolic Dish Antenna to the leading broadcaster as mentioned in the table below in immediate preceding past five years:

| S. No. | Offered Equipment | Qty |
|---|---|---|
| 1 | Receive Parabolic Dish Antenna | 10 Nos. |

3.4.1.3 Copies of supply order and receipt certificate/Factory dispatch document/delivery challan/Copy of invoice of above said quantity of Receive Parabolic Dish Antenna provided in para 3.4.1.2 to various organizations in preceding past five year should essentially be submitted along with the bid document.

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

**3.5** Bidder not having relevant experience may tie up with other partner/partners having requisite experience as mentioned above. In such case, the partner/partners alongwith the bidder will be responsible for carrying out Design, Fabrication, Supply, Installation, Testing & Commissioning of the offered system. The documents for requisite experience of the partner/partners along with the bidder are to be submitted along with bid. The Memorandum of Understanding (MOU) of partnership to this effect should be submitted along with the bid. However, this MOU does not absolve the bidder from successful completion of SITC job as per the terms and conditions of the tender.

**3.6** Bidder must have his local office/authorized representative/dealer in India for after sales service support.

## 4. Turnkey Implementation and Commissioning:-

a) The complete project will consist of Supply, Installation, Testing and Commissioning (SITC) of four compression chain and their monitoring system at DTH Earth Station Todapur. The project will be carried out on turnkey basis.

b) Each and every offered equipment and accessories including software should be from internationally reputed manufacturer and the quoted model should be high class, high MTBF, field proven and in use by leading broadcasters/ organizations in various continents of the World.

c) The system shall be designed to meet the International standards for digital satellite broadcasting known as the 4:2:0, MPEG-2, MP@ML & H.264/MPEG-4, MP@L3 for SDTV and 4:2:0, H.264/MPEG-4, MP@L4 & H.265/HEVC, MP@L4 for HDTV standards.

d) All the offered equipment shall be BIS compliant and conform to the Government approved standards.

### 4.1 Input and Base Band System:

4.1.1 The L band output signal of 6 nos. of new Receive Antenna & 14 nos. of existing receive PDA will be connected to splitter and one output of splitter shall be connected to OFC trans unit in the existing Porta cabin. After that, Optical output of trans unit will be delivered to L band Receive unit of OFC Link in new compression room and connected to new L band Router. The second output of splitter will be connected to dual channel L band amplifier and delivered to existing L band splitter through RF Cable in old compression room. Thereafter, output of existing L band splitter shall also be connected to new L band Router in new compression room.

4.1.2 Bidder has to supply, lay, integrate and test OFC and RF cables with matching connectors as per DRG 1, 2, 2A, 3 & 4.

### 4.2 Compression System:

4.2.1 Bidder shall lay, integrate and test video cables with matching connectors from all IRDs (i.e. 128 nos. IRDs) to SD/HD-SDI Input patch panels, SD/HD-SDI Input Patch Panels to SD/HD SDI Routers, Output of SD/HD SDI Routers to Output Patch Panels and finally upto the input of all Encoder chassis.

4.2.2 Bidder shall lay, integrate and test Audio cables with matching connectors from all Radio IRDs (i.e. 36 nos. IRDs at new compression room) to the Input of AES patch panels, AES Patch Panels to AES Audio/Video Embedder; Video cables from AES Audio Emberdder to SD/HD-SDI Input patch panels, SD/HD-SDI Input Patch Panels to SD/HD SDI Routers, Output of SD/HD SDI Routers to Output Patch Panels and finally upto the input of all Encoder chassis.

4.2.3 Bidder shall lay, integrate and test Audio cables with matching connectors from all Radio IRDs (i.e. 18 nos. IRDs at old compression room) to the Input of AES patch panels, AES Patch Panels to AES Audio/Video Embedder; Video cables from AES Audio Emberdder to existing SD/HD-SDI Input patch panels.

4.2.4 Bidder shall lay, integrate and test Ethernet cables with matching connectors from IRDs to (1+1) IP data switch & network switch and upto the input of all Encoder chassis. Further, Ethernet cables with matching connectors shall also be laid, integrate and test from the output of Encoder chassis to (1+1) IP data switch and upto the input of (1+1) IP Encapsulator of each sets.

4.2.5 There shall be two fully populated complete chassis of encoder as redundant for each stream. The number of encoders in the redundant chassis shall be populated with same or more number of encoders as in highest populated main encoder chassis.

4.2.6 Bidder shall lay, integrate and test Ethernet cables with matching connectors from IP Router to EPG and PSI/SI Generator/Server and upto the IP data switches & network switches.

4.2.7 Bidder shall lay, integrate and test RF cables with matching connectors from GPS Antenna to NTP Time server and Ethernet cables from NTP server to IP network switches.

4.2.8 All the Electronic equipment should have necessary control interfaces through RS 232 / RS 422/ RS 485/ RJ45 etc so that they can be interfaced with a Control Computer for remote monitoring and control with suitable GUI. The associated software for logging, archiving, monitoring and controlling along with the accessories should also be made available.

4.2.9 For Integration of equipment, Indoor type Video Cable, Audio Cable, and CAT-6 or better cable for Audio/Video/IP data, IP networking should be used.

4.2.10 The system must offer an intuitive user interface as well as remote configuration of all modules, simplifying system deployment and reducing operational routines.

## 4.3 Mains Distribution Unit (MDU) and Power Supply system:

4.3.1 Bidder shall supply, install, test & commission (SITC) Panel Distribution Panel, Sub Distribution Boards (SDBs) fitted with MCCBs & MCBs in new compression room and Monitoring Room for each source of power supply which caters the load of all new equipment in the respective room. Please refer drawing no 13.

4.3.2 Bidder shall supply, install, test & commission (SITC) two nos. single phase MDUs (minimum) and one no. single phase automatic power transfer/static switch(minimum) in each rack for providing redundant power supply to equipment. Please refer drawing no 13.





24/03/22

24/03/22

4.3.3 Bidder shall provide two separate sources of power supply in each rack through physically isolated routes and terminated on industrial type 3 Pin female connecter to be mounted near each rack. Further, both source of power supply shall be connected to single phase automatic power transfer/static switch through industrial type 3 Pin male connector. The outputs of single phase automatic power transfer/static switch shall be connected to MDUs for further feeding to equipment. Please refer drawing no 13.

4.3.4 Bidder shall supply, install, test & commission (SITC) Thermometers and Hygrometers with IP output in each rack for monitoring of temperature and humidity of each rack at monitoring room through remote monitoring system. Please refer drawing 14.

4.3.5 Bidder shall assess the electrical load of equipment installed in each room, required length & rating of power supply cables. Bidder shall provide assorted length of copper power supply cables with minimum 50 percent (nominal) load margin for interconnecting/integrating from existing UPS Output PDPs to individual rooms PDPs & SDBs etc Please refer drawing no 13.

4.3.6 The layout plan, electrical diagram, PDP layout, SDB layout, Rack layout, Interconnecting drawing of Equipment Drawing and other drawings need to be submitted for approval of Doordarshan before execution of SITC work at site.

4.3.7 The offer shall include supply, installation, testing and commissioning (SITC) of the setup, complete in all respects. A suggestive block schematic is provided to give a general idea about the intended configuration. A complete schematic of actually proposed implementation including power supply system should be supplied along with the quote.

## 4.4 Monitoring and Measuring system

4.4.1 Bidder shall make provision for monitoring of Input/Source signals received from C - band receive PDA through IRDs i.e. IP Input (MPEG-2 TS over IP) compressed in MPEG-2, MPEG-4 & HEVC format need to be routed to the input of multi-viewer. Dolby Digital (AC-3) 5.1 audio data with meta data are also embedded on to HD-SDI signal which shall be routed to multi viewer system for monitoring. In addition to above, Bidder shall also make provision for monitoring of Inputs/source signal of Radio service received from the output of AES Audio embedder i.e. carrying with SD/HD-SDI colour bar and routed to the input of Multi-viewer. (Please refer drawing no. 12).

4.4.2 Bidder shall make provision for monitoring of DTH Downlink signals received from Ku-band receive PDAs need to be routed through chassis consisting of multiple DVB-S & DVB-S2 demodulators & iCAS descramblers with MPEG-2 TS over IP output and MPEG-2, MPEG-4 & HEVC SD and HD decoders and it shall be routed to the input of multi viewer of monitoring system. MPEG-1 Layer-II and Dolby Digital (AC-3) 5.1 audio data with meta data are also embedded on to HD-SDI signal which shall be routed to multi viewer system for monitoring. (Please refer drawing no. 12). There should be at least one chassis of demodulator & iCAS descramblers for each stream.





24/03/22

24/03/22

4.4.3 There should be CI slot in downlink chain to demodulate DVB-S & DVB-S2 services and descramble (iCAS) all MPEG-2, MPEG-4 & HEVC services of all streams. There shall be provision to demodulate & descramble (iCAS) at least 40 TV service & 8 Radio channel per stream. CI slot is required to be provided in the downlink monitoring chain for CAM modules in demodulators/Descrambler or before decoders so that encrypted channels can be received. Each CAM module shall decrypt upto eight services.

4.4.4 Bidder shall supply, install, test & commission (SITC) Eight sets of multi-viewer display system for monitoring of TV Channels (Four sets for Input source and other Four sets for Monitoring of Ku band DTH Downlink signal).Each set of multi viewer display system shall be provisioned to decode and display 40 SDTV including 16 HDTV channels and 8 Radio channels.

4.4.5 The input source of signal shall be IP Input (MPEG-2 TS over IP, RTMP, HLS, SRT) compressed in MPEG-2, MPEG-4 & HEVC format. Ku band DTH down link signal shall be iCAS encrypted MPEG-2 TS over IP with MPEG-2, MPEG-4 & HEVC compressed, DVB-S & DVB-S2 standard. (Please refer Drawing # 12 for monitoring setup).

4.4.6 Bidder shall provide new sets of video cables connected between new multi viewer systems to display system in Monitoring room.

4.4.7 Bidder shall supply, install, test & commission (SITC) 4 nos. of Ku- band receive PDA having size 120 cm and 4 nos. of Ku band receive PDA having size 60 cm for receiving the downlink signal for DTH downlink monitoring.

4.4.8 Bidder shall supply install, test & commission (SITC) of 2 sets of Computer Control system for Multi-viewer monitoring system. One set shall be used for Input source multi viewer monitoring and other set for down link multi viewer monitoring system.

4.4.9 The bidder shall supply, install, test & commission (SITC) 1 set of 64x32 SD-SDI & HD-SDI/ASI routers with redundant power supply with X-Y remote panel and single Bus panel(Please refer Drawing # 11 for confidence monitoring setup.

4.4.10 Bidder shall supply, install, test & commission (SITC) 1 set of confidence level monitoring system including IRDs, 16.5 to 17 inch color monitor, Audio/Video Ampli speaker etc. There should be provision for monitoring points at the following locations:

a. **Input Monitoring(SDI)**: SDI (with Embedded audio in MPEG-1 Layer-II, Dolby Digital AC-3 5.1 Audio & Dolby Digital Plus 5.1 audio and metadata) from SDI Routers using 64x32 SD & HD-SDI/ASI Router, WFM, 16.5 to 17 inch colour monitor, 16 Channel Audio/Video Monitor with Amplispeaker (Refer DRG No. 4, 5, & 11). However, existing WFM shall be used.



24/03/22

24/03/22

b. **Input Monitoring (ASI & IP)**: ASI Output of source IRDs through patch panel and its IP output through IP Switch, IRD (with ASI & IP input) and 64x32 SD & HD-SDI/ASI Router, using WFM and 16.5 to 17 inch Colour monitor, 16 Channel Audio/Video Monitor with Ampli speaker (Refer DRG No. 4, 5, & 11). However, existing WFM shall be used.

c. **Encoders Monitoring:** Output of encoder through IP Switch, IRD (with IP input) and 64x32 SD & HD-SDI/ASI Router, using WFM and 16.5 to 17 inch Colour monitor, 16 Channel Audio/Video Monitor with Ampli speaker (Refer DRG No. 6, 7, & 11). However, existing WFM shall be used.

d. **Multiplexers monitoring:** Multiplexer output through ASI router and IRD (with ASI input) and 64x32 SD & HD-SDI/ASI Router, using WFM & 16.5 to 17 inch Colour monitor, 16 Channel Audio/Video Monitor with Ampli speaker ) (Refer DRG No. 6, 7 & 11). However, existing WFM shall be used.

e. Temperature and humidity monitoring facility of each new equipment rack through remote computer.

## 4.5 Receive Antenna System:

4.5.1 Bidder shall supply, install, test and commission (SITC) 6 nos. 4.5 mtr to 4.8 mtr (size) manual motorized receive PDA with four port C & Ku Band linear orthogonal feed.

4.5.2 Bidder shall carry out Antenna foundation with provision of Earthing including Earthing pits and Lightning Arresters for the offered Receive Antenna System.

4.5.3 Bidder shall Supply and install Support poles & covered cable tray from Receive Antenna system to existing cable tray and to be integrated with existing cable tray (Min. distance-50 m) at site for laying of L band cables and power cables of newly supplied receive PDAs.

4.5.4 The Support poles & Cable tray with cover must be made up of galvanized iron material and should be painted with anti-rust, anti-corrosion paint matching with existing cable tray.

4.5.5 L band cables of these receive antenna will be brought to existing Porta cabin and shall be terminated at the respective L band patch panel.

4.5.6 Power Supply cables of these receive antenna will be brought from outdoor unit to Antenna SDB installed near existing Porta cabin; and shall be terminated to MCBs. Supply, Installation and Integration of MCBs of suitable rating for these Antenna in existing SDB is in the scope of the bidder.



24/03/22

24/03/22

## 4.6 System Requirements:

4.6.1 The bidder must ensure completeness of the envisaged expansion of DTH set up in all respects. The envisaged DTH set up should be completed and fully wired for all the equipment fitted in 19" standard racks. The offered system must have enough flexibility in adapting the changing requirements from the technical and operational point of view. The bidder should submit detailed schematics and layouts for proposed solution based on the offered equipment along with the offer.

4.6.2 In order to ensure the completeness of the scope of system, any additional equipment/accessories which bidder feels necessary to complete the configuration should also be quoted. However, in such case they should provide proper justification for the additional equipment required.

4.6.3 Bidder shall submit only one solution (Single BOM) for the offered system. Bid with multiple options against any requirement is liable to be rejected. BOM shall not contain any optional items as an alternative for any line entry item. However, bidder can offer additional accessory items as options for performance improvement of main line entry item of same make.

4.6.4 Each offer should be complete in all respect. Incomplete & non-compliant offers will be rejected summarily, without making any references to bidder.

4.6.5 Bidder may have to demonstrate the features of equipment offered as and when asked as part of technical evaluation of tender including statistical multiplexing in MPEG-4/HEVC compression format for 32 SDTV/16 HDTV channels in full resolution per transport stream. However, it will not bestow any right of acceptance of the bid.

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

4.6.7 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.

4.6.8 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 five years of installation i.e. warrantee period should be supplied free of cost.

4.6.9 The bidders may visit the site for their assessment of existing facilities and requirement before submission of the bid. Bidders desiring to visit the site must submit the request to Doordarshan in one week advance with the details of the persons for facilitating the visit.

4.6.10 Cost of any other work, consultancy and material required for completing the installation & commissioning of the Input Baseband System, Compression and



24/03/22

(For Industry Feedback)

24/03/22

monitoring system including power supply system should be taken into account and clearly mentioned while submitting the tender.

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

4.6.12 The offer should clearly specify the list of equipment hardware, interfaces, cables etc and associated software provided with the Remote Computer System for interfacing it with different components of the chain.

4.6.13 To avoid any delay due to inter-dependent activities like site readiness, providing power supply etc, The bidder should submit time frame for completing the activities up to the commissioning of the set-up on a PERT chart starting from date of issue of Purchase Order (P.O.)( i.e. DD/MM/YYYY)+ along with bid.

4.6.14 As an SITC contract, all supplied equipment are to be installed, tested and commissioned at site mentioned above, by the Bidder. The cost of any other interconnecting material and labour required for laying of cables, Earthing etc. should be included in the tender.

4.6.15 The successful bidder will be solely responsible for commissioning and operationalisation of the Input and Baseband System, Compression System, Monitoring System and Power Supply System to the satisfaction of Doordarshan.

4.6.16 System/equipment (motor controllers etc.) 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.

4.6.17 The routing of wiring between racks to be done from the Top of the racks.

4.6.18 The bidder should specify the hardware limitation if any.

4.6.19 The system must offer an intuitive user interface as well as remote configuration of all modules, simplifying system deployment and reducing operational routines.

4.6.20 A suggestive block schematic is provided in annexure –VI (17 sheets) to explain the full scope of the work and give a general idea about the intended configuration. A complete schematic of actually proposed implementation should be supplied along with the quote. Physical topography may be different than the suggestive block diagram but it should meet the project objectives.

4.6.21 The layout plan of equipment of Input and Base band system, Compression system and Monitoring system, Power Supply System, racks, electrical diagram, PDP, SDB layout and other drawings need to be submitted for approval of Doordarshan before execution of SITC work at site.

4.6.22 The system offered should be complete in all respect.

# 5. Technical Specification of Major Equipment

## 5.1 Specification for Input and Base band System

L band output signal of 6 nos. of new Receive Antenna & 14 nos. of existing receive PDA will be connected to splitter and one output of splitter shall be connected to OFC trans unit in the existing Porta cabin. After that, Optical output of trans unit will be will be delivered to L band Receive unit of OFC Link in new compression room and connected to new L band Router. The second output of splitter will be connected to dual channel L band amplifier and delivered to existing L band splitter through RF Cable in old compression room. Thereafter, output of existing L band splitter shall also be connected to new L band Router in new compression room and finally L band signal shall be connected to all IRDs. The major equipment of input and base band system will consist of:

(a) Dual Channel L band OFC Link
(b) Dual Channel L Band Amplifier
(c) 64x192 L Band Router
(d) IRD's for SD and HD channels
(e) 8 AES Audio Digital & SDI Video Embedder
(f) 4.5 mtr to 4.8 mtr C & Ku band Receive Only Antenna

### 5.1.1 Dual channel L Band Optical Fiber Link :-

#### A) General

(i) The L-Band fibre optic Transmitter and Receiver pair will be used for transporting RF Satellite signals in the L Band over fibre from the panels located at porta cabin near antenna to the L band router panel located in new Compression room.

(ii) The offered solution should be scalable and modular in design and architecture. The offered system should have space for future expansion by adding additional optical transmitter and/or receiver modules.

(iii) The system should have built-in 1:1 dual redundant & hot-swappable power supply units.

(iv) Trans & Receive unit shall be configurable locally through front-panel or remotely via Web-Interface (Web-GUI, SNMP etc).

(v) The Optical Transmitter and Receiver Module should support RF Power monitoring.

(vi) The system may have minimum 12 slots per chassis and 19" rack-mount.

## B) Dual Channel L-Band to Optical Fiber Transmitter:-

### (a) Features:-

(i) It shall accept dual RF input in L band on coaxial cable and provide corresponding independent optical output for transmission.

(ii) The units should provide DC pass through and 13/18V/OFF DC modes for LNB power along with Active LNB current limit & short circuit protection.

(iii) It should have 22 kHz tone on/off for LNB local oscillator control.

(iv) It should have Manually adjustable or AGC gain modes to manage RF level.

(v) It should have comprehensive LED indicators on Transmitter module and/or LCD Display panel on chassis for status information like Link RF drive strength, LNB voltage and DC input voltage level etc.

(vi) It should have Protocol independent design - transports all modulation formats.

### (b) Technical parameter of dual channel Optical Fiber Transmitter (L band to optical fiber conversion):-

| S. No. | Parameter | Specification |
|---|---|---|
| 1 | RF Input Connector | BNC/F-Type, Female, |
| 2 | No of RF Input Port | Minimum one no. for each channel |
| 3 | RF Input Impedance | 75Ω |
| 4 | Input Frequency Range | 950 MHz to 2150 MHz |
| 5 | RF Input Level | -10 to -60 dBm |
| 6 | RF input power level (Damage Level) | +10dBm or better |
| 7 | Input return loss | 10 dB or better |
| 8 | Link Gain Range | 20 dB Min in 1 dB step |
| 9 | Switchable LNB-supply | 13V, 18V, OFF (Selectable) DC, 22kHz tone, 400mA max |
| 10 | Protection | Short Circuit, Current Limited |
| 11 | Optical output connector | SC/LC APC, Female |
| 12 | No of OFC output port | minimum 1 No. for each channel |
| 13 | Fibre Type | Single Mode |



24/03/22

24/03/22

| | | |
|---|---|---|
| 14 | Operating wavelength | 1310nm ±10nm |
| 15 | Optical output power | +2dBm or better |
| 16 | Compliance laser Safety | Class-1 laser product, compliance with IEC 60825-1 or better |
| 17 | Compliance EMI/RFI | Comply with FCC part 15,Class A EU EMC directive |

**C) Dual Channel Optical to L Band Receiver:-**

**(a) Features:-**

(i) It shall accept dual optical input and provide corresponding independent L band output for transmission.

(ii) The fibre optic receivers should accepts a single fiber optic input on an SC/LC/APC connector and provide L band output signal. They should accept the fibre optic input from a compliant transmitter and provide the undistorted L band output signal.

(iii) It should be Protocol transparent receiver who can receive all video, audio and data modulation formats.

(iv) It should have built-in gain for optimal signal level tuning and supports manual, and automatic (AGC) gain control modes to provide L band output independent of optical loss.

(v) It should have comprehensive LED indicators on Receiver module and /or LCD display panel on chassis for status information.

**(b) Technical parameter of dual channel Optical Fiber Receiver (Optical to L Band conversion):-**

| S. No. | Parameter | Specification |
|---|---|---|
| 1 | Optical Input Connector: | SC/LC APC, Female |
| 2 | No of Input Connector | Minimum 1 No. for each channel |
| 3 | Fibre type | Single Mode |
| 4 | Operating Wavelength (Nominal) | 1310 nm - 1550 nm (Optimized with OFC Transmitters) |
| 5 | Optical Power sensitivity | 0 dBm or better |
| 6 | Optical input power level (Damage Level) | +3dBm or better |
| 7 | RF output | Minimum 1 No. for each channel |



24/03/22

24/03/22

| | | |
|---|---|---|
| 8 | RF output connector | BNC/ F-Type, Female, 75 Ohms |
| 9 | RF output Frequency range | 950 MHz to 2150 MHz |
| 10 | RF output | Better than -30dBm |
| 11 | Output return loss | 12 dB |
| 12 | Frequency response OFC Link | ±1.5dB max at -30dBm RF output |
| 13 | Link Gain range | 20 dB (in 1 dB step) |
| 14 | Compliance EMI/RFI | Comply with FCC part 15,Class A EU EMC directive |

### 5.1.2 Dual Channel L Band Line Amplifier

**A General**

1. The L-Band Line amplifier will be used for transporting RF Satellite signals in the L Band from porta cabin to the L band router panel located in old Compression room; and old Compression room to new Compression room.
2. The offered solution should be scalable and modular in design and architecture. The offered system should have space for future expansion by adding additional modules.
3. The system should have built-in 1:1 dual redundant & hot-swappable power supply units.
4. L band Line Amplifier shall be configurable locally through front-panel or remotely via Web-Interface (Web-GUI, SNMP etc).
5. It should have comprehensive LED indicators on amplifier module and/or LCD display panel on chassis for status information like Link RF drive strength, LNB voltage and DC input voltage level etc.
6. L band line Amplifier should support RF Power monitoring.
7. The system may have minimum 4 slots per chassis and 19" rack-mount.

**B Technical Specification**

| S. No. | Parameter | Specification |
|---|---|---|
| 1 | RF Input Connector | BNC/F-Type, Female, |
| 2 | No of RF Input Port | Minimum one no. for each channel |
| 3 | RF Input Impedance | 75Ω |
| 4 | Input Frequency Range | 950 MHz to 2150 MHz |
| 5 | RF Input Power Level Range | -10 to -60 dBm |



24/03/22

24/03/22

| | | |
|---|---|---|
| 6 | RF input power level (Max) | +10dBm max. (damage level) |
| 7 | Input Return Loss | 12 dB min |
| 8 | Output frequency response | ±1.5dB max at 0dBm RF Output |
| 9 | Output Gain Control | MGC and AGC selectable |
| 10 | Gain Range | 25 dB Min in 1 dB step |
| 11 | Switchable LNB-supply | 13V, 18V, OFF (Selectable) DC, 22kHz tone, 400mA max |
| 12 | Protection | Short Circuit, Current Limited |

### 5.1.3 L-Band Router (64 x 192) with control panel

**A. General**

(i) L band signal shall be received through RF cable from OFC Receive unit and existing L band Router/splitter. The output of L band router shall be connected to IRDs.

(ii) Router should have Full fan out (splitting) facility such that it can be configured to route any of the input (64 input) carrying L band signal to any or all of the output (192 no. outputs).

(iii) It should have hot swappable dual redundant Power supply unit.

(iv) It should have hot swappable frame controller card or CPU Card.

(v) It should have Cross point Matrix module or Mid Matrix Card or Central Switch Board.

(vi) It should have hot swappable Input cards and hot swappable Output cards.

(vii) The unit shall be able to provide DC power to LNBCs either through inbuilt power supply or external power supply unit of the same make as of router.

(viii) The matrix should be scalable to future expansion upto (64 x 256) as and when required.

(ix) The control of the L-band router (LBR) should be through OEM (Router) supplied NMS apart from the manual control & configuration through external control panel or control panel on router or front panel touch screen panel.

**B. Technical Specification**

| Sl. | Parameter | Specification |
|---|---|---|
| 1 | Operating frequency | 950 to 2150 MHz |
| 2 | **Isolation** | |
| a | Input to input | 60dB (min.) |
| b | Output to output | 60 dB (min.) |





24/03/22

24/03/22

| | | |
|---|---|---|
| c | Input to output | 50 dB (min.) |
| 3 | **Return loss** | |
| a | Input return loss | 10 dB (min.) |
| b | Output return loss | 10 dB (min.) |
| 4 | Input/output RF Connector | Type "F/BNC" |
| 5 | Impedance | 75 ohm |
| 6 | Remote control | RS 232 or RS422/485 or RJ45 or other |

## 5.1.4 Specification for Integrated Receiver Decoder (IRD)

### A. General

(i) The professional IRDs should receive the L band input and give digital (SD-SDI, SD-SDI with Embedded Audio, AES/EBU, HD-SDI, HD-SDI with Embedded Audio), ASI outputs and MPEG-2 TS over IP output with multiple services filtering facility and bulk decryption.

(ii) One SD-SDI down converted output of HD-SDI should be available.

(iii) IRD should be able to carry out multiple services filtering on IP output port.

(iv) IRD should have a front control panel display to enter or edit all the parameters for perfect reception of the signals.

(v) There shall be a provision for observing BER & signal level or C/N & C/N margin or Eb/No & Link Margin for DVB-S mode of operation and PER & signal level or C/N & C/N margin or Es/No & Link Margin for DVB-S2 mode of operation on the front display panel.

(vi) IRD should be able to bulk descramble BISS mode 1 and BISS-E signals.

(vii) There should be at least one vacant slot (CI slot) for conditional Access System (iCAS) for descrambling all MPEG-2, H.264/MPEG 4 & H.265/HEVC and DVB-S & DVB S2 services.

(viii) There should be direct decompression of ASI to SDI i.e. not through analog to Digital conversion.

(ix) IRD should be able to store at least 10 presets channels configuration in memory.

(x) It should be possible to configure and monitor the IRD through NMS of compression system.

(xi) IRD should be able to generate and save log for alarms and warning through NMS of compression system.

(xii) 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.





24/03/22 24/03/22

## B. RF Parameter Specifications

| Sl. No. | Parameters | Specification |
|---|---|---|
| 1 | Input Frequency Range | 950 - 2150 MHz |
| 2 | No. of Inputs | 2 (min.) |
| 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,<br>DVB-S2 QPSK and 8PSK |
| 13 | Variable Symbol Rates | 1.0 to 40 M Symbol /sec for ( DVB-S)<br>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),<br>R=1/2, 3/5, 2/3, 3/4, 4/5,5/6, 8/9, 9/10 (For DVB-S2, QPSK)<br>R= 3/5, 2/3 , 3/4, 5/6,8/9,9/10<br>( DVB-S2 , 8PSK) |
| 15 | IF Filter Bandwidth | Automatic Selection (dependent on Symbol Rate). |

## C. ASI Input and ASI Output Transport Stream specification

| Sl. No. | Parameters | Specification |
|---|---|---|
| **A** | **ASI Input** | |
| **1** | Format | MPEG-2 TS over ASI on BNC |
| **2** | Quantity for ASI Input | Minimum one no. on BNC |
| **B** | **ASI Output** | |
| **1** | Format | MPEG-2 TS over ASI on BNC |
| **2** | Quantity for ASI Output | Minimum one no. on BNC |





24/03/22

24/03/22

## D. Audio and Video Decompression Parameters

| Sl. No. | Parameters | Specification |
|---|---|---|
| 1 | Video Resolution (all resolutions shall be capable of I, P & B frame decoding, other standard solution should be selectable) | i) For SDTV<br>720 X 576<br>544 X 576<br>480 X 576<br>ii) For HDTV<br>1920x1080<br>1440x1080 |
| 2 | Video Decompression Type | i) SD MPEG-2, MP@ML, 4:2:0<br>ii) SD MPEG-2, 422@ML, 4:2:2<br>iii) SD MPEG-4, MP@ L3, 4:2:0<br>iv) SD MPEG-4, Hi422@ L3, 4:2:2<br>v) HD H.264 MP@ Level 4.0 4:2:0<br>vi) HD H.264 Hi422 @ Level 4.0, 4:2:2<br>vii) HD H.265/HEVC Main 10 4:2:0 |
| 3 | Television Standard | PAL-B (EN50083-9) |
| 4 | Audio Decompression Type | i) MPEG-1 Layer-II audio<br>ii)HE AAC( MPEG 4) v1 & v2 5.1 Audio<br>iii)Dolby Digital (AC-3) 5.1 Audio<br>iv) Dolby Digital plus 5.1 Audio (E-AC-3) (Pass through)<br>v) Linear PCM (Pass Through)<br>vi) Dolby E (Pass-through) |

## E. Digital Video output Specifications (SD-SDI & HD-SDI)

| Sl. No. | Parameters | Specification |
|---|---|---|
| 1 | SD-SDI and HD-SDI O/P Serial Interface | SMPTE 259M-(10 bit) 270 Mbps<br>SMPTE 292M-1485 Mbps |
| 2 | SD-SDI with Embedded Audio | SMPTE 272M |
| 3 | HD-SDI with Embedded Audio | SMPTE 299 M |
| 4 | Video Output Format | HD-SDI and SD-SDI |
| 5 | Connector Type | BNC (75 Ohms) |
| 6 | Quantity | Minimum 2 Nos. of digital output compliant to ITU-R BT.656 Standard or latest |
| 7 | Level | 800mV p-p for SDI As per ITU-R BT.601 (part A) and ITU-R BT.709 |





24/03/22

24/03/22

## F. Digital Audio Output Specifications

| Sl. No. | Parameters | Specification |
|---|---|---|
| 1 | Output Format | i) AES/EBU or AES3 id<br>ii) HE AAC( MPEG 4) v1 & v2 5.1 Audio<br>iii)Dolby Digital (AC-3) 5.1 Audio<br>iv) Dolby Digital Plus 5.1 Audio (E-AC-3) (Pass-through)<br>v) Linear PCM (Pass Through)<br>vi) Dolby E (Pass-through) |
| 2 | Load Impedance | 75/110 Ohms |
| 3 | Connector Type | BNC Female / XLR male Socket or with suitable XLR adapter (i.e. no terminal block) |
| 4 | Number of Output | 4 Stereo Channels |

## G. LNB Power Supply & Control

| Sl. No. | Parameters | Specification |
|---|---|---|
| 1 | LNB Voltage | + 13 V (Vertical) and 18 V (Horz) polarizations switching or 19 V fixed. |
| 2 | Power Consumption | 300 mA. (Max.) |
| 3 | Over Current and short circuit protection | Fold back current limiting. |
| 4 | LNB Power Supply & Control | Receive Polarization Control by electrical Command Via LNB-IF feeder (High & Low band switching Pulse for Ku-Band operation). |

## H. IP Input (TS & Data) and IP Output (TS & Data) specification

| Sl. No. | Parameters | Specification |
|---|---|---|
| **A** | **IP Input** | |
| 1 | Format | MPEG-2 TS over IP (MPTS & SPTS) on Ethernet |
| 2 | Quantity for IP Input | Minimum two nos. RJ 45 if Uni-directional ports<br>OR<br>Minimum one no. RJ 45 if Bi-directional port |
| **B** | **IP Output** | |
| 1 | Format | MPEG-2 TS over IP on Ethernet with multiple services filtering facility and decryption including opportunistic data. |



24/03/22 24/03/22

| | | |
|---|---|---|
| 2 | Quantity for IP Output | Minimum two nos. RJ 45 if Uni-directional ports<br>OR<br>Minimum one no RJ 45 if Bi-directional port |

**I. Size**

| Sl. No. | Parameters | Specification |
|---|---|---|
| 1 | Mount | 19" Rack Mount |

## 5.1.5 Specifications for 8 AES Digital Audio & SDI Video Multiplexer Unit (Embedder) for Radio Service

### A. General

1) The offered product should auto detect the defined standard of video input signal.
2) It should be able to provide programmable audio delay for lip sync issues.
3) The offered Embedder should have excellent performance features like "high Input impedance", "flat frequency response", "very low total harmonic distortion" and "extremely high signal to noise ratio (S/N)".
4) It should be able to remove all available audio before embedding or allow overwriting with channel shuffling.
5) It should be able to embed AES on output without video source or genlock i.e. on Internal Colour bar.
6) It should be able to provide high quality cable equalization to the input signal up to the length of minimum 100 m @1.5 Gb/s & 300m @270 Mb/s cable
7) Monitoring software should allow configuration and status of the card.
8) Visual indicators should also give its status about power supply, input etc.
9) 19" rack Frame with Frame controller for remote configuration & monitoring; and auto switchable dual redundant power supply unit. Two Audio embedder card shall be fitted in each Frame and also expandable to accommodate upto four Audio embedder card in future.

**B. Technical Specifications**

| (a) | Input: | | |
|---|---|---|---|
| i. | Digital Audio Inputs | : | AES3 |
| ii. | No. of Audio Input | | 8 |
| iii. | Connector type | | DIN/BNC/XLR with suitable adapter |
| iv. | Impedance | | 110 Ohm balanced |
| v. | Serial digital video Input | : | 1 no. HD/SD-SDI & Internal colour bar |
| vi. | No. of Outputs | : | 2 or more HD/SD-SDI signal with Embedded audio |
| vii. | Serial input & output return loss | : | > 10 dB up to 3 GHz |

## 5.1.6 4.5 m to 4.8m Manually Operated motorized C & Ku-band Receive Antenna

**A. Feature**

(i) This antenna would be used to receive satellite down link signals in C & Ku-band. Antenna reflector should be made of lightweight material.

(ii) Azimuth, Elevation offset angles (Calibrated and absolute) shall be available for the operator at the base of the antenna.

(iii) There shall be manually operated motorized facility for independent movement of antenna in Elevation & Azimuth direction and also for fine correction of polarization.

(iv) Repeat accuracy of the performance should be ensured by the manufacturer.

(v) All the petals and struts are to be marked by stamping for proper placing during reassembling.

(vi) No major field alignment is required at the site for getting the specified performance.

(vii) Descriptive details of the antenna installation should be provided, along with antenna foundation details, including bar bending schedule, bill of materials and procedure to be followed in the installation.

(viii) All iron parts should be hot galvanized (Minimum 100 microns).

(ix) Bidder will have to supply, install, test and commissioning the PDA.

(x) Bidder shall provide PDA foundation on ground.

(xi) Detailed diagram showing the Antenna foundation & installation and connection of accessories must be given along with the offer for approval. As an SITC contract, material, labour for earthing, earth pits, Lightening arrester for antenna etc. should be included.





24/03/22

24/03/22

## B. Technical Specification

| Sl. No. | Parameter | Specification |
|---|---|---|
| 1 | Antenna Type | Parabolic Prime focus |
| 2 | Reflector Type | Single piece solid or Segmented solid |
| 3 | Reflector Material | Aluminum Stretched formed or Precision formed or<br>GFRP with UV protection SMC coating |
| 4 | Size | 4.5 m to 4.8m |
| 5 | Mount | Mount of Elevation and Azimuth |
| 6 | Frequency of operation (Receive C-Band) | 3.7 GHz to 4.2 GHz |
| 7 | Frequency of operation (Receive Ku-Band) | 10.7 GHz to 12.75 GHz |
| 8 | Gain (Receive C-band) | 42.2 dBi (min) at midband |
| 9 | Gain (Receive Ku-band) | 51.0 dBi (min) at midband |
| 10 | Feed | 2 Port (H & V) C-band & 2 Port (H & V) Ku- Band receiving both linear orthogonal polarized signals |
| 11 | Polarization type | Linear orthogonal |
| 12 | Drive System | Manually operated Motorized |
| 13 | Steer ability | Manually operated Motorized |
| | a) Azimuth | Steer ability of Motorized Antenna control system, Azimuth should be 110 degrees continuous |
| | b) Elevation | Steer ability, Elevation 5 deg to 85 deg |
| | c) Polarization | ± 90 deg (min). |
| 14 | Cross Pole Isolation | 30 dB (min) |
| 15 | VSWR (receive) | ≤ 1.5: 1 |
| 16 | Wind Speed | |
| | a)Operational | Upto 70 KMPH |
| | b)Survival | upto190 KMPH |
| 17 | Waveguide Flanges (Receive C band) | CPR 229G |
| 18 | Waveguide Flanges (Receive Ku band) | WR 75 |
| 19 | Feed Impedance | Matching with LNBC |



24/03/22

24/03/22

## C. Manually operated Motorised Antenna Controller

(i) Manually operated Motorised antenna controller unit shall have control facility for all the three axis (AZ/EL/POL) for orientation of Receive Antenna.

(ii) Manually operated Motorised Antenna Controller unit shall be outdoor type and to be installed near Receive Antenna.

## D. Specification for LNBC (Digital PLL C band)

| Sl. No. | Parameter | Specification |
|---|---|---|
| 1 | Input frequency range | 3.7 GHz to 4.2 GHz |
| 2 | Local Oscillator frequency | 5.150 GHz |
| 3 | L.O. Stability | ± 10 PPM |
| 4 | L.O. Phase noise | 70 dBc/Hz @ 1kHz (min) |
| | | 80 dBc/Hz @ 10kHz (min) |
| | | 90 dBc/Hz @ 100kHz (min) |
| 5 | Output frequency | 950 MHz to 1450 MHz |
| 6 | Conversion gain | 55 dB (min.) |
| 7 | Gain response | Better than ± 1 dB/40 MHz |
| 8 | Output level at 1dB compression point | 6 dBm (min.) |
| 9 | Output Connector | F connector |
| 10 | Input VSWR/Output VSWR | Better than 2.5:1 |
| 11 | Noise Temperature | Better than 30deg K |
| 12 | Power supply requirement | Should work between + 15V to +24V With current consumption of about 350mA (max.) |
| 13 | Input flange | CPR 229 |

## E. Specification for LNB ( Ku Band)

| Sl. No. | Parameter | Specification |
|---|---|---|
| 1 | RF frequency range | 10.7 – 11.7 GHz (low)<br>11.7- 12.75 GHz(high) |
| 2 | IF Range | 950- 1950 MHz (low)<br>1100-2150 MHz (high) |
| 3 | Noise Figure | better than 1.0 dB |



24/03/22

24/03/22

| | | |
|---|---|---|
| 4 | LO frequency | 9.75 GHz (low)<br>10.60 GHz(high) |
| 5 | LO stability | better than ± 2 MHz |
| 6 | LO phase noise | -50 dBc @1 KHz |
| | | -75 dBc @ 10 KHz |
| | | -85 dBc @ 100 KHz |
| 7 | Current Consumption | ≤150 mA |
| 8 | Band selection | By Voltage |
| 9 | Output Connector | F –Type Female |
| 10 | Gain | 48 dB min |
| 11 | Supply Voltage to energies LNB and band Selection | Anyone voltage between 11.5 V to 14.0 V (Low)<br>Anyone Voltage between 16.0 V to 19.0 V (High) |

### 5.1.7 Specification for the Low loss cable

Low loss cable of 100 meter length with each antenna is to be supplied for connecting LNBC to Trans unit of Fiber link installed in Porta cabin. The cable should have 75 ohm impedance and Attenuation (dB / 100 meter) at different frequencies as below –

| Sl. No. | Operating Frequency (in MHz) | Maximum Attenuation of Cable upto (dB/100meters) |
|---|---|---|
| 1 | 100 | 4.5 |
| 2 | 200 | 6.5 |
| 3 | 500 | 10.5 |
| 4 | 1000 | 15.0 |
| 5 | 1400 | 17.6 |
| 6 | 1800 | 20.0 |
| 7 | 2150 | 22.0 |





24/03/22

24/03/22

## 5.2 Digital Compression System

i) The baseband and MPEG 2 TS over IP signals to the Input of the Encoders are to be brought from IRDs installed in Input rack via SDI Router & IP Data Switch. All the compression equipment should preferably be from one OEM/company or approved by OEM of compression system, for ease of operation, networking and full automation. The system management should be through NMS. The compression system shall comprise basically a minimum of the following equipment:

   a) 64x64 SD/HD-SDI Routing Switcher

   b) Chassis consisting of multiple MPEG-2 & MPEG-4 SDTV and MPEG-4 & HEVC HDTV Video Encoder

   c) IP Encapsulator cum Multiplexer for Statistical Multiplexing with DVB-CSA (V-1 & V-2) supported DVB-CAS(iCAS) simulcrypt encryption

   d) IP Data Switch

   e) Compression Control system Computer (Hardware and Software) i.e. Network Management System (NMS)

   f) 8 x 8 or better matrix of SDI/ASI Router

   g) EPG and PSI/SI Generator/Server

   h) GPS enabled NTP Time Server

   i) IP Router

ii) The compression system should have facility to insert Logo for each channel either in encoder or in multiplexer. Alternatively, separate logo inserter unit can also be offered.

iii) All the Compression equipment like SDI Router, Encoders and IP Encapsulator cum Multiplexer, IP Switches, IP Router, ASI Router, EPG and PSI/SI Generator, NTP Server etc shall be compatible with IP based interface.

iv) All the Electronic equipment should have necessary control interfaces through RS 232 / RS 422/ RS 485/ RJ45 etc so that they can be interfaced with a Control Computer for remote monitoring and control with suitable GUI. The associated software for logging, archiving, monitoring and controlling along with the accessories should also be made available.

## 5.2.1 Specification for 64 x 64 SD/HD-SDI Routing Switcher

### A. General:

The routing Switcher should be very reliable and able to be used for selection of any one of the 64 HD-SDI input signals to 64 HD-SDI different destinations. All 64 x 64 input and destinations shall also be SD-SDI. The equipment so offered should be for professional set-up applications. The Router has to be quoted with X-Y and Single Bus Remote Control Panels.

### B. Essential features:

(i) The routing switcher electronics should be capable of being mounted in a standard 19" rack frame.

(ii) The rack frame should be modular to house input, output, control and power supply modules.

(iii) The switcher shall handle HD-SDI & HD-SDI with embedded audio, SD-SDI & SD-SDI with embedded audio and ASI signal for routing from input to output destinations of their respective port. The switching should take place during the vertical interval period.

(iv) The switcher should have storage facilities for control information, so that in case of power supply failure, the status of the switcher output should remain unchanged when the power supply is restored.

(v) The switcher should have redundant cross point card/module and redundant controller/ logic cards to achieve complete (1+1) redundancy.

(vi) The switcher should have auto-switchable redundant dual power supplies.

(vii) A certificate from Compression OEM regarding compatibility with compression NMS is required to be submitted for offered router along with the bid.

(viii) Any of the 64 HD-SDI and SD-SDI input shall be capable of being switched to any or all of 64 outputs port.

### C. Technical Specification:

| Sl. No. | Parameter | Specification |
|---|---|---|
| 1. | Matrix size | 64 x 64 for HD-SDI and SD-SDI port |
| 2. | Input | HD-SDI with embedded audio ( including Dolby AC-3 5.1 audio & Dolby E, SD-SDI with embedded audio, and ASI ( BNC/HD BNC; 75 ohms) |





24/03/22

24/03/22

| | | |
|---|---|---|
| 3. | Equalization for SD-SDI signal | Automatic: 150 Meters at 270 Mbps. |
| 4. | Equalization for HD-SDI signal | Automatic: 80 Meters at 1.485 Gbps. |
| 5. | Output | One or more HD-SDI SDI with embedded audio (including Dolby AC-3 5.1 audio & Dolby E) and SD-SDI with embedded audio for each of 64 HD & SD SDI destinations; BNC/HD BNC; 75Ω, 800 mV ±10%. |
| 6. | Return Loss | ≥10 dB on data rate upto 1485 Mb/s throughout the switching chain. |

## 5.2.2 Specification for SDTV Encoder in MPEG-2 & H.264/MPEG-4-AVC Compression and HDTV Encoder in H.264/MPEG-4-AVC & H.265/HEVC Compression Configuration

### A. Configuration of Encoding System:

(i) Bidder shall supply, install, test and commission (SITC) 4 sets of compression system having H.264/MPEG-4 and H.265/HEVC compliant Encoders in (X+2) chassis configuration where "X" is no. of chassis comprising of atleast 16 HDTV Encoders with SDI input per stream. "X" no. of these encoder chassis shall also be capable to take atleast 40 SDTV signal with SDI input and compress them to MPEG-2 and H.264/MPEG-4 compression format without any limitation or requiring upgradation /downgrading by way of hardware and software. Each encoder chassis shall have 4 to 10 BNC/HD BNC/Micro BNC/DIN/Mini DIN Female ports enabled for feeding SD/HD SDI input signal. Each encoder chassis should have same hardware and software licenses.

For example, if bidder offers encoder chassis with 10 BNC/ HD BNC/Micro BNC/DIN/Mini DIN Female port, the probable combination/configuration of channels to be compressed in each chassis are tabulated below:

| No. of BNC/ HD BNC/Micro BNC/DIN/Mini DIN Female Ports enabled per chassis | No. of SDTV Channel to be compressed in MPEG-2 & H.264/MPEG-4 (at a time anyone standard) with SDI Input | No. of HDTV Channel to be compressed in H.264/MPEG-4 & H.265/HEVC (at a time anyone standard) with SDI Input | Total No of TV channels to be compressed in Each chassis |
|---|---|---|---|
| 10 | 10 | 0 | 10 |
| 10 | 9 | 1 | 10 |
| 10 | 8 | 2 | 10 |
| 10 | 6 | 4 | 10 |

(ii) All the above encoder chassis of compression system shall also be capable to take MPEG-2 TS over IP input with decoding of MPEG-2, H.264/MPEG-4-AVC and H.265/HEVC Main 10 compressed contents to base band signal format. All encoder chassis with MPEG-2 TS over IP input shall be capable to encode minimum 4 HDTV channel in H.264/MPEG-4-AVC & H.265/HEVC Main 10 (at a time anyone standard) and minimum 16 SDTV channel in MPEG-2 & H.264/MPEG-4 (at a time anyone standard) without any limitation or requiring upgradation/downgrading by way of hardware and software licenses.

The probable combination/configuration of channels to be compressed by enabling various filters (Noise Filters, Pre-processing, etc) are tabulated below:

| Groups/Combinations (at a time anyone) | No. of SDTV Channels to be compressed in MPEG-2 & H.264/MPEG-4 (at a time anyone standard with MPEG-2 TS over IP Input) | No. of HDTV Channels to be compressed in H.264/MPEG-4 & H.265/HEVC (at a time anyone standard with MPEG-2 TS over IP Input) | Total No of TV channels to be compressed in each chassis |
|---|---|---|---|
| 1 | 16 | 0 | 16 |
| 2 | 13 | 1 | 14 |
| 3 | 9 | 2 | 11 |
| 4 | 6 | 3 | 9 |
| 5 | 4 | 4 | 8 |

**B. Features of Encoder**

(i) There should be dual redundant SMPS power supply units per Chassis. In case of Single power supply unit in encoder chassis, bidders can offer additional chassis which shall be populated with same no. of encoders with single power supply unit for the completeness of the offer as an alternative to inbuilt redundant power supply unit.

(ii) It should also have the preprocessing facility for the efficient encoding process viz; adaptive noise reduction.

(iii) It should have multi-pass encoding.

(iv) It should have interface for Remote Control.

(v) It should generate PSI.

(vi) On loss of Video input, it should have option to auto switch to pre-recorded Image (JPEG/PNG, GIF format) and in case of "No video Input", it should be configurable to 'No video output".



24/03/22

24/03/22

(vii) The encoder shall be MPEG-2, MPEG-4 and HEVC standard compliant without any limitation or upgradation by way of hardware or software licenses.

(viii) There should be provision for 4 stereo audio with MPEG-1 Layer-II & HE AAC v1 & v2 5.1 audio encoding in each SDTV encoder.

(ix) There should be provision for 4 stereo audio with Dolby Digital (AC-3) 5.1 decoding & encoding, Dolby Digital plus 5.1 decoding & encoding, MPEG-1 Layer-II & HE AAC v1 & v2 5.1 audio encoding in each HDTV encoder which may enable to encode the audio in Dolby Digital (AC-3) 5.1 and Dolby Digital Plus 5.1 audio with down-mix of one MPEG-1 Layer-II at any given point of time.

(x) There should be audio loudness control in each channel for maintaining uniform audio level in spite of changes from different input feeds and programs meeting the ITU-BS-1770-2/ITU-BS-1770-3 standard for loudness control.

(xi) The Encoder shall be closed captioning compliant with EIA 608/708, DVB-subtitling and digital program insertion compliant with SCTE 35 insertion via SCTE104 triggers without any limitation or upgradation by way of hardware or software licenses.

(xii) The encoded output of chassis should be MPEG-2 TS over IP on RJ45 connector.

(xiii) Encoder hardware/Server shall decode RTMP, HLS, SRT & ZIXI IP Input stream of TV and Radio Services in various format as mentioned below under clause "F" and these services shall be re-encoded; and encapsulated in the output of transport stream by IP Encapsulator cum Multiplexer. In addition to above, Encoder hardware/Server shall also be capable for encoding/streaming of TV & Radio services in RTMP, DASH, HLS format, so that it may be enabled by additional licenses in future, if required.

(xiv) There should be provision for internal de-embedding of 8 AES audio channel from SDI input and thereafter these de-embedded 8 AES audio channel shall be encoded and configured to 8 Radio channel in each encoder chassis.

## C. Serial Digital Interface (SDI) Input Specifications

| Sl. No. | Parameter | Specification |
|---|---|---|
| 1 | Video Inputs | SD-SDI & HD-SDI with embedded audio |
| 2 | Serial Interface | i) SMPTE 292M, 1485 Mb/s (10 bit) with embedded audio<br>ii) SMPTE 259M, 270 Mb/s (10 bit) with embedded audio |
| 3 | Format | ITU(R)-BT. 601 & ITU-R BT.709 |
| 4 | Connector | BNC/HD BNC/Micro BNC/DIN/Mini DIN Female, 75 ohm |
| 5 | Physical SDI Port enabled | i) Minimum 4 Port<br>ii) Maximum 10 Port |

| | | |
|---|---|---|
| 6 | Input Level | 800 mV p-p nominal ±10%, SDI input |
| 7 | Return Loss | ≥15 dB from 5 MHz to 1.5 GHz /OR<br>≥10 dB on data rate upto 1485 Mbps |

## D. Embedded Serial Digital Audio Input Specifications

| Sl. No. | Parameter | Specification |
|---|---|---|
| 1 | Serial interface | a) SMPTE 272M<br>b) SMPTE 299M |
| 2 | Format | AES/EBU, 4 stereo channels |
| 3 | Connector | BNC/HD BNC/Micro BNC/DIN/Mini DIN Female,75 ohm |

## E. IP Transport Stream Input Specifications

| Sl. No. | 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<br>ii) H.264/MPEG-4-AVC<br>iii) H.265/HEVC Main 10 |
| 4 | Decoding of Audio from TS | i) MPEG-1 Layer-II<br>ii) HE AAC V1 & V2 5.1 Audio<br>iii) Dolby Digital AC-3 5.1 Audio<br>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 |

## F. IP Streaming Input Specifications

### 1. RTMP IP Streaming Input Format of TV Service

i) HDTV Channel

| Input Format | Streaming Format | Profile Number | Video Decoding standard | Profile | Video Resolution | Audio Decoding Standard | Type of Audio channels |
|---|---|---|---|---|---|---|---|
| RTMP PUSH | MPEG TS i.e. (.TS) | 1 | H.264 | High | 1920 x 1080 | AAC-LC,V1,V2, | Stereo, Mono for AACLC,V1 and V2 |
| | | 2 | H.264 | High | 1440 x 1080 | AAC-LC,V1,V2 | Stereo, Mono for AACLC,V1 and V2 |
| | | 3 | H.264 | High | 1280x720 | AAC-LC,V1,V2 | Stereo, Mono for AACLC,V1 and V2 |



24/03/22

24/03/22

ii) SDTV Channel

| Input Format | Streaming Format | Profile Number | Video Decoding standard | Profile | Video Resolution | Audio Decoding Standard | Type of Audio channels |
|---|---|---|---|---|---|---|---|
| RTMP PUSH | MPEG TS i.e. (.TS) | 1 | H.264 | High | 720 x 576 | AAC-LC,V1,V2, | Stereo, Mono for AACLC,V1 and V2 |
| | | 2 | H.264 | High | 544 x 576 | AAC-LC,V1,V2 | Stereo, Mono for AACLC,V1 and V2 |
| | | 3 | H.264 | High | 480x576 | AAC-LC,V1,V2 | Stereo, Mono for AACLC,V1 and V2 |

## 2. HLS IP Streaming Input Format of TV Service

i) HDTV Channel

| Input format | Streaming Format | Profile Number | Video Decoding standard | Profile | Video Resolution | Audio Decoding Standard | Type of Audio channels |
|---|---|---|---|---|---|---|---|
| HLS PUSH | MPEG TS i.e. (.TS) | 1 | H.264 & HEVC | High | 1920 x 1080 | AAC-LC,V1,V2, DD, DD+ | Stereo, Mono for AACLC,V1 and V2 5.1 for DD & DD+ |
| | | 2 | H.264 & HEVC | High | 1440 x 1080 | AAC-LC,V1,V2, DD, DD+ | Stereo, Mono for AACLC,V1 and V2 5.1 for DD & DD+ |
| | | 3 | H.264 & HEVC | High | 1280x720 | AAC-LC,V1,V2, DD, DD+ | Stereo for AACLC,V1 and V2 5.1 for DD & DD+ |

ii) SDTV Channel

| Input Format | Streaming Format | Profile Number | Video Decoding standard | Profile | Video Resolution | Audio Decoding Standard | Type of Audio channels |
|---|---|---|---|---|---|---|---|
| HLS PUSH | MPEG TS i.e. (.TS) | 1 | H.264 & HEVC | High | 720 x 576 | AAC-LC,V1,V2, DD, DD+ | Stereo, Mono for AACLC,V1 and V2 5.1 for DD & DD+ |
| | | 2 | H.264 & HEVC | High | 544 x 576 | AAC-LC,V1,V2, DD, DD+ | Stereo, Mono for AACLC,V1 and V2 5.1 for DD & DD+ |
| | | 3 | H.264 & HEVC | High | 480x576 | AAC-LC,V1,V2, DD, DD+ | Stereo, Mono for AACLC,V1 and V2 5.1 for DD & DD+ |



24/03/22 24/03/22

### 3. SRT IP Streaming Input Format of TV Service

i) HDTV Channel

| Input format | Streaming Format | Profile Number | Video Decoding standard | Profile | Video Resolution | Audio Decoding Standard | Type of Audio channels |
|---|---|---|---|---|---|---|---|
| SRT (Listener & Caller) | MPEG TS i.e. (.TS) | 1 | H.264 & HEVC | High | 1920 x 1080 | MPEG-1 L-II, AAC-LC,V1,V2, DD, DD+ | Stereo, Mono for AACLC,V1 and V2 5.1 for DD & DD+ |
| | | 2 | H.264 & HEVC | High | 1440 x 1080 | MPEG-1 L-II, AAC-LC,V1,V2, DD, DD+ | Stereo, Mono for AACLC,V1 and V2 5.1 for DD & DD+ |
| | | 3 | H.264 & HEVC | High | 1280x720 | MPEG-1 L-II, AAC-LC,V1,V2, DD, DD+ | Stereo for AACLC,V1 and V2 5.1 for DD & DD+ |

ii) SDTV Channel

| Input Format | Streaming Format | Profile Number | Video Decoding standard | Profile | Video Resolution | Audio Decoding Standard | Type of Audio channels |
|---|---|---|---|---|---|---|---|
| SRT (Listener & Caller) | MPEG TS i.e. (.TS) | 1 | H.264 & HEVC | High | 720 x 576 | MPEG-1 L-II, AAC-LC,V1,V2, DD, DD+ | Stereo, Mono for AACLC,V1 and V2 5.1 for DD & DD+ |
| | | 2 | H.264 & HEVC | High | 544 x 576 | MPEG-1 L-II, AAC-LC,V1,V2, DD, DD+ | Stereo, Mono for AACLC,V1 and V2 5.1 for DD & DD+ |
| | | 2 | H.264 & HEVC | High | 480x576 | MPEG-1 L-II, AAC-LC,V1,V2, DD, DD+ | Stereo, Mono for AACLC,V1 and V2 5.1 for DD & DD+ |

### 4. ZIXI IP Streaming Input Format of TV Service

i) HDTV Channel

| Input format | Streaming Format | Profile Number | Video Decoding standard | Profile | Video Resolution | Audio Decoding Standard | Type of Audio channels |
|---|---|---|---|---|---|---|---|
| ZIXI PUSH & PULL | MPEG TS i.e. (.TS) | 1 | H.264 & HEVC | High | 1920 x 1080 | MPEG-1 L-II, AAC-LC,V1,V2, DD, DD+ | Stereo, Mono for AACLC,V1 and V2 5.1 for DD & DD+ |



24/03/22

24/03/22

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | 2 | H.264 & HEVC | High | 1440 x 1080 | MPEG-1 L-II, AAC-LC,V1,V2, DD, DD+ | Stereo, Mono for AACLC,V1 and V2 5.1 for DD & DD+ |
| | | 3 | H.264 & HEVC | High | 1280x720 | MPEG-1 L-II, AAC-LC,V1,V2, DD, DD+ | Stereo for AACLC,V1 and V2 5.1 for DD & DD+ |

ii) SDTV Channel

| Input Format | Streaming Format | Profile Number | Video Decoding standard | Profile | Video Resolution | Audio Decoding Standard | Type of Audio channels |
|---|---|---|---|---|---|---|---|
| ZIXI PUSH & PULL | MPEG TS i.e. (.TS) | 1 | H.264 & HEVC | High | 720 x 576 | MPEG-1 L-II, AAC-LC,V1,V2, DD, DD+ | Stereo, Mono for AACLC,V1 and V2 5.1 for DD & DD+ |
| | | 2 | H.264 & HEVC | High | 544 x 576 | MPEG-1 L-II, AAC-LC,V1,V2, DD, DD+ | Stereo, Mono for AACLC,V1 and V2 5.1 for DD & DD+ |
| | | 3 | H.264 & HEVC | High | 480x576 | MPEG-1 L-II, AAC-LC,V1,V2, DD, DD+ | Stereo, Mono for AACLC,V1 and V2 5.1 for DD & DD+ |

## 5. Input Format of Radio Service received through IP Streaming

| Input Format | Profile Number | Streaming Format | Audio Decoding Standard | Type of Audio channels |
|---|---|---|---|---|
| RTMP PUSH | 1 | (i) MPEG TS i.e. (.TS)<br>(ii) Raw audio format(.aac) | (i) AAC-LC,<br>(ii) HE-AAC V1,<br>(iii) HE-AAC-V2, | Stereo , Mono for AACLC, V1 and V2 |
| HLS PUSH | 1 | (i) MPEG TS i.e. (.TS)<br>(ii) Raw audio format(.aac) | (i) AAC-LC,<br>(ii) HE-AAC V1,<br>(iii) HE-AAC-V2, | Stereo , Mono for AACLC, V1 and V2 |



24/03/22

24/03/22

## G. Video compression parameters

| Sl. No. | Parameter | Specification |
|---|---|---|
| 1 | Video Resolutions (PAL) | For SDTV<br>720 x 576,<br>544 x 576,<br>480 x 576,<br>For HDTV<br>1920 x 1080<br>1440 x 1080 |
| 2 | Profiles and Levels | i) SD MPEG-2, MP@ML<br>ii) SD H.264/MPEG-4, MP@ L3<br>iii)HD H.264 Main Profile Level 4.0<br>iv)HD H.264 High Profile Level 4.0<br>v) HD H.265/HEVC Main 10 |
| 3 | Video Bit-rate | i) 500 Kbps to 4 Mbit/s for 4:2:0 Profiles of SDTV on MPEG-2 depending upon Resolution<br>ii) 3 to 20 Mbit/s for 4:2:0 Profiles of HDTV in MPEG-4 depending upon Resolution<br>ii) 3 to 8 Mbit/s for 4:2:0 Profiles of HDTV in HEVC depending upon Resolution |
| 4 | Temporal Processing | I, B, B, P frames structure to support low delay mode. |
| 5 | Coding of Interlaced Video | Adaptive field & frame Processing support |
| 6 | Spatial Redundancy | Discrete Cosine Transform (DCT) Reduction |
| 7 | Chrominance Format | 4:2:0 |
| 8 | Aspect Ratio | 4:3 and 16:9 |
| 9 | Type of Encoding | Variable bit rate |

## H. Audio Compression Paramètres

| Sl. No. | Parameter | Specification |
|---|---|---|
| 1 | Audio Encoding Method | i) MPEG-1 layer II<br>ii) HE-AAC (MPEG-4) v1 & v2 5.1 Audio<br>iii) Dolby Digital 5.1AC-3 audio<br>iv) Dolby Digital Plus 5.1 E-AC-3 audio |
| 2 | Data rate | i) 64-192 kbps (MPEG-1, layer II)<br>ii) 32-72 kbps (MPEG-4, HE AAC V1 encoding)<br>iii) 16-48 kbps (MPEG-4, HE AAC V2 encoding)<br>iii) 224-640kbit/s (Dolby Digital 5.1 audio encoding)<br>iv) 192-640kbit/s (Dolby Digital Plus 5.1 audio encoding) |

## I. IP Transport Stream Output Specification

| Sl. No. | Parameter | Specification |
|---|---|---|
| 1 | Type | Gigabit Ethernet |
| 2 | MPEG Format | MPEG 2 TS over IP |
| 3 | No of Ports dedicated for IP Output | Minimum two nos. independent ports and configurable in redundant mode |
| 4 | Speed | 1000 Mbps or better per port |
| 5 | Addressing | Unicast and Multi cast (at a time only one). |
| 6 | Ethernet Interface | 1000 base T or better |
| 7 | Ethernet Connectors | RJ 45 |

## J. Control and configuration of Encoder chassis

| Sl. No. | Parameter | Specification |
|---|---|---|
| 1 | Control port | Min. 1 no. 10/100/1000 Base-T Ethernet port for NMS |
| 2 | Connector Type | RJ 45 |

## K. Hardware of Server in case of software compression solution

### a) General Feature:

i. CPU/Chipset of server should have facility to enable an environment where applications can run within their own space, protected from all other software on the system.
ii. CPU/Chipset of server should have security feature that can reduce exposure to viruses and malicious-code attacks and prevent harmful software from executing and propagating on the server or network.
iii. CPU/Chipset of server should have facility of Secure Key consisting of a digital random number generator that creates truly random numbers to strengthen encryption algorithms.
iv. CPU/Chipset of server should have Thermal Monitoring facility to protect the processor package and the system from thermal failure.
v. The offered processor of server should be scalable, high quality, robust with efficient performance.
vi. Each server of software compression solution should be designed with 85 percent (Max.) CPU loading.
vii. CPU of server shall be similar to Intel Xeon Gold series or better and launch date of CPU of server should not be prior to year 2020.
viii. Facility to store the last configuration in the network hardware so that in case of failure of the Compression System Control Computer, the system remains running and continues to Statistically multiplex two or more programme as per the last good configuration.



(For Industry Feedback)

**b) Hardware Feature:**

| Sl. No. | Parameter | Specification |
|---|---|---|
| **A** | **Performance of Central Processing Unit** | |
| 1 | No. of Core | 18 (Min.) per CPU |
| 2 | No. of Thread | 36 ( Min.) per CPU |
| 3 | Processor Base Frequency | 2.10 GHz or better |
| 4 | No. of CPU | Two or more |
| **B** | **Memory Specification** | |
| 5 | RAM | DDR4, 64 GB or more |
| 6 | Storage Memory | SSD, 240 GB (Min.) in Raid 1 Configuration |
| **C** | **Operating System** | |
| 7 | Operating system | Linux |
| **D** | **Ethernet Network** | |
| i | No. of Ports (Duplex) in server | i) Two nos. of 1 Gigabit port for Input or more<br>ii)Two nos. of 1 Gigabit port for Output or more<br>iii) Two nos. of 1 Gigabit port for Management & Control<br>iv)Two nos. of 1 Gigabit port for Ancillary services |
| **E** | **PCI slot** | |
| i | PCI slot | 2 nos. or more |
| **F** | **Operating Environment** | |
| 8 | Operating Temperature | 10 to +35 °C |
| 9 | Humidity | 10% to 90% non-condensing |

## 5.2.3 Specification for IP Data Switch

### A. Features

(i) Multicast IP routing, and access control list of connected hardware
(ii) Redundant swappable Power System for protection against power supply failures.
(iii) IEEE 802.1/w Rapid reconfiguration of Spanning Tree, and IEEE802.1s Multiple VLAN instances of spanning Tree.
(iv) IEEE 802.1x support for dynamic, port-based security, providing user authentication.
(v) Real-time network fault analysis with easy-to-deploy device specific best-practice templates.
(vi) The required hardware and software including their licenses shall be provided for Multicast IP Routing, VLAN configuration and GUI of the switch for configuration and Monitoring of IP ports through Compression NMS.



24/03/22

(For Industry Feedback)

24/03/22

(vii) The required Hardware & associated accessories (Cable with Connector) and software including their licenses shall be provided for stacking of the all IP Switches.

### B. Specification

| Sl. No. | Parameter | Specification |
|---|---|---|
| **A** | **Performance** | |
| 1 | Forwarding rate | 72 Mpps (100 MBps) or better |
| 2 | Memory: | |
| i | DRAM | 4 GB (Min) |
| ii | FLASH | 2 GB (Min) |
| 3 | Maximum 10/100/1000 Ethernet ports (Selectable) | 48 (Min) |
| 4 | Switching capacity | 176 Gbps(Min) |
| 5 | Throughput | 72 Mpps(Mega packets per second) or better |
| 6 | IPv6 support | in software |
| 7 | Uplink optics type | 4 SFP (Min 10 GB per SFP port) with device |
| 8 | CPU | 800 MHz (Min) |
| 9 | Shared buffer | 12 MB (Min) |
| 10 | Height of IP Switch | 1 RU |
| **B** | **Indicators** | |
| 11 | Per-port status LEDs | link integrity, disabled, activity, speed, and full-duplex indications |
| 12 | System-status LEDs: | Fan, power and system Indicator |

## 5.2.4 Specification for IP Router

### A. General Features

(i) IP Router shall support broadband and leased line access for delivering any services i.e. Audio, Video, data etc) to encoding System

(ii) IP Router shall have dual redundant hot swappable Power System for protection against power supply failures.

(iii) IP Router shall be scalable by providing additional hardware and software in future.

(iv) IP Router shall have Network Address Translation (NAT) facility to mask the IP Addresses & ports of the host to another IP address & ports.

(v) IP Router shall support both Encryption and non-Encryption streaming.





24/03/22

24/03/22

(vi) IP Router shall offer service flexibility and deliver Layer 2 VPN and Layer 3 VPN and Multicast services.

(vii) It shall have inbuilt firewall processor with port blocking facility to support IP security to protect against vulnerabilities to subscriber traffic and network.

(viii) The required hardware and software including their licenses shall be provided on perpetual basis for Multicast IP Routing, NAT, VLAN, Tunneling configuration and GUI of the Router for configuration and Monitoring of all IP ports.

**B. Technical Specification**

| Sl. No. | Parameter | Specification |
|---|---|---|
| **A** | **Performance** | |
| 1 | CPU | 4 core or better |
| 2 | Memory: | |
| i | DRAM | 8 GB (Min) |
| ii | FLASH | 8 GB (Min) |
| 3 | Maximum 10/100/1000 Ethernet ports (Selectable) | 24 (Min) |
| 4 | Network Address Translation | Minimum 1000 Devices. |
| 5 | Supporting Protocol of IP Router | IPv4, IPv6, static routes, Routing Information Protocol Versions 1 and 2, Multicast Internet Group Management Protocol Version 3 (IGMPv3), DHCP, HSRP, IPv4-to-IPv6 Multicast, MPLS, Layer 2 and Layer 3 VPN, IP sec, Layer 2 Tunneling Protocol Version 3 etc |
| 6 | Aggregate Throughput | 1Gbps or better |
| 7 | Height of IP Router | 1 RU |
| **B** | **Indicators** | |
| 8 | Per-port status LEDs | link integrity, disabled, activity, speed, and full-duplex indications |
| 9 | System-status LEDs: | Fan, power and system Indicator |

## 5.2.5 IP Encapsulator cum Multiplexer Specifications

**A. Features:**

i) Each IP Encapsulator cum multiplexer shall be capable of multiplexing minimum of 64 SDTV services or 20 HDTV services or combination of both SD & HD service + 8 Radio channels (only in CBR) with DVB-CSA (V-1 & V-2) supported DVB-CAS simulcrypt encryption through IP and ASI in CBR and/or VBR mode inputs per transport stream. It should have the facility for statistical Multiplexing, scrambling, De-multiplexing and again multiplexing the relevant/required services.

ii) The Compression system ( Either IP Encapsulator cum multiplexer or Encoder) should be able to create independent as well as combination of pool of services mux in statistical & CBR for MPEG 2, H.264/MPEG 4 and H.265/HEVC Compressed streams of SD & HDTV channels.

iii) Each IP Encapsulator shall have enabled minimum four independent IP data port (Bi-directional), one IP port for DVB-CSA (V-1 & V-2) supported DVB-CAS with simulcrypt encryption & four independent ASI input port and four independent ASI output port, so that IP Encapsualtor shall be able to take input stream/signal through IP as well as ASI port for multiplexing the channels and take out multiplexed transport stream through IP on RJ 45 as well as ASI on BNC/HD BNC/Micro BNC port.

iv) Each IP Encapsulator shall generate four independent ASI output transport stream with DVB-CSA (V-1 & V2) supported DVB-CAS simulcrypt Encryption(iCAS) for transmission with option of generating ASI output transport stream without DVB-CAS encrypted (free to air) for monitoring of this set up.

v) Each IP Encapsulator should be capable to multiplex both SDTV and HDTV signal simultaneously with DVB-CSA (V-1 & V-2) supported DVB-CAS simulcrypt encrypted ASI output as well as without DVB-CAS encrypted (free to air) independent ASI transport output for monitoring.

vi) It should be possible to include any HD encoder part of any mux pool and transport stream irrespective of its physical location at IP switch and Route any service through any Input to any output.

vii) There should be a facility to add minimum four numbers of configurable ASI port for implementation of DVB-CSA (V-1 & V2) compliant CAS system without any up-gradation by way of hardware and software in future.

viii) IP Encapsulator should be capable to accept variable video bit rate Programme Stream and Multiplex the multiple streams in a multiple Multiplexing Group i.e. "n x services" and allocate optimum bit rate to the services in the Transport Stream.

ix) The multiplexer shall be capable of transmission of broadcast data signals along with video and audio.

x) IP Encapsulator should have DVB compliant for encapsulation of EPG data, DVB-SI/PSI table, NIT table, EMM table, ECM table generated by EPG and DVB-SI/PSI Generator/Server and CAS server in the output of transport streams.

xi) Each IP Encapsulator cum Multiplexer unit should have Hot swappable dual redundant SMPS Power Supply.

## B. Technical Specification

| Sl. No. | Parameter | Specification |
|---|---|---|
| a) | **IP data Port Specifications** | |
| 1 | Type | Gigabit Ethernet 802.3z |
| 2 | No. of data Ports | Minimum four independent ports (Bi-directional) with licenses (2 ports for Input & 2 ports for output configurable) |
| 3 | I/O Speed | Min 900 Mbps per port |
| 4 | IP Encapsulation | MPEG -2 TS over IP |
| 5 | MPEG Format | 188 B per TS |
| 6 | Addressing | Unicast and Multi cast (at a time only one). |
| 7 | Ethernet Interface | 1000 base T |
| 8 | Ethernet data Connector | i) Min. 7 Nos. 1 Gigabit RJ 45 port (Bi-directional) for Input data, Output data and Ancillary data.<br>ii) Min. 4 Nos. 10 Gigabit SFP Port (Bi-directional) with device. |
| 9 | Ethernet Control and Management connector | Min. 1 no RJ 45 for control and management |
| b) | **DVB-ASI Transport Stream Input Specifications** | |
| 1 | Format | MPEG-2 TS/ DVB-ASI |
| 2 | Quantity | Minimum 4 independent ports |
| 3 | Connector | BNC/HD BNC/Micro BNC; Female |
| c) | **DVB-ASI Transport Stream Output Specifications** | |
| 1 | Format | MPEG-2 TS/ DVB-ASI |
| 2 | Quantity (No. of o/p Port) | Minimum Four Independent ports configurable to DVB-CSA (V-1 & V-2) encryption for transmission.<br>These ports shall also be enabled to simulcrypt minimum two DVB-CAS encryption and configurable to free to air mode for monitoring. |
| 3 | Transport Stream output | 100 Mbps per Output Stream |
| 4 | Connector | BNC/HD BNC/Micro BNC; Female |





24/03/22 24/03/22 24/3

| d) | **DVB-CSA ( V-1 & V2) supported simulcrypt DVB-CAS Feature** | |
|---|---|---|
| 1 | IP Port for DVB-CSA V-1 & V-2 supported DVB-CAS Control with required licenses | Minimum one port (RJ-45) |
| 2 | No. of DVB-CAS to be simulcrypt | Minimum two CAS |
| 3 | Name of CAS to be deployed | Indian Conditional Access System (iCAS) |
| 4 | IP data port for OTA with required license | Through IP data port or ASI input port |
| 5 | Scrambling Feature with required licenses | On all independent output port with each service and ON-Off facility. |
| 6 | EMM processing bandwidth | 4 Mbps or better |
| 7 | ECM processing bandwidth | 300 kbps or better |

**C. Statistical Multiplexing:**

(i) There should be Statistical Multiplexing software to enable Doordarshan to control the configurations of each channel encoder in order to optimize the bit rate used to encode the video material.

(ii) The statistical Multiplexing shall essentially have following feature:-

a. User selectable minimum & maximum bit rates per channel.

b. Provision for linear bit rate changeover on frame by frame basis as per specified bit rate of each channel.

c. There shall be no break in service during change of bit rate of compression equipment and also during transition to redundant IP Encapsulator cum Multiplexer. There shall be no requirement of rebooting of the compression equipment for effecting the change in configuration.

d. Real time bit rate management for continuous allocation of bandwidth between the encoders using only native hardware and software of encoders and multiplexer i.e. without the use of any additional / external computer hardware or software.

e. Stat Mux facility should support among all SDTV & HDTV channel with DVB-CSA (V-1 & V-2) supported simulcrypt DVB-CAS encryption (iCAS).

f. Fast response to the variations as per the complicacy of the source material.

g. Enabling of statistical Multiplexing shall not need any change in the hardware or software of the receiving equipment i.e. STBs.





24/03/22

24/03/22

**D. Implementation of DVB-CSA (V-1 & V-2) supported DVB-CAS, EPG, Video on Demand (VoD), NVoD, Subtitling, Audio descriptor, closed captioning etc.**

Services like DVB-CSA (V1 & V-2) supported with simulcrypt DVB-CAS encryption (iCAS), Subtitling, Audio descriptor, EPG etc will be carried by the DD free Dish DTH platform and the equipment offered by the bidder shall be capable of carrying these services without any limitation or requiring upgradation by way of hardware and software. IP Encapasulator cum multiplexer shall also be Video on Demand (VoD) & NVoD compliant, however Storage server, Playout system, GSM or IP based network for return path are not in the scope of this tender.

## 5.2.6 Specification for 8x8 or better matrix SDI/ASI Routing Switcher

**A. General:**

The equipment should be very reliable and able to be used for selection of any one of the ASI/ SDI input signals to all destinations. The equipment so offered should be for professional Broadcast applications. The Router has to be quoted with X-Y and Single Bus control panels.

**B. Essential Features:**

i. The routing switcher electronics should be capable of being mounted in a standard 19" rack frame.
ii. The switcher shall handle SDI/ ASI signal for routing from input to output destinations. The switching should take place during the vertical interval period with re-clocking.
iii. The switcher should have storage facilities for control information, so that in case of power supply failure, the status of the switcher output should remain unchanged when the power supply is restored.
iv. The switcher should have a built in Auto-Switchable redundant dual power supply.
v. The switcher quoted against this specification should be complete in all respects and should have the desired features.
vi. A certificate from Compression OEM regarding compatibility with compression is required to be submitted alongwith the bid.
vii. Any of the input shall be capable of being switched to any or all outputs of router.
viii. Number of input and output port of ASI/SDI Router shall be same.

### C. Technical Specification:

| Sl. No. | Parameter | Specification |
|---|---|---|
| 1. | Matrix size | 8x8 or better matrix |
| 2. | Input | SDI/ASI ( BNC 75 ohms) |
| 3. | Equalization | Automatic: 150 Meters at 270 Mbps. |
| 4. | output | SDI/ASI (BNC 75 ohm) |
| 5. | Return Loss | Should be maintained better than 15 dB on data rate up to 270 Mb/s throughout the switching chain. |

## 5.2.7 Compression System Control Computer with Software

### A. Compression System Management Functions

(a) The compression system control computer shall control the operation, redundancy switching and configuration of all parameters of encoders, IP Encapsulator cum multiplexers, SDI & ASI routers and IRDs including alarm and fault logs for a minimum of 365 days or configurable to 90/120/180 days subject to limitation of hard disk space.

(b) The NMS(Compression control system) offered should be capable to mux 60 TV channels (min) per mux group. However, there should not be any restriction on total number of streams.

(c) NMS shall have the facility to configure, control and monitor minimum 60 equipment/elements like IRDs, Encoders, IP Encapsulator cum Multiplexers, SDI Router, ASI Router, RCPs, IP Switches etc.

### B. Salient Features:

The System Control Computer shall be used as a control protocol to configure the various parameters for the statistical multiplexing such as:

i. To configure encoders for variable Bit Rate Transport Stream. Setting of minimum and maximum limits of data rate for each encoder.

ii. To configure GOP pattern for frame-by-frame encoding. Encoding should take place at the encoder in real time.

iii. If the System Control Computer fails or powered down, the whole system should be failure protected so that it still works.

iv. Facility to store the last statistical Multiplex configuration in the network hardware so that in case of failure of the Compression System Control

Computer, the system remains running and continues to statistically multiplex two or more program as per the last good configuration.

v. To configure IRDs supplied by OEM to any pre-defined TV channels.

vi. There shall also be a facility to configure the encoders for pre-defined Image(PNG/JPEG, GIF format) on the loss of video input in NMS.

vii. There shall be facility to create ghost backup of hard disk of NMS computer on USB storage.

viii. Each set of Network Management System (NMS) shall comprise of (1+1) rack mounted server for 24x7 operation in master and slave configuration or cluster configuration with four client licenses.

ix. There shall be four client PCs with required licenses and 21 inch or better size display monitors along with each PC for monitoring of all 4 sets of NMS system from remote locations.

x. These client PCs shall be installed in new compression room, Monitoring room, shift in-charge room and supervisor room. The supervisor room is located 100 meters away. An Ethernet connection required to be provided on the client PC for monitoring in supervisor room.

xi. The Compression Control Computer (NMS) should be capable of controlling and monitoring all parameters of the digital video and audio compression system through suitable hardware interface and user friendly GUI.

xii. To facilitate centralized network management operations in future, it should be possible to operate the system remotely via a suitably configured computer and modem over standard dial-up telephone lines or Broadband network. It should be supplied with complete hardware and software to interface all the equipment in the chain for their proper control and monitoring.

xiii. The complete compression NMS software of each set is to be loaded on a single control computer with networking facilities.

## C. Required Hardware and Software

The compression system control computer shall be based on industry standard, open system hardware and software that will provide a user-friendly GUI to the operator.

| Sl. No. | Parameter | Specification |
|---|---|---|
| 1 | Man Machine Interface | Graphical User Interface (GUI) |
| 2 | Operational Features | Based on latest Windows / Linux version:<br>(a) Diagnostic log<br>(b) Transaction log<br>(c) Password privilege system<br>(d) Dial in modem support/Through Broadband<br>(e) Multi user terminal support |
| 3 | Physical Connection to Equipment | Ethernet 10 Base-T/100 Base-T through CAT 6 or better cable |



24/03/22 24/03/22

| | | |
|---|---|---|
| 4 | Hardware Platform | Supplier to provide full details of the industry standard hardware platform proposed |
| 5 | Software | Supplier to provide full details of the industry standard software platform proposed |
| 6 | Back up on USB storage | The back up/ recovery USB storage for all the software are to be provided with proper licenses. |
| 7 | No of Equipment/Element to be controlled by offered Compression NMS | 60 nos. (Minimum) |
| 8 | Storage Memory | SSD, 240 GB (Min.) in RAID 1 Configuration |

**D. Remote Access**

It shall be possible to add a remote user terminal and modem/IP interface to provide access to the control system computer from a remote location via dial up telephone line/ Broadband network. The remote user shall have access to all the commands available at the main control system, subject to password restrictions for security. The remote user shall be presented with a user interface, which is identical to the local user interface.

## 5.2.8 EPG and PSI/SI Generator/Server

**A. General :**

(i) EPG and PSI/SI Generator/Server shall comprise of (1+1) Rack mounted server in redundant configuration for 24x7 hrs operation.

(ii) All the Software and hardware for EPG and PSI/SI Generator functionality shall be included in the offer.

(iii) There should be provision to insert Electronic Programme Guide for TV channel and private Data in the output transport streams of Multiplexer.

(iv) The server shall generate DVB compliant Program Specific Information (PSI) and Service Information data for multiple transport stream over ASI and IP interface i.e. the system should support external Data/ASI stream and IP stream as input to the multiplexer.

(v) EPG and PSI/SI generator/server shall generate DVB Compliant Tables namely PAT, CAT, BAT, PMT, NIT, SDT, TDT, TOT, EIT-PF, EIT scheduler, etc.

(vi) EPG Generator shall have the facility for EIT scheduler of minimum 7 days for 175 TV channels in multiple Transport stream i.e. minimum six transport stream with mirror output.

(vii) It shall support management of Logical Channel Numbers and private data of conditional Access System (CAS) in simulcrypt mode.

(viii) It shall have PID filtering facility to pass PID of incoming Input to Output stream.

(ix) The offered generator shall have the facility to analyse and monitor output transport stream on 24x7 hrs. basis.

### B. Technical Specification

| Sl. No. | Parameter | Specification |
|---|---|---|
| 1 | Software | Software to Generate DVB compliant EPG and PSI/SI functions |
| 2 | Man Machine Interface | Graphical User Interface (GUI) |
| 3 | Operational Features of EPG and PSI/SI Generator | Based on latest Windows / Linux version:<br>(i) DVB compliant PAT, CAT, PMT, SDT, BAT, NIT, EIT, TDT, TOT etc table<br>(ii) Diagnostic log<br>(iii) Password privilege system<br>(iv) Web Browsing Through Broadband<br>(v) Multi user terminal support |
| 4 | No of Ports | (i) 2 Nos. Bi-directional configurable data Port (RJ45)<br>(ii) 2 Nos. Bi-directional configurable Management Port (RJ45) |
| 5 | Hardware | |
| a | No of CPU | Two or more |
| b | Processor Base Frequency | 2.1 GHz or better |
| c | Storage Memory | 240 GB (Min.) in Raid 1 Configuration |
| d | RAM | 2x8 GB and above |
| e | Network card | 1 GB or better |
| 6 | Back up on DVD ROM/USB storage | The back up/ recovery DVDs ROM/USB storage for all the software are to be provided with proper licensees. |

## 5.2.9 Specification for Network Time protocol (NTP) Server

### A. General

i. NTP server should be secured and reliable source of network time synchronization for broadcast application.
ii. NTP Server shall have front panel display and keypad for configuration.
iii. It should have Secure Web Interface for Configuration, monitoring of status, logs, etc via Internet browser
iv. It should have dual redundant power supply.
v. It should have also GPS based time synchronization facility consisting of necessary equipment and licenses.

**B. Technical Specification**

| S. NO. | Description | Specification |
|---|---|---|
| 1 | Accuracy (GPS Locked) | 5 microseconds per day ($5.79x10^{-11}$) |
| 2 | Type of Oscillator | Rubidium (Rb) |
| 3 | Network Timing Service | i) NTP V2, V3, V4<br>ii) SNTP V3, V4 |
| 4 | Number of clients/devices to be synchronized | Minimum 2000 |
| 5 | Mode of Operation | Unicast, Broadcast and Multicast |
| 6 | Network Input output port | Minimum two no. Gb Ethernet (RJ-45) |
| 7 | Management IP Protocol | IPv4/ IPv6 Compliant |
| 8 | Antenna Connector | SMA/N-type/TNC |
| 9 | Management Interface | RS-232 or 10/100/1000 Based-T Ethernet Port |
| 10 | Status Indicator | LED/OLED based |
| 11 | Size | 19" rack mountable |

## 5.3 Monitoring System

The monitoring system has two parts:

(a) Confidence level monitoring system
(b) Input and downlink monitoring system of TV and Radio channels

A confidence level monitoring system consists IRDs with L-Band inputs, IRD with ASI input, IRD's with IP input, 64x32 SDI Router, Waveform monitor, 17"colour monitor, and 16 channel Audio Video Monitor, Test Pattern Generator etc. However, existing WFM will be used for confidence level Monitoring.

The input monitoring system of TV channel consists of IRDs with MPEG-2 TS over IP output, TV and Radio channel Multi Image Display System, 55" LCD Video Wall Display and associated accessories.

The downlink monitoring system consists of DVB-S & DVB-S2 de-mod with/and DVB-CAS Descrambler (iCAS), TV and Radio Channel Multi Image Display System, 55" LCD Video Wall Display associated accessories.

The specifications of main equipment of monitoring systems are given below.

## 5.3.1 Confidence Level monitoring system

### 5.3.1.1 Specification for 17 inch (Nominal) LCD (TFT) SD & HD Colour Monitor

**A) ESSENTIAL FEATURES:**

i) The offered monitor should incorporate high intensity, high contrast wide screen 17 inch (Nominal), wide viewing angle LCD Panel to view stable images from various angles: both horizontally and vertically, with no reduction in picture contrast, brightness and colour saturation.

ii) The LCD panel of the offered monitor should have resolutions of 1920 x 1080 pixels in 16:9 aspect ratio. The offered monitor should support 16:9 and 4:3 aspect ratios of the video signal. The monitor should also support 1920X1080/50I (HD) and 720X576/50I (SD) video formats.

iii) LCD colour monitor should accept SD and HD SDI input (detected automatically).

iv) The offered monitor should support embedded audio.

v) The offered monitor should have 10-bit signal processing.

vi) The monitor should have 1:1 pixel mapping to display the pictures in the original resolution (subject to the native resolution of the LCD panel) and aspect ratio of the input signal without any stretch and distortion.

vii) It should be possible for the user to select the industry standard colour temperature through menu for matching colours and gradation of the monitor.

viii) The LCD panel should be coated with Anti-Reflection protection layer to provide high transmission rate of the internal light source and to keep the reflection from ambient light to a minimum.

ix) The monitor should have an external remote control capability via Ethernet, serial or similar interface.

x) The monitor should be light weight, robust, compact and 19 inch rack mountable. It should have front panel controls to control the display parameters like brightness, contrast, colour saturation, audio etc.

**B) Technical Specifications**

| Sl. No. | Parameter | Specification |
|---|---|---|
| 1 | Display Size | 17 inch(Nominal) diagonally |
| 2 | Resolution | 1920x1080 pixels or better |
| 3 | Colour reproduction | 16 millions or better |
| 4 | Contrast ratio | 300: 1 or better |
| 5 | Viewing Angle | 150 degree (min.) in Horizontal |

| | | |
|---|---|---|
| | | 150 degree (min.) in Vertical |
| 6 | Brightness | 250 cd / sq. m or better |
| 7 | Supported Aspect ratio | 4:3 and 16:9 |
| 8 | Video Input | HD & SD-SDI (BNC) x 2 or more |
| 9 | Audio input | Embedded Audio |
| 10 | Video Format | SD 720 x 576, 704 x 576, 544 x 576, 480 x 576, 352 x 576 1920X1080/50I (HD) |

## 5.3.1.2 Specification for 16 Channel Audio/ Video Monitor

### a) ESSENTIAL FEATURES:

I) Audio/Video Monitor is to be used for confidence level monitoring of transmission chain at various points. Output of 64x32 SD/HD-SDI router will be fed to 16 Channel Audio/Video monitor Refer diagram-11.

ii) The offered Audio/Video monitor should have high resolution LCD/OLED/TFT screen and support 1920X1080/50I (HD-SDI) and 720X576/50I (SD-SDI) video formats.

iii) It should decode and display upto 16 channel multi format audio embedded with SDI simultaneously like Dolby Digital (AC-3) 5.1 audio, Dolby digital plus 5.1 (E-AC-3) audio, AES/EBU stereo channel for monitoring and metering.

iv) The offered system should have multi channel audio bar graph and speakers and should not be overlayed on the video.

v) It should be 19" rack mountable and have facility to monitor loudness and save minimum 5 preset configurations.

### b) Technical Specification :

| Sl. | Parameter | Specification |
|---|---|---|
| 1 | Video input format | **a)** SMPTE 259 M SD-SDI with embedded audio<br>**b)** SMPTE 292 M HD-SDI with embedded audio |
| 2 | Embedded Audio on SDI | i)Dolby digital (AC-3) 5.1 audio,<br>ii)Dolby digital plus 5.1(E-AC-3) audio<br>iii) Dolby E<br>i) One Stereo AES/EBU |

| | | |
|---|---|---|
| 3 | Video input quantity& type | 2 nos., SD & HD-SDI input |
| 4 | Connector type | BNC, female |
| 5 | Audio input format | 8 channel/ 4 stereo digital AES / EBU |
| 6 | AES and SDI termination | 75 ohm unbalance |
| 7 | Level meter scaling | AES/EBU, VU |
| 8 | Level meter Parameter | Threshold, Reference, limits |
| 9 | Loudspeaker Power | 12 W per speaker |
| 10 | Display Screen type & size | LCD/OLED/TFT , min 3.4 inch (diagonal) or better |

### 5.3.1.3 Specification for MPEG Decoder or IRD with ASI & IP input for SDTV & HDTV

This IRD shall be provided with DVB-ASI & IP input card having MPEG-2 & H.264/ MPEG-4 for SD-SDI with embedded audio, H.264/MPEG-4 & H.265/HEVC for HD-SDI with embedded audio and Dolby Digital 5.1 & Dolby digital plus 5.1 audio decoder. The specification remains the same as given in the para 5.1.4, except the fact that RF Specification parameter specification 5.1.4(A)(i), 5.1.4(A)(v), 5.1.4(B) & 5.1.4(G) are not applicable.

### 5.3.1.4 Specification for 64x32 HD-SDI/ASI Routing Switcher

**A. General:**

The equipment should be very reliable and able to be used for selection of any one of the 64 HD-SDI/ASI input signals to all destinations. The equipment so offered should be for professional Broadcast applications. The Router has to be quoted with X-Y and Single Bus control panels.

**B. Essential Features:**

i. The routing switcher electronics should be capable of being mounted in a standard 19" rack frame.
ii. The switcher shall handle HD-SDI/ ASI signal for routing from input to output destinations. The switching should take place during the vertical interval period with re-clocking
iii. The switcher should have storage facilities for control information, so that in case of power supply failure, the status of the switcher output should remain unchanged when the power supply is restored.
iv. The switcher should have a built in Auto-Switch able redundant power supply.
v. The switcher quoted against this specification should be complete in all respects and should have the desired features.
vi. Any of the 32 input shall be capable of being switched to any or all of 32 outputs.

**C. Technical Specification:**

| Sl. No. | Parameter | Specification |
|---|---|---|
| 1 | Matrix size | 64x32 |
| 2 | Input | 64 nos. HD-SDI/ASI ( BNC 75 ohms) |
| 3 | Equalization | Automatic: 150 Meters at 270 Mbps. |
| 4 | Output | 32 nos. HD-SDI/ASI (BNC 75 ohm) |
| 5 | Return Loss | Should be maintained better than 15 dB up to 270 Mb/s throughout the switching chain. |

## 5.3.2 Input Source and Downlink monitoring system

a. The input source monitoring of all the 40 SDTV channels including 16 HDTV channels and 8 Radio channel of each stream will be done on Multi-image display system. All input signal of SDTV and HDTV channel will be available in MPEG-2, MPEG-4 & HEVC compressed MPEG-2 TS over IP format on RJ45. Whereas, input signal of Radio channel will be available on SDI with embedded Audio on BNC/HD BNC. It shall have the facility to decode and display SD & HDTV channels; and Radio Channel through RTMP, HLS, SRT IP streaming.

b. The downlink signal monitoring of all the 40 SDTV channels including 16 HDTV channels and 8 Radio channel of each stream will be done on Multi-image display system. The downlink signal will be required to demodulate and descramble (iCAS) the transport stream of all services (40 SDTV channels including 16 HDTV channels and 8 Radio Channels). The descrambled transport stream will be available in MPEG-2, MPEG-4 & HEVC compressed MPEG-2 TS over IP format on RJ45. It shall have the facility to decode and display SD & HDTV channels; and Radio Channel through RTMP, HLS, SRT IP streaming.

c. Other physical topography is acceptable provided it meets scope of work and project objective.

### 5.3.2.1 Specification for Professional Broadcast Quality Multi Image Display System for TV & Radio Channel

**A. Features of Multi-Image Display System:**

a) The Multi-viewer system is meant for monitoring the input sources and Ku Band DTH downlink signals.

b) Each set of offered product shall be of professional broadcast quality & is able to display up to 40 or more videos simultaneously along with the corresponding audio bar graph keyed into the video and 8 Radio Channel.

c) Eight sets of complete monitoring systems are required to be provided. Four sets monitoring system shall be configured for monitoring of input sources (40 SD including 16 HDTV and 8 Radio channel in each set) and another Four sets monitoring system for Ku Band downlink signals (40 SD including 16 HDTV and 8 Radio Channel in each set) available in IP format of 1Nth, 2Nnd, 3Nth & 6N$^{th}$ streams compressed in MPEG-2, MPEG-4 & HEVC format. (Please see DRG: 12).

d) The product shall facilitate selection of preset window layouts of various patterns and various sizes of video images.

e) The system shall be flexible in terms of :

i) Control Multiple Screens

ii) Display the same source multiple times, in different sizes in the same or different modules.

iii) The system shall be capable of resizing the video signal and re-arranging the screen layout as per requirement

f) It shall be possible to display real time analogue and digital clocks as a substitute for any input signal into a display window

g) The offered product shall have the facility for labeling the displayed video source. The above features shall be selectable and removable depending upon the application

h) It should support 4:3 and 16:9 aspect ratios and shall be able to configure for 4:3 or 16:9 aspect ratio instantly.

i) It shall have SDI/DVI/XVGA/HDMI/DP or better output to feed the combined video to display monitor

j) The video output of multi-viewer shall be matched with the video input of the 55" display system, if not then matching adapter may be included in offer.

k) The system should have one dedicated remote control panel (RCP) for easy, quick and user friendly access for recalling the required preset layouts, selecting full screen window, and selecting the audio source for monitoring etc. In case of software based RCP the required hardware should be provided in the offer.

l) The offered product should have the interfacing facility to connect an external PC for video layout configuring.

m) It should have hot swappable dual redundant power supply.

n) It should have 19" rack mounted main frame to accommodate inputs, outputs and other interfacing facilities.

o) It should have facility to store/recall at least 10 nos. of preset layouts, window sizes etc.

p) The offered solution shall be expandable.



(For Industry Feedback)

24/03/22

24/03/22

q) The system shall provide High Video Quality with Excellent scaling, Full Frame rate. The system shall have scalability of Sources Display Devices.

r) The system shall log actions taken in a secured file.

s) The system shall provide customizable criteria for fault detection, alarm and reporting.

t) The system/solution shall be able to detect and give (i) on screen alarms (ii) Audible alarms (like beep sound or tone) and (iii) log the following faults/errors :

   a) Loss of video.

   b) Frozen video.

   c) Black video.

   d) Loss of audio.

   e) Audio level.

u) There shall be a facility to add UMD for each and every input injected in the Video.

v) The system/solution shall have the facility to integrate multiple Multiviewer units and analyse all channels of stream 1N, 2N, 3N & 6N simultaneously and display Major & Minor alarms of all Input sources (at a time minimum 4 channel) in a separate monitor.

w) The screen of monitor shall be blank in case of no alarm is detected in the Input sources, whereas on the detection of alarm in any channel, the same channel shall be routed to this monitor.

x) The system/solution should have the facility to integrate multiple Multiviewer units and display the name of all channel/label multiplexed in stream 1N, 2N, 3N & 6N in one window on a remote monitor. The colour of the channel name/label, displayed on remote monitor should be changed on acquisition of Major, Minor alarms and warning in any of the channel.

y) There shall have the facility to decode and display SD & HDTV channels; and Radio Channel received through RTMP, HLS, SRT IP Streaming.

## B. Technical Specification of Multi Viewer/Image Display System Processor

| Sl. No. | Parameter | Specification |
|---|---|---|
| 1 | IP Input Format | (i) MPEG 2 TS over IP (SPTS & MPTS)<br>(ii) RTMP stream<br>(iii) HLS stream<br>(iv) SRT stream |

| | | |
|---|---|---|
| 2 | DVI Input | Minimum 1 No. |
| 3 | SDI with Embedded Audio Input for Radio Service | Minimum 2 Nos. on BNC |
| 4 | SD-SDI Decoder from IP stream | i) SD MPEG-2<br>ii) SD H.264/MPEG-4 AVC |
| 5 | SD-SDI Video Resolution | 720x576<br>704x576<br>544x576 |
| 6 | HD-SDI Decoder from IP Stream | i) HD H.264 Main Profile Level 4.0 8 bit<br>ii) HD H.264 High Profile Level 4.<br>iii) HD H.265/HEVC Main Profile level 4.0 10 bit |
| 7 | HD-SDI Video Resolution | 1920x1080 |
| 8 | Decoding of Audio from IP Stream | i) MPEG-1 Layer-II<br>ii) HE AAC V1 & V2 5.1 Audio<br>iii) Dolby Digital AC-3 5.1 Audio<br>iv) Dolby Digital Plus 5.1 E-AC-3 Audio |
| 9 | Video Output | SDI/DVI / XVGA/HDMI/DP |
| 10 | No of Video Output | Min 2 nos. ( Independent) |
| 11 | Operating Temperature | 5 to 35 degree Centigrade |
| 12 | Humidity | 10 – 90% non -condensing |

## 5.3.2.2 Specification for DVB-S & DVB-S2 Demodulator

The demodulators will be used in downlink monitoring chain. The chassis should consist of multiple modules. The module should essentially meet the following specs:-

| Sl. No. | Parameters | Specification |
|---|---|---|
| **DVB-S Demodulator** | | |
| 1 | Standards: | EN 300 421 (DVB-S), |
| 2 | Input Frequency Range | 950 - 2150 MHz |
| 3 | No. of Inputs per module | 1 or more independently tunable |
| 4 | Decoding | RS |
| 5 | Symbol Rates | 5 to 40 M symbol/sec for ( DVB-S) |
| 6 | FEC DVB-S | R= 1/2, 2/3, 3 /4, 5/6, 7/8 |
| 7 | LNB Signaling | LNB voltage + 22KHz continuous tone |
| 8 | LNB Voltage | 0/13/18Volts |
| 9 | Connector: | F connector |
| 10 | Impedance: | 75 ohms |
| 11 | Monitoring port | 1 x ASI output on BNC or DVB-ASI over IP. |
| 12 | Management | 10/100/1000 Base-T Ethernet |

| DVB-S2 Demodulator | | |
|---|---|---|
| 1 | Standards: | EN 302 307 (DVB-S2) |
| 2 | Input Frequency Range | 950 - 2150 MHz |
| 3 | No. of Inputs per module | 1 or more independently tunable |
| 4 | Decoding | LDPC and BCH |
| 5 | Symbol Rates | 5 to 40 M symbol/sec for (DVB-S2) |
| 6 | FEC DVB-S2 QPSK | R= ½, 3/5, 2/3, ¾, 4/5, 5/6, 8/9, 9/10 |
| 7 | FEC DVB-S2 8PSK | R= 3/5, 2/3 , ¾, 5/6, 8/9, 9/10 |
| 8 | LNB Signaling | LNB voltage + 22KHz continuous tone |
| 9 | LNB Voltage | 0/13/18Volts |
| 10 | Connector: | F connector |
| 11 | Impedance: | 75 ohms |
| 12 | Monitoring port | 1 x ASI output on BNC or DVB-ASI over IP |
| 13 | Management | 10/100/1000 Base-T Ethernet |

## 5.3.2.3 Specification of Demodulator with/and Descrambler

### A. General Feature

(i) Descrambler should receive the L band input and give multi service descrambling on to MPEG-2 TS over IP output.
(ii) There should be vacant slot (CI slot) for descrambling of simulcrypt DVB-CAS (iCAS) for all MPEG-2, MPEG 4 & HEVC and DVB-S & DVB S2 compliant services.
(iii) It should be possible to configure and monitor the Descrambler through Remote PC.
(iv) Descrambler should be able to generate and save logs for alarms and warning through Remote PC.
(v) A separate unit of DVB-CSA (V1 & V2) supported DVB-CAS(iCAS) descrambler shall also be acceptable.

### B. RF Specifications

| Sl. No. | Parameters | Specification |
|---|---|---|
| 1 | Input Frequency Range | 950 - 2150 MHz |
| 2 | No. of Inputs | 1 (min.) |
| 3 | Satellite Frequency Band | C- Band & Ku-Band, Selectable |
| 4 | Input Impedance | 75 Ohms |
| 5 | Input Connector | F-Type female |
| 6 | Input Power Range | -30 to -60 dBm per carrier |
| 7 | LNB Voltage | 13V, 18V or off, 22 kHz on/off |
| 8 | De-Modulation Method | DVB-S QPSK,<br>DVB-S2 QPSK and 8PSK |

| | | |
|---|---|---|
| 9 | Variable Symbol Rates | 5.0 to 40 M Symbol /sec for (DVB-S)<br>5.0 to 40 M Symbol /sec for (DVB-S2) |
| 10 | Convolution Inner FEC selectable | R= 1/2, 2/3, 3/4, 5/6,7/8 (DVB-S, QPSK),<br>R=1/2, 3/5, 2/3, 3/4, 4/5,5/6, 8/9, 9/10 (For DVB-S2, QPSK)<br>R= 3/5, 2/3 , 3/4, 5/6,8/9,9/10 (DVB-S2 , 8PSK) |

**C. Descrambler Specifications**

| Sl. No. | Parameters | Specification |
|---|---|---|
| 1 | DVB Descrambler | DVB-CSA (V1 & V2) supported DVB-CAS(iCAS) |
| 2 | No of services to be descrambled per CAM module/CI slot | Maximum 8 services |
| 3 | Free to air services | Pass through |
| 4 | Bit rate of per TS | 65 Mbps |
| 5 | Total No. of Services to be descramble per stream | Minimum 40 TV services and 8 Radio services |

**D. IP Transport Stream Outputs and Control Ports**

| Sl. No. | Parameters | Specification |
|---|---|---|
| 1 | Ethernet data port | 1x 1000 Base T on RJ45 connector) |
| 2 | Output Format | MPEG-2 TS over IP |
| 3 | Ethernet Control port | 1x10/100 Base T (on RJ45 connector) |

## 5.3.2.4 Specification for Professional Broadcast 55" LCD Video wall Display

| Sl. No. | Parameter | Specifications |
|---|---|---|
| 1 | Size | 55 inch or more |
| 2 | Backlit light | LED |
| 3 | Input | DVI, HDMI |
| 4 | Output | DVI |
| 5 | Resolution | 1920x1080 or higher |
| 6 | Aspect ratio | 16:9 |
| 7 | Viewing angle | Horizontal: 170 degree,<br>Vertical : 170 degree |
| 8 | Luminance | ≥ 450 cd/m2 |

| | | |
|---|---|---|
| 9 | Contrast | 1200:1 |
| 10 | Bezel Size | Maximum 4.0 mm/4.0mm Bottom/Right)<br>Maximum 4.0mm/4.0mm (Top/Left) |
| 11 | Power consumption | 400W Max |
| 12 | Operation Hours | 24/7 |
| 13 | Mounting | Wall and stand Mounting type with mounting kit |
| 14 | Accessory | Power cord, DVI / HDMI Cable |

## 5.4 Measuring Equipment

### 5.4.1 Specification for Multi format Video Generator (Test Pattern Generator)

#### A. General

The multi format digital signal generator is to be used for test signal generator for broadcast facilities and to test the equipment performance the essential features are:

(i) The equipment shall have multi format digital (SD-SDI and HD-SDI) test signal generation facility.

(ii) It shall have channel configuration and performance to support reference generator needs.

(iii) It shall have unique, robust channel of mode to provide stable synchronization signal for digital broadcast facility.

(iv) It shall provide 8 channels (4 AES/EBU pairs) of audio signal generation.

#### B. Technical Specification:

| Sl. No. | Parameters | Specification |
|---|---|---|
| **1.** | **Audio signal** | |
| a) | Output Standard | ANSI S4.40 (AES3) |
| b) | Amplitude | 1V ± 0.2V |
| **2.** | **Digital test signal (SD-SDI)** | |
| a) | Output Standard | ITU-R BT 601 & SMPTE 259 M |
| b) | Bit rate | 270 Mbps |
| c) | Amplitude | 800 mV p-p ± 10% |
| **3.** | **Digital test signal (HD-SDI)** | |
| a) | Output Standard | SMPTE-292M |
| b) | Bit rate | 1485 Mbps |
| c) | Amplitude | 800 mV p-p ± 10% |

## 5.5 Power Supply System

The Power Supply System consists of the following equipment:-

a. Power Distribution Panel and Sub distribution Board (SDB) for power distribution to the various equipment chain.
b. Suitable earthing for the power supply system.
c. 4 core & 3 core copper Power Supply Cables of various rating
d. Mains Distribution Unit

### 5.5.1 Specification for Power Distribution Panel and Sub Distribution Board

Suitable Power Distribution Panel (PDP) and Sub Distribution Board (SDB) must be supplied and installed which will distribute the AC power to each rack of the Input Baseband System, Compression and Monitoring system. The suggestive block schematic is given for general idea about the configuration of PDPs & SDBs (Please refer DRG no. 13). Bidder shall submit schematic diagram in advance before installation for approval.

### 5.5.2 Earthing System

a. Earth pits should consist of Copper Earth electrode (diameter 20 mm (min)), insulated copper strip/wire (75 Sq. MM (Min)), Chemical earth fill compound with fast discharge characteristics, water absorbing gel, perforated Hard HDPE pipe (diameter 40 mm (min)), funnel, water supply provision upto each earth pit (preferably from A/c condenser), 10 feet depth (min) and 1 feet diameter (min.). Earth pit should be prepared so that earth resistance is less than 1 ohms -typical depth of earth pit is 10 feet minimum. (Sample picture is enclosed at DRG. 13)

b. All earth pits shall be extended upto earth terminals mounted on wall with insulated copper strip (75 Sq.mm (Min)) in their respective equipment room i.e. new Compression room & Monitoring room. All equipment rack of each row shall be directly connected to Earth Terminals with insulated multi strand copper wire (25 sq mm (Min)) with copper lugs at both ends.

### 5.5.3 Specification for Mains Distribution Unit (MDU):

#### A. General Features

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



24/03/22 24/03/22

ii) Every rack should have minimum one set of single phase auto change over switch along with two Mains Distribution units (MDUs). Each MDU shall have sequential delayed output start up, output status LED and IEC-3 pin for each equipment installed in the rack. (Please refer DRG No: 13).

iii) All Equipment which have dual power supply unit shall be connected directly from MDUs. (Please refer DRG No: 13).

**B. Technical Specification**

| Sl. No. | Parameter | Specification |
|---|---|---|
| 1 | No. of fused outlets with IEC 3-Pin Connectors in each MDU | 12 nos. or more |
| 2 | Primary Power Supply | 220/240 V AC nominal, Single phase, (50 +/- 2 )Hz |
| 3 | Current (Max) | 16 Amp |

## 6 COMPLEMENT OF EQUIPMENT:

a) The make and model/part no. of each and every equipment/item/installation material etc. should be clearly mentioned in the offered Bill of Material (BOM).

b) 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 requirement as per DD specifications. The quantity of each item including sub-module, licenses etc. are to be specified clearly and compulsorily, failing which the bid is liable to be rejected summarily. The following is the proforma for the BOM:

| Sr. No. | Description of the item as per specification (suggestive BOM) | Description of items offered by bidder | Quantity as per suggestive BOM | Quantity offered by the Bidder | Make Offered | Model Offered |
|---|---|---|---|---|---|---|
| 1. | 2. | 3. | 4. | 5. | 6. | 7. |
| | | | | | | |

c) The bidder should provide the offered un-priced Bill of Material in electronic form with the priced bid for ease of technical evaluation.

# 7 Physical, Environmental and Mechanical Specifications of equipment

## 7.1 Environmental Specifications (Wherever not mentioned)

| Sl. No. | Parameter | Specification |
|---|---|---|
| 1 | Operating Temperature (Indoor) | 5°C to 35°C |
| 2 | Operating Temperature (For Outdoor Equipment) | -10°C to 50°C |
| 3 | Storage Temperature | -10°C to 60°C |
| 4 | Humidity (Indoor) | 10 to 90% non-condensing |
| 5 | Humidity (For Outdoor Equipment) | 10 to 95 % |
| 6 | Altitude | 2 to 1000 m |

## 7.2 Mechanical Specifications (Wherever not mentioned)

| Sl. No. | Parameter | Specification |
|---|---|---|
| 1 | Construction | Modular approach, EIA RS-310C, 19" rack mount |
| 2 | Cooling | Internal circulation fan wherever applicable |
| 3 | Mounting | Equipment shall be rack mounted and required number of racks shall be supplied pre-wired to house all the supplied equipment. |

# 8 GENERAL

## 8.1 Compliance and OEM Authorisation

**a)** Bidder must submit a point-by-point compliance statement in respect of all the points, sub-points and Paras laid down in this specification from page 1 in the format as indicated below along with bid .

| 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 | ----- | | | | | | | |
| 3 | ----- | | | | | | | |

**b)** In addition to the above, compliance from respective OEMs (not from their Indian representatives) in respect of the equipment as listed below should necessarily be given, in respect of all the points, sub-points and paras laid down in the Technical Specification of the respective equipment in the format as given above. The OEM should necessarily record the performance figure of the equipment offered in the quote for which the compliance statement is required.

| | |
|---|---|
| **A** | **Input and Base Band System** |
| 1. | Dual Channel L Band OFC Link |
| 2. | Dual Channel L Band Amplifier |
| 3. | 64x192 L Band Router |
| 4. | Integrated Receiver Decoders (IRDs) |
| 5. | 4.5 mtr to 4.8 mtr Receive PDA |
| **B** | **Digital Compression System** |
| 1. | 64x64 SDI Router |
| 2. | Encoder |
| 3. | IP Encapsulator cum Multiplexer |
| 4. | 8x8 ASI/SDI Router |
| 5. | Network Management system (NMS) |
| 6. | EPG and PSI/SI Generator/Server |
| 7. | NTP Server |



24/03/22 24/03/22

| C | **Input Source & D/L Monitoring system** |
|---|---|
| 1. | Demodulator with/and Descrambler |
| 2. | Multi viewer |
| 3. | 64x32 ASI/SDI Router |
| 4. | 17 inch (nominal) TFT Monitor |
| 5. | 16 Channel Audio/Video Monitor |
| 6. | Professional Broadcast 55" LCD Video Wall Display |
| **D** | **Measuring Equipment** |
| 1. | Multi Format Video Generator |

**c)** Mere signature on a copy of Doordarshan specifications shall not be accepted as a compliance statement.

**d)** The compliance statement in respect of Technical Specifications of the equipment should be supported by highlighted record of these in the relevant technical literature/data sheets of respective equipment enclosed with the tender and a clear reference (with volume number and page number of tender documents) 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.

**e)** Data sheets in respect of all offered equipment should be submitted. 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 of the compliance statement.

**f)** 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.

**g)** The bidder is also required to submit authorization in respect of the equipment as listed above at Sl. No. 8.1(b) in their favour from respective OEMs (not from their Indian representatives) on their letter heads along with the bid **as prescribed in Annexure II.**

## 8.2 Documentation:

a) One set of technical manual for all the equipment are to be provided along with the tender to facilitate the technical evaluation, otherwise the tender is liable to be ignored.

b) The successful bidder will have to supply set of printed technical & user manuals along with factory test report of all the offered equipment.



24/03/22 24/03/22

c) Operation Manual for all equipment should also be supplied on DVD/USB storage with search facility.

d) All offered software should have perpetual validity and should be in the name of Doordarshan. All software backups should also be supplied on DVD/USB storage.

e) For facilitating maintenance issues, the bidder must submit the firm's self certified copies of Bill of Entry/Bill of Laden/Custom Invoice of all imported items to DG:DD.

f) The successful bidder must ensure that all Invoices bear serial numbers of equipment to meet the requirement of WPC.

## 8.3 Guarantee/Warranty and After Sales Service Support:

a) All the offered equipment shall be guaranteed against any manufacturing defect for a period of **5 (Five)** years from the date of Commissioning.

b) Any part failing during the guarantee period shall be repaired/replaced free of charge by the successful bidder at site. For repairing of any defective 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.

c) 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. no transportation charges would be paid by DD for transporting the defective/ repaired items, if required to be removed from site, during the guarantee period.

d) Guarantee period is to be extended corresponding to the outage period if the failure rectification takes more than 15 days time.

e) If bidder is not the OEM, then the guarantee/ warrantee in respect of the equipment as mentioned in Clause 8.1(b) shall be provided by the bidder through respective OEMs. ***A certificate, duly signed by the OEM on the OEM letterhead, in this regard of the respective equipment must be submitted with the offer by the bidder as prescribed in Annexure III.***

f) If bidder is not the OEM, then after sales service support for additional **2 (Two) years** for the repairs/ maintenance in respect of the equipment as mentioned in Clause 8.1(b) after the completion of guarantee/ warrantee period shall also be provided by the OEM either directly or through his representative in India. ***A certificate, duly signed by the OEM on the OEM letterhead, in this regard of the respective equipment must be submitted with the offer by the bidder as prescribed in Annexure IV.***



24/03/22 24/03/22

## 8.4 Inspection and Commissioning:

a) All the equipment to be supplied against this A/T (Purchase Order) for this tender shall be subjected to pre-installation inspection at Doordarshan Site by Doordarshan Officer appointed by Doordarshan Directorate. The pre installation inspection shall be based on manufacturers factory test results and physical verification of make and model of equipment. The successful bidder should produce the factory test reports of the offered equipment to facilitate inspection.

b) Post installation inspection and commissioning of the system will be carried out by a team of Doordarshan Officers authorized by Doordarshan Directorate and based on approved Acceptance Test Procedure (ATP).

c) A draft copy of ATP (Acceptance Test Procedure) must be submitted by the successful bidder one month in advance of the proposed date of inspection of the installed system to Doordarshan Directorate for approval. ATP should describe the standard test procedure of individual equipment and overall system. The factory test report will not be treated as ATP.

d) The approved ATP with or without changes shall be sent back to the successful bidder to be used for inspection and commissioning of the installed system by DD Engineer(s) at site. All the equipment required for the inspection as per the approved ATP are to be provided by the successful bidder.

e) The SITC certificate will be issued by the team of Officers appointed at S.N. **8.4(b)** above.

## 8.5 Delivery Period:

Five months from the date of issue of purchase order(A/T) by Doordarshan to the successful bidder.

## 8.6 Pre-Bid Conference:

a) 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.

b) 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.

c) Amendments subsequent to the pre bid conference shall be sent to prospective bidders, who have purchased tender document by e-mail/fax/post.

d) It shall be bidder's responsibility to check for any amendments/addendum on the website before submitting their duly completed bids.



24/03/22 24/03/22

## 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 **(Annexure V)**.

a) Whether documents related to fulfilment of the eligibility criteria as per Clause 3 have been submitted.

b) Whether the BOM has been submitted in the prescribed format as given in Clause 6.

c) Ensure that all equipment and accessories as given in Annexure-1 have been included in the offered BOM.

d) Whether the compliance statement from the bidder as required in Clause 8.1 (a) has been submitted.

e) Whether the compliance statements from the respective OEMs for equipment/system mentioned in Clause 8.1 (b) have been included.

f) Whether the Authorization as required vide clause no. 8.1(g) in respect of equipment as mentioned in Clause 8.1 (b) from respective OEMs have been included.

g) Ensure that the relevant technical brochures/manuals containing all the parameters of technical specifications of all the offered equipment and accessories have been included with proper indexing for ease of identification.

h) Whether the page numbers of the relevant enclosed technical data sheet/manual against each parameter of the technical specifications have been given in the compliance statements.

i) Whether the requisite undertakings for guarantee/warranty and after sales service support by OEMs as required vide Clause no. 8.3 have been submitted.

j) Ensure that no alternate item has been offered.

k) Ensure that the Un-priced BOM has been included.

l) Any other item mentioned elsewhere in the tender.



24/03/22

24/03/22

**Annexure II**

## OEM 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 Doordarshan for the products offered by us against the above tender.

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

**Annexure III**

## OEM LETTER HEAD

### CERTIFICATE FOR GUARANTEE

**Date:**

**Tender No. :**

We, M/s ..... (Name and address of the OEM), do hereby confirm that:

1. All the offered equipment shall be guaranteed against any defect for a period of **5 (FIVE)** years as per terms & conditions of tender document.

2. Any part failing during the guarantee period shall be repaired/replaced free of charge by the successful bidder at site. For repairing of any defective 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.

3. It is the responsibility of M/s ----------, ( their local office/ Authorized representative/ dealer of the bidder) to arrange the repair/ replacement of faulty items for Doordarshan i.e. no transportation charges would be paid by DD for transporting the defective/ repaired items, if required to be removed from site, during the guarantee period.

4. Guarantee period may be extended corresponding to the outage period if the failure rectification takes more than 15 days' time.

5. All software being offered, are to 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 have to be supplied free of cost.

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



24/03/22 24/03/22

**Annexure IV**

## OEM 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 **Five (5) Years** guarantee/ warrantee 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 | Name & Address of authorized After Sales & Support Office/Firm | Telephone/ Fax | Email of concerned personnel |
|---|---|---|---|---|
| 1 | | | | |

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

**Annexure V**

# BIDDER LETTER HEAD

## DECLARATION BY THE BIDDER

1. Bill of Material (BOM)- : [Yes/No]
2. Bidder's compliance (As per specs clause no. 8.1.(a)) : [Yes/No]
3. The copy of Dealer Possession License in case of possession of RF equipment ( if applicable) : [Yes/No]
4. Copy of the Memorandum of Understanding (MOU) (if any) of partnership (as per clause no. 3.5) : [Yes/No]

5. OEM Compliance for following equipment from their respective OEMs (as per clause no. 8.1.(b)):

| S. No. | Name of equipment | Name of OEM | OEM compliance submitted (Yes/ No) |
|---|---|---|---|
| i | | | |
| ii | | | |

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

| S.No. | Name of equipment | Name of OEM | Authorization certificate submitted ( Yes/ No) |
|---|---|---|---|
| i. | | | |
| ii. | | | |
| iii. | | | |
| . | | | |
| . | | | |

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

| S.No. | Name of equipment | Name of OEM | Guarantee certificate submitted (Yes/ No) |
|---|---|---|---|
| i. | | | |
| ii. | | | |
| iii. | | | |
| . | | | |
| . | | | |
| . | | | |

8. 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. | | | |
| ii. | | | |
| iii. | | | |
| . | | | |
| . | | | |
| . | | | |

9. Datasheet for the offered equipment as per offered BOM: [Yes/No]

   i.

   ii.

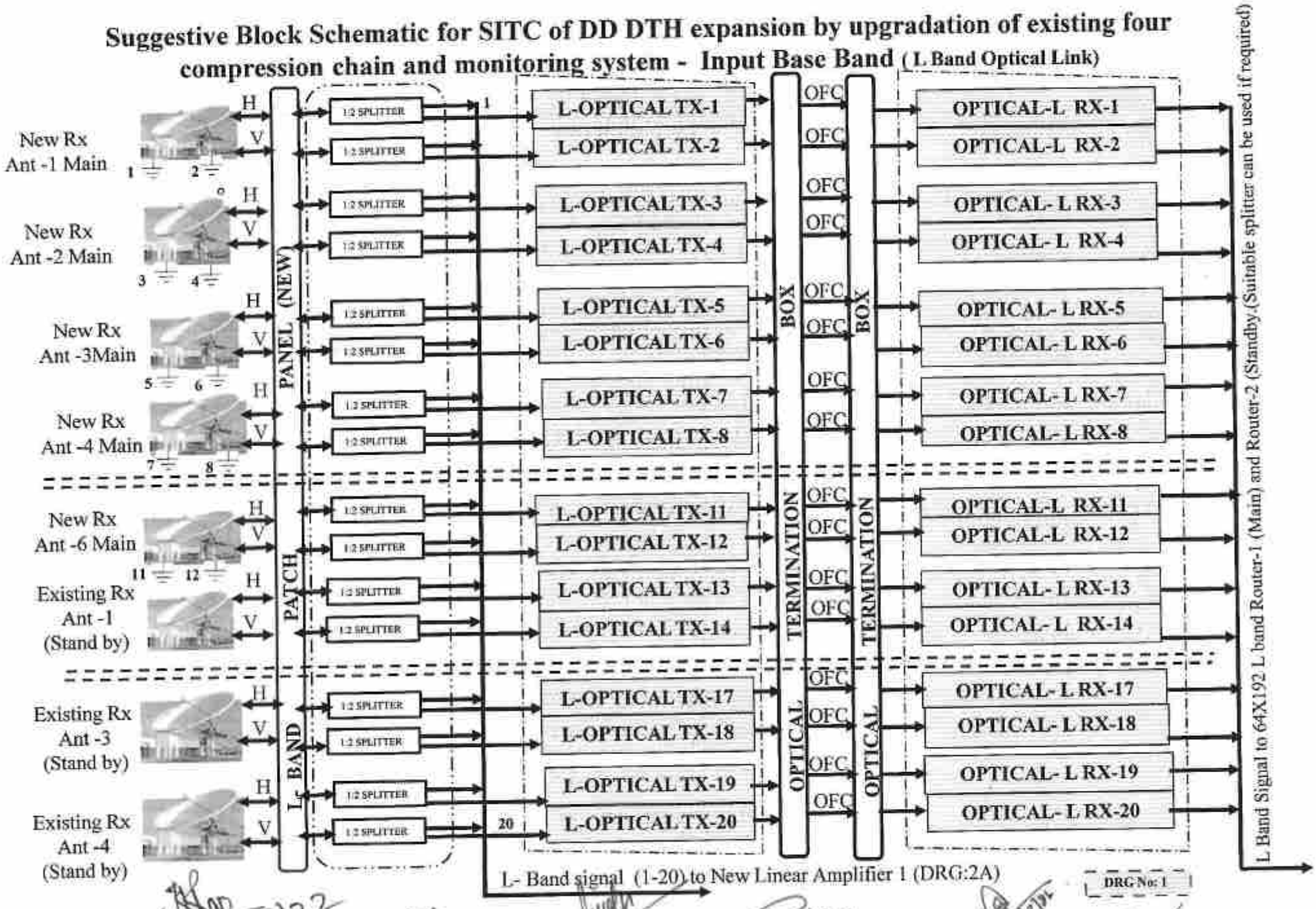
   iii.

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



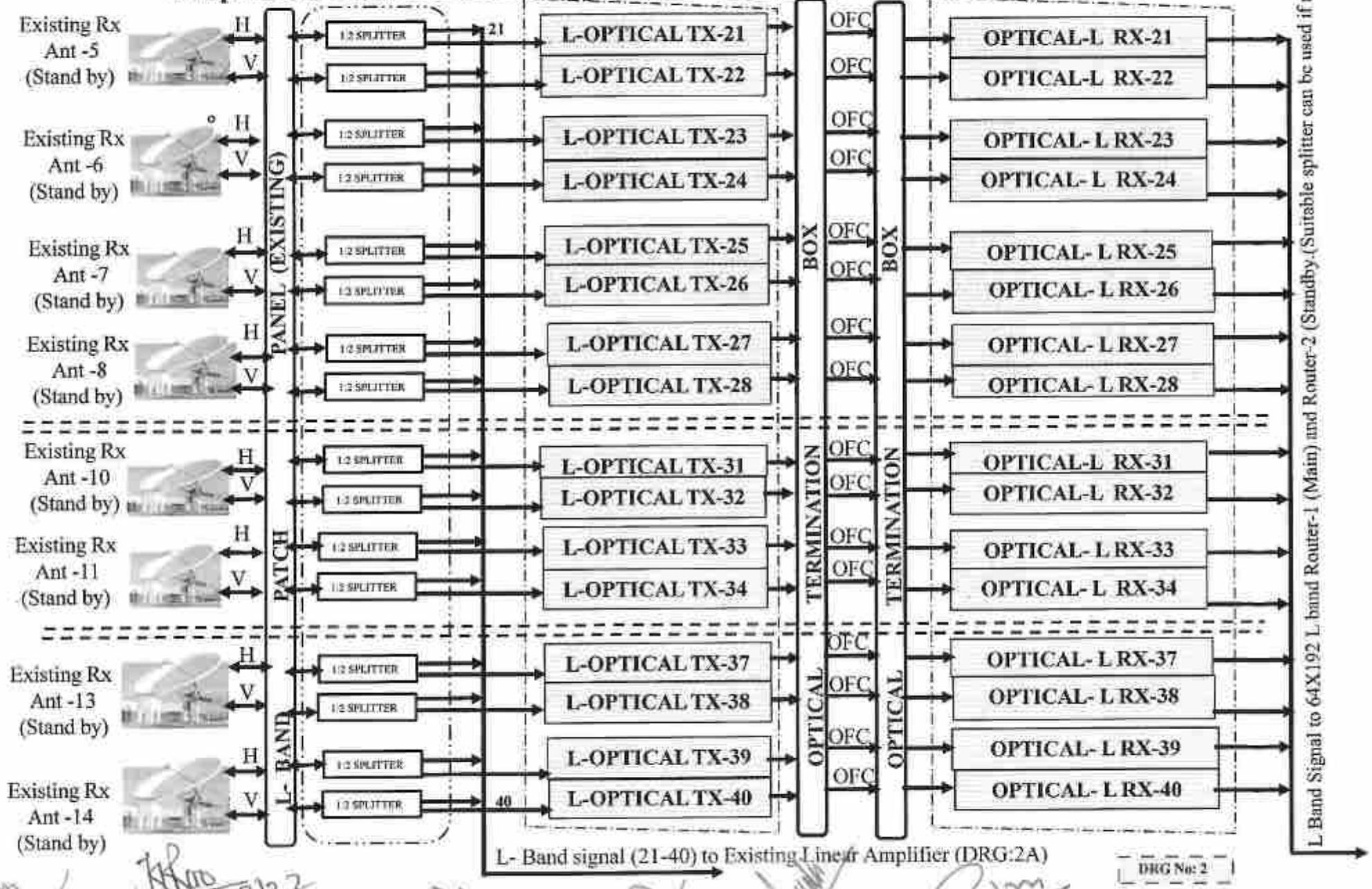
24/03/22 24/3/22 24/03/22

# Suggestive Block Schematic for SITC of DD DTH expansion by upgradation of existing four compression chain and monitoring system - Input Base Band (L Band Optical Link)




24/03/22

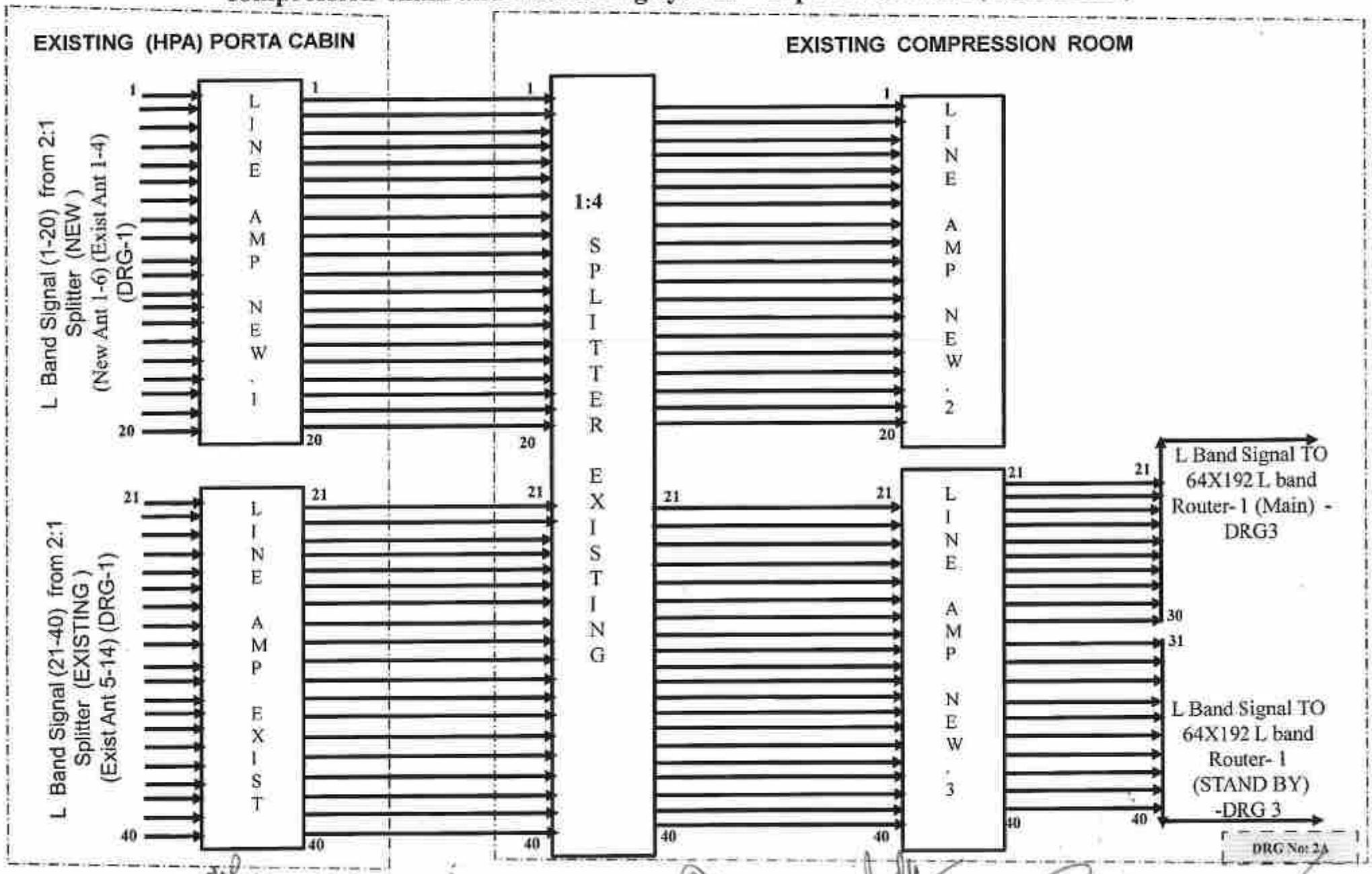
# Suggestive Block Schematic for SITC of DD DTH expansion by upgradation of existing four compression chain and monitoring system - Input Base Band ( L Band Optical Link)



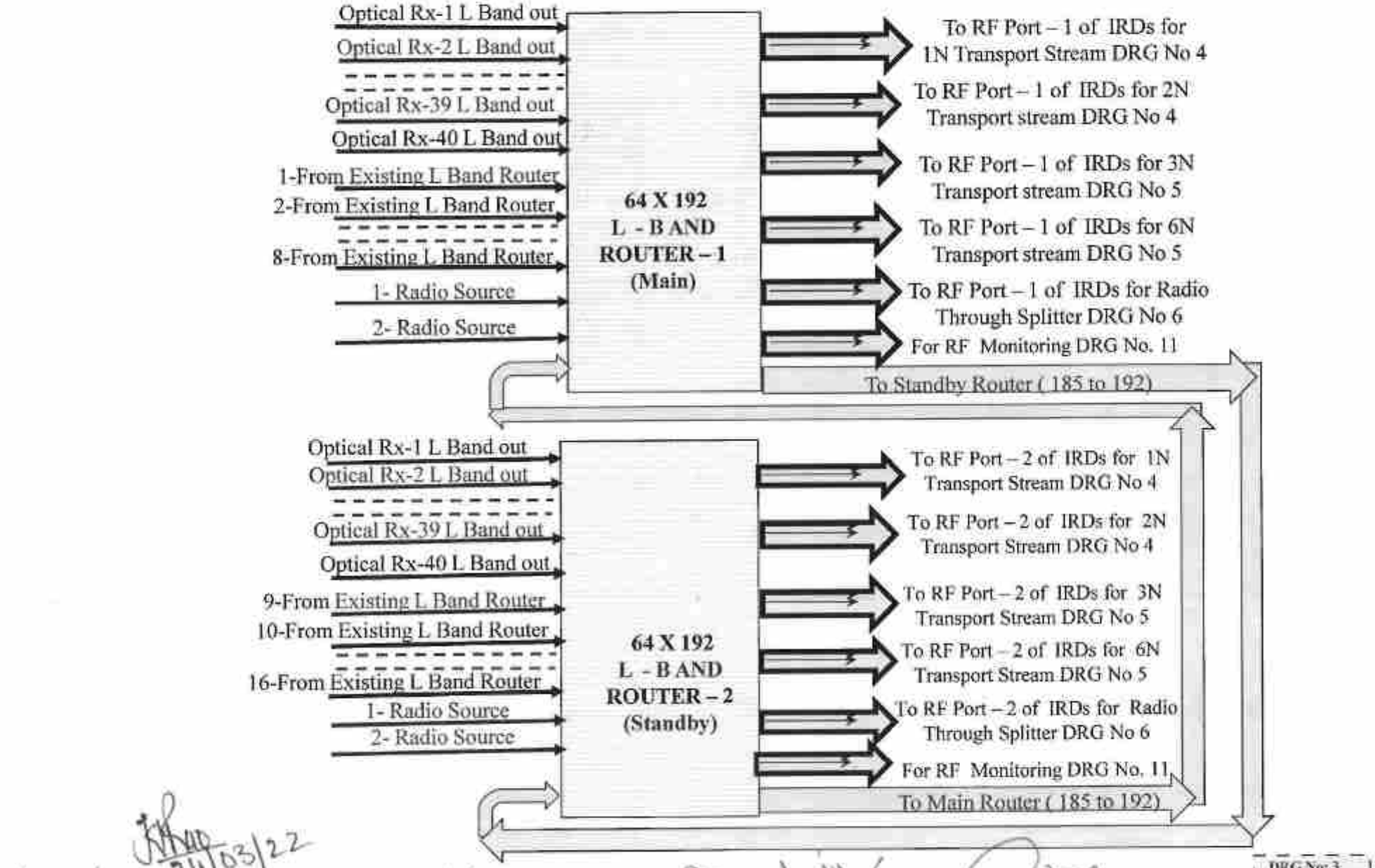

24/03/22

24/03/22

# Suggestive Block Schematic for SITC of DD DTH expansion by upgradation of existing four compression chain and monitoring system - Input Base Band ( L Band Router)



# Suggestive Block Schematic for SITC of DD DTH expansion by upgradation of existing four compression chain and monitoring system - Input Base Band (L Band Router)

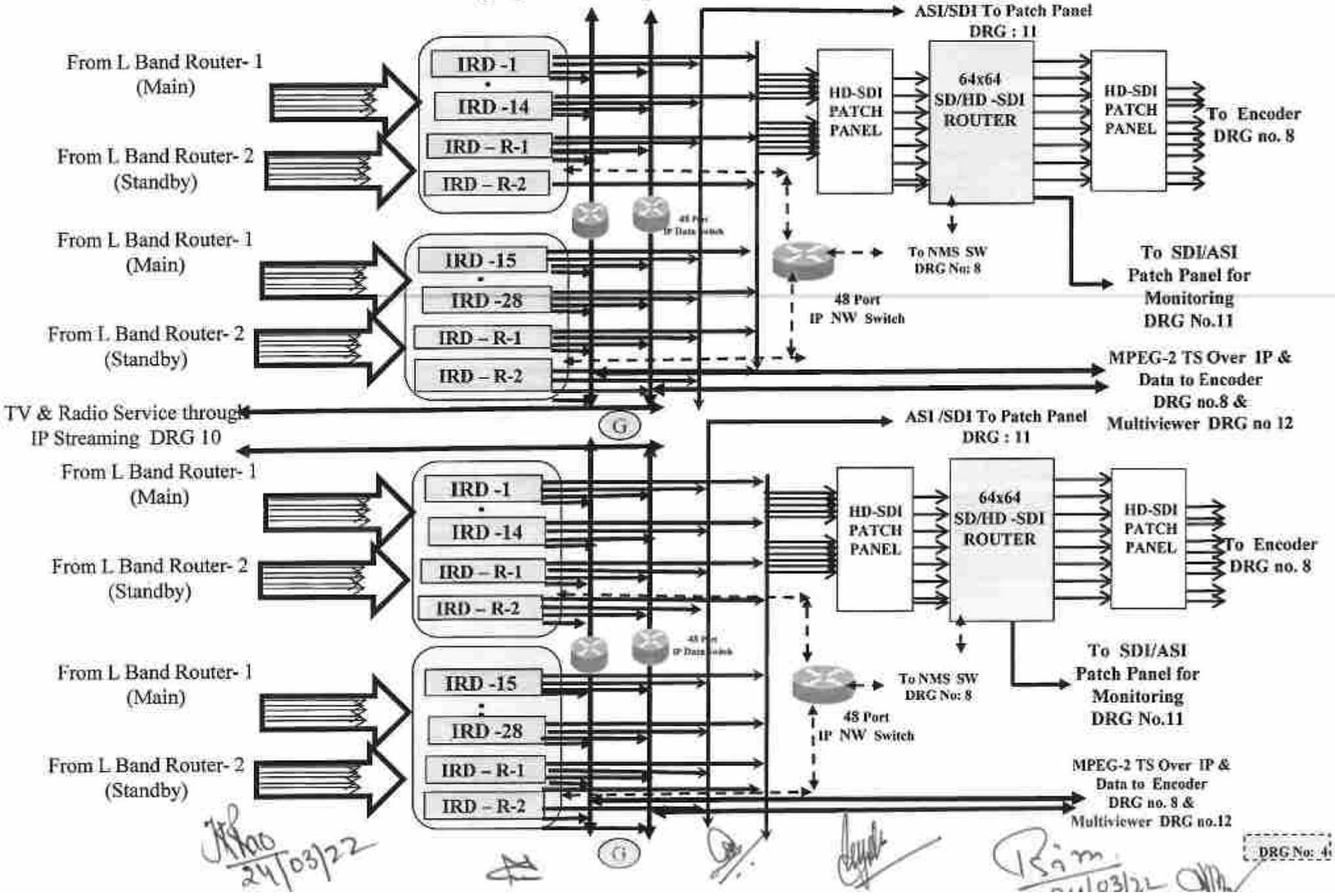



24/03/22

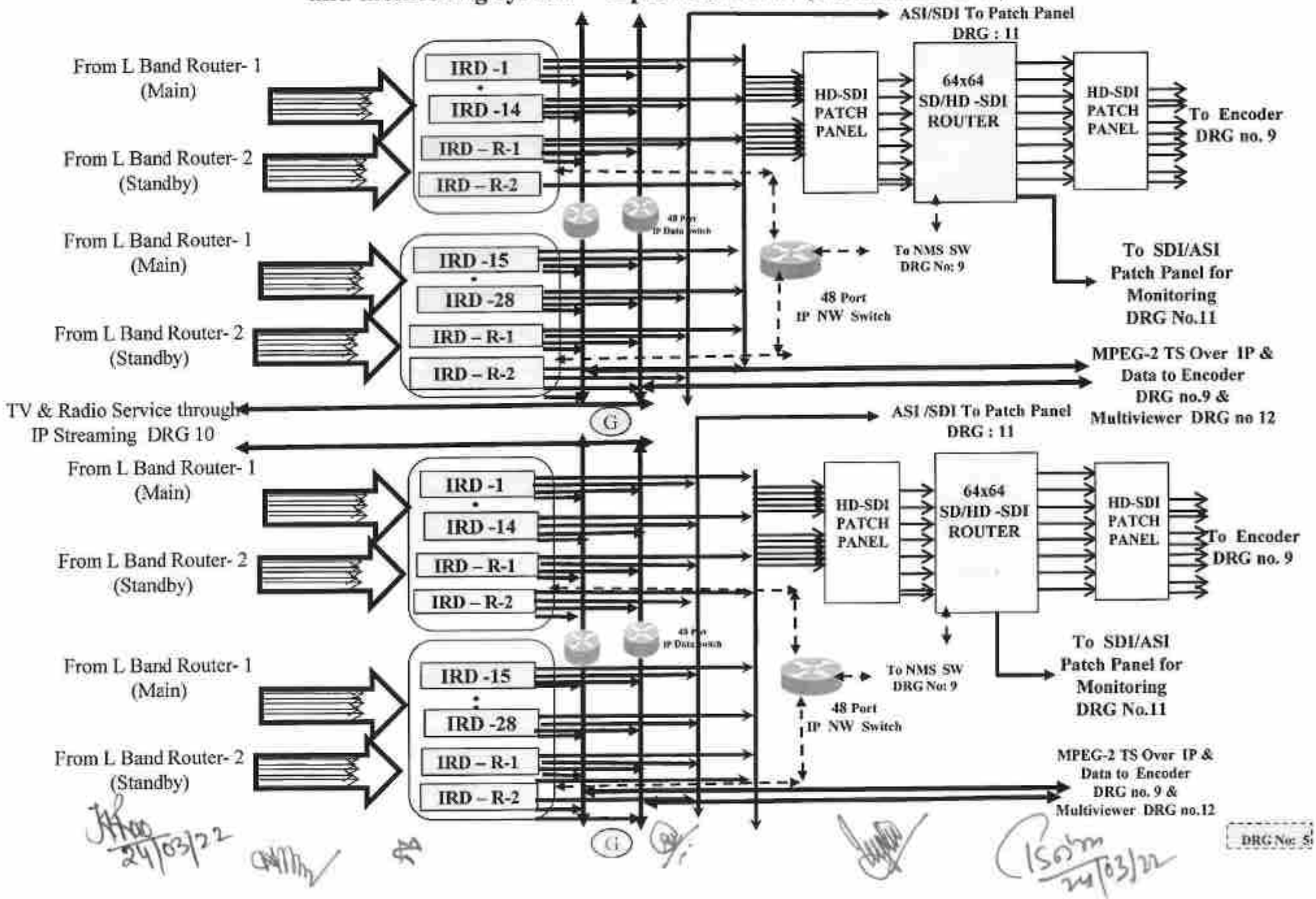
24/03/22

DRG No: 3

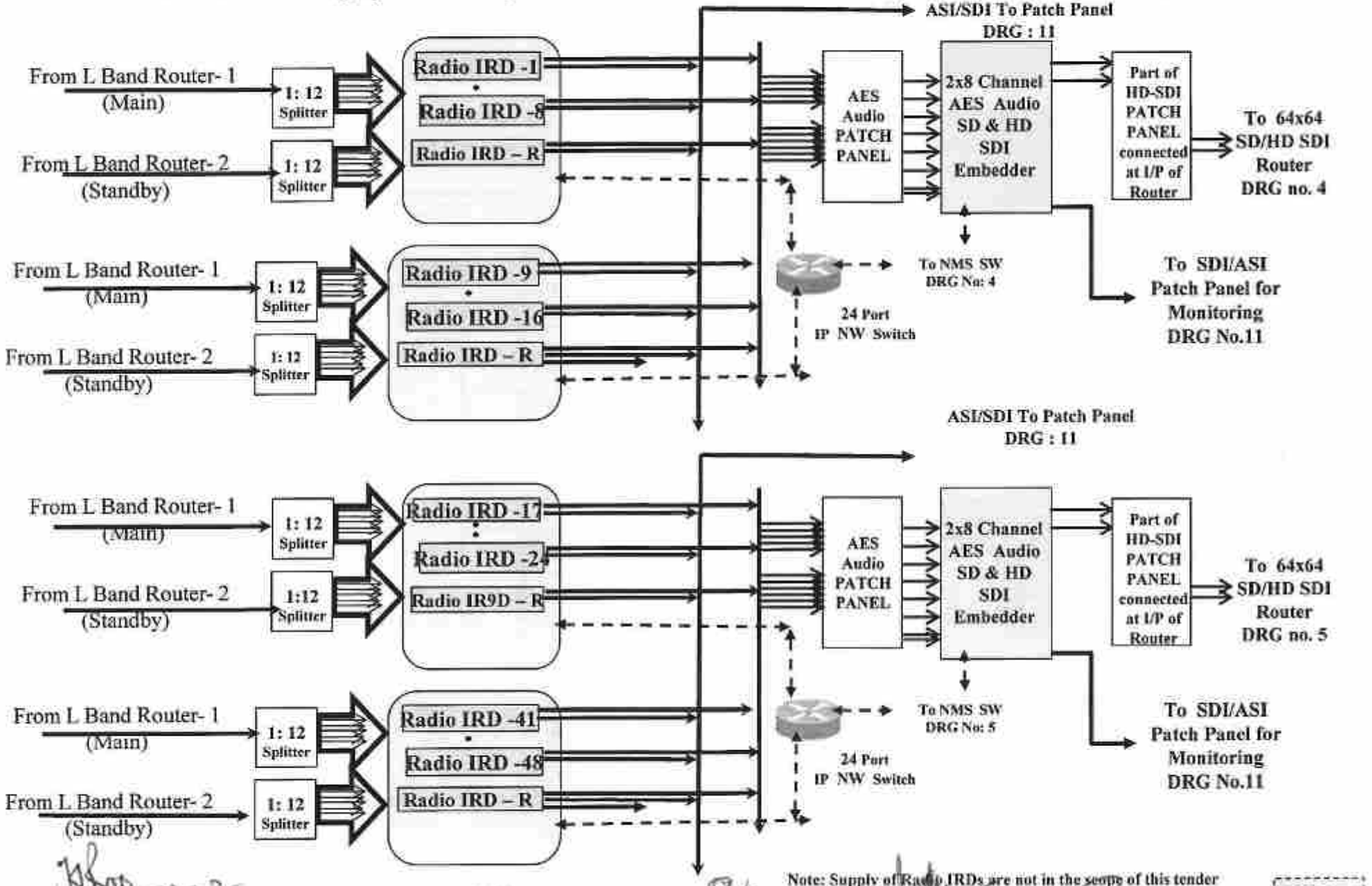
# Suggestive Block Schematic for SITC of DD DTH expansion by upgradation of existing four compression chain and monitoring system - Input Base Band ( For Stream 1N & 2N)



# Suggestive Block Schematic for SITC of DD DTH expansion by upgradation of existing four compression chain and monitoring system - Input Base Band ( For Stream 3N & 6N)



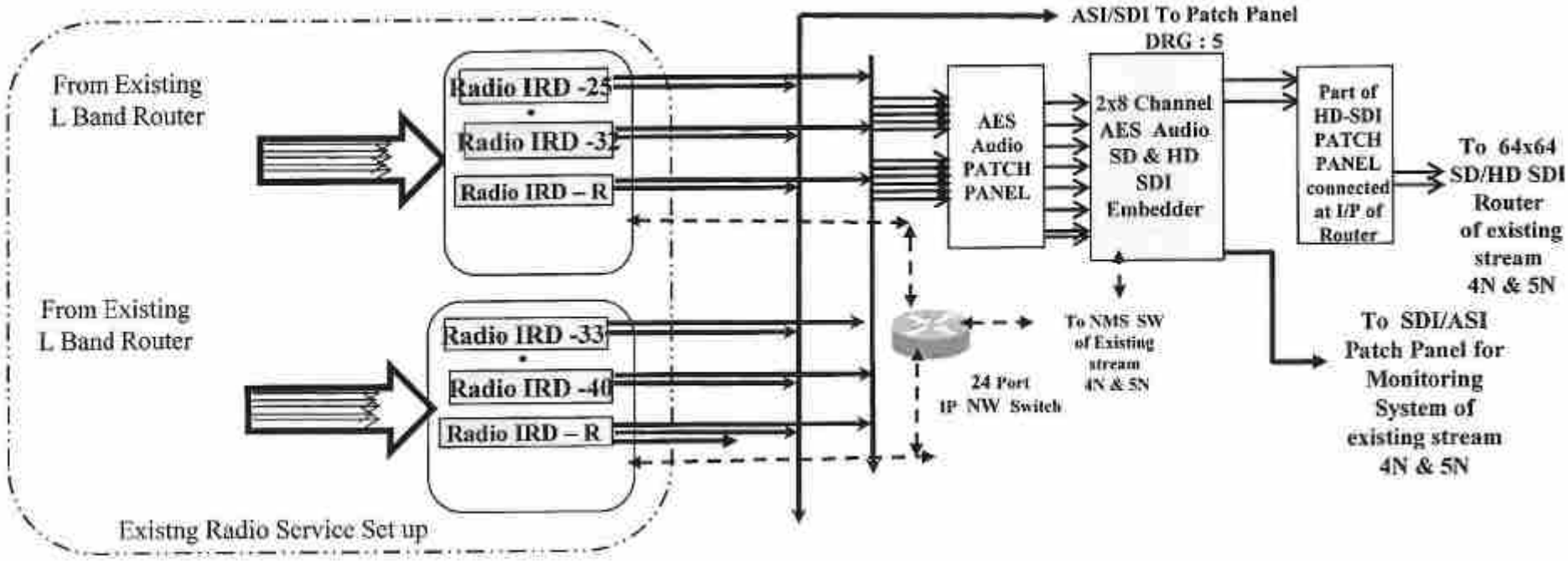
# Suggestive Block Schematic for SITC of DD DTH expansion by upgradation of existing four compression chain and monitoring system - Input Base Band-Radio Service ( For Stream ,1N, 2N, 3N & 6N)




Note: Supply of Radio IRDs are not in the scope of this tender

DRG No: 6

# Suggestive Block Schematic for SITC of DD DTH expansion by upgradation of existing four compression chain and monitoring system - Input Base Band-Radio Service ( For Stream 4N & 5N)



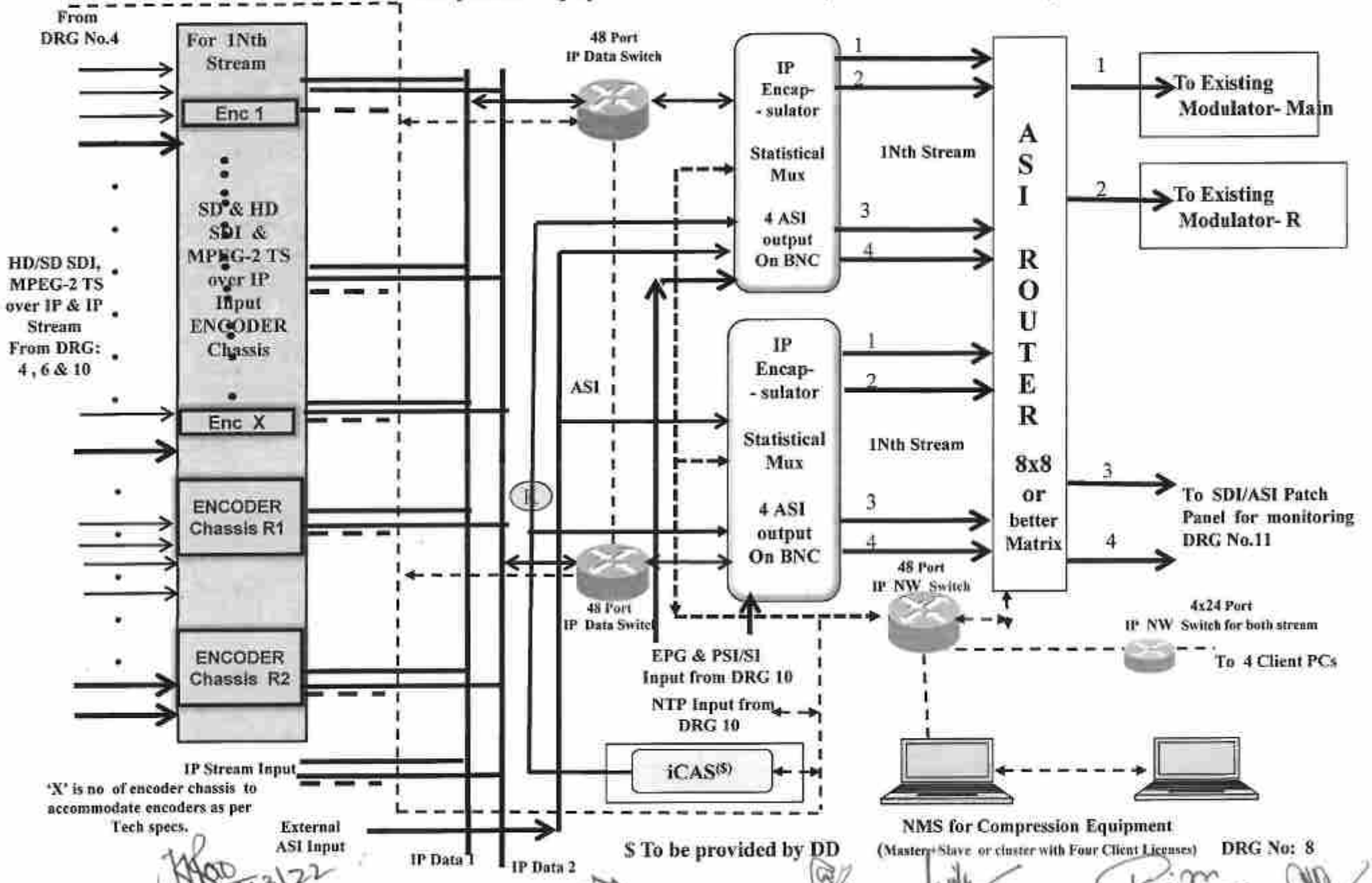

24/03/22

24/03/22

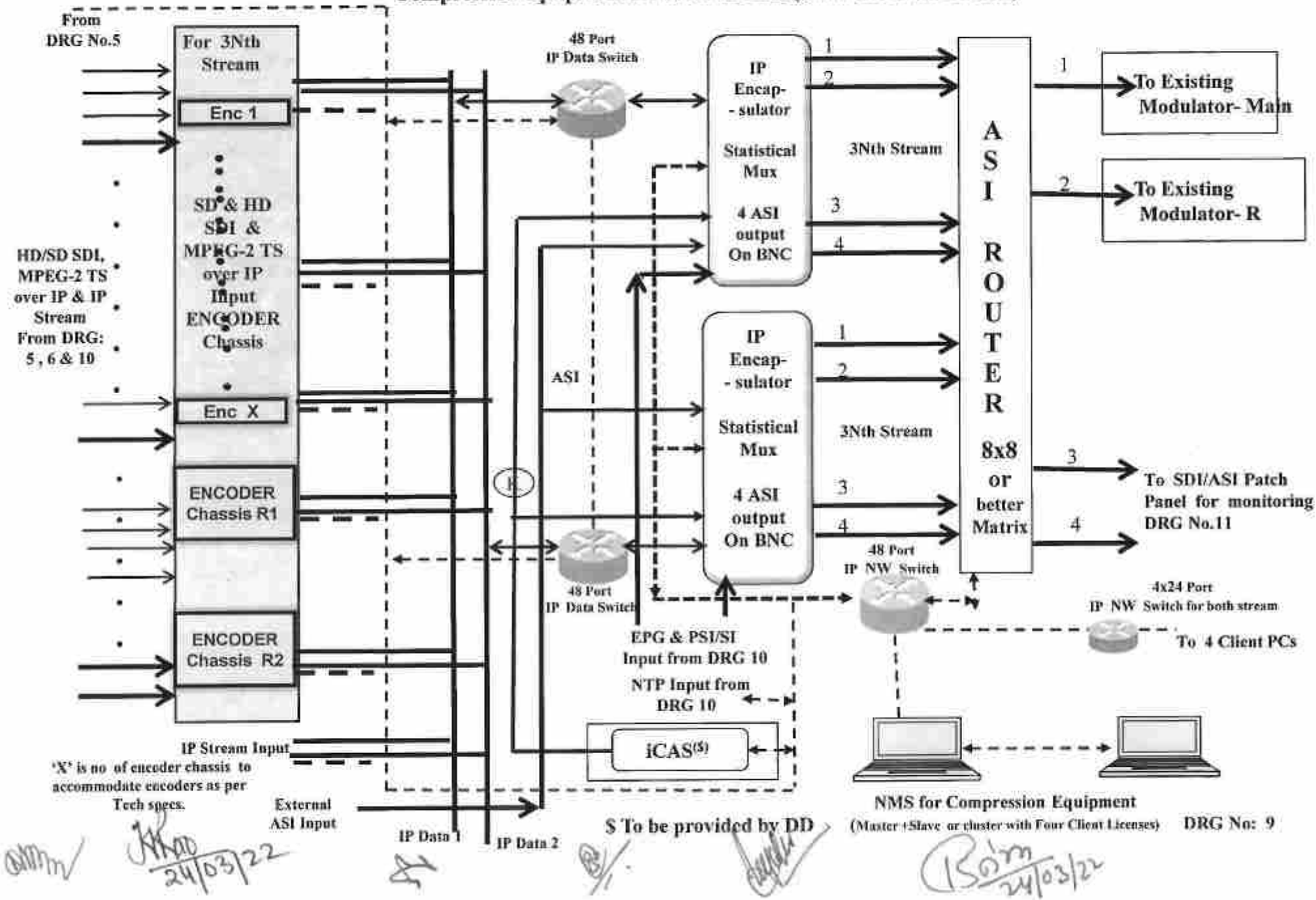
Note: (i) Supply of Radio IRDs are not in the scope of this tender
(ii) To be installed in old Compression Room

DRG No: 7

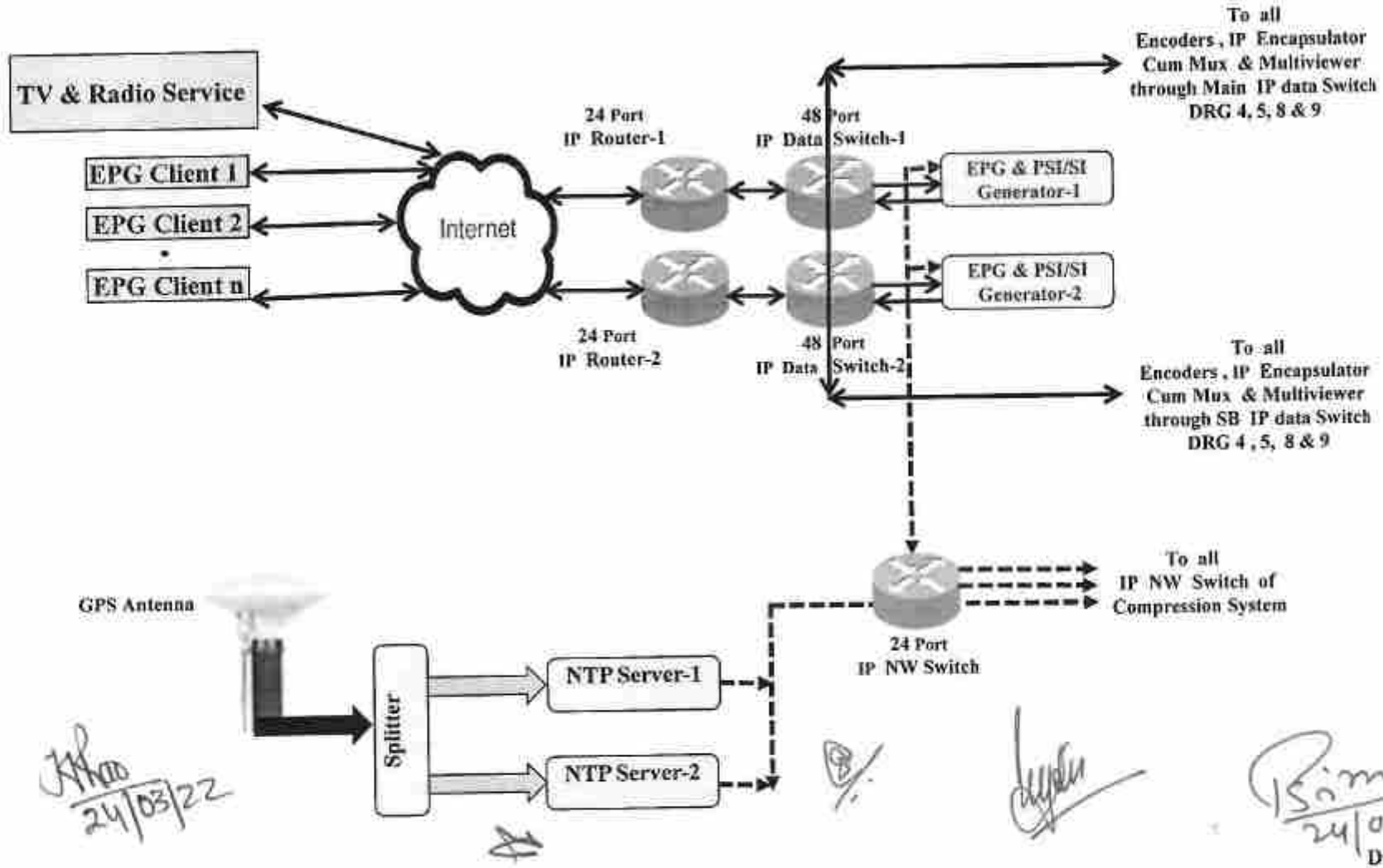
## Suggestive Block Schematic for SITC of DD DTH expansion by upgradation of existing four compression chain and monitoring system - Compression equipment for 1Nth Stream (Same for 2Nth Stream)



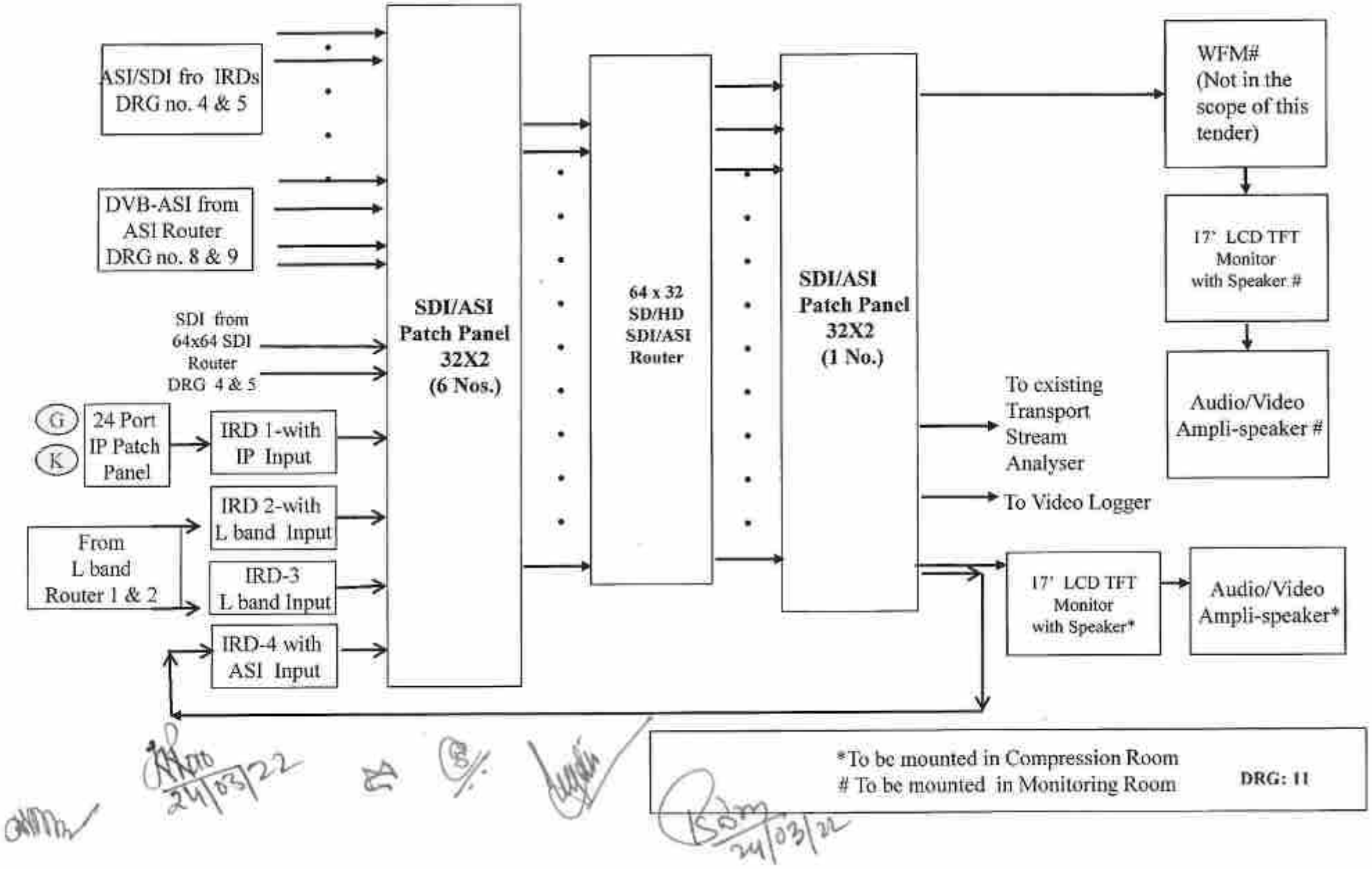
# Suggestive Block Schematic for SITC of DD DTH expansion by upgradation of existing four compression chain and monitoring system - Compression equipment for 3Nth Stream (Same for 6Nth Stream)



**Suggestive Block Schematic for SITC of DD DTH expansion by upgradation of existing four compression chain and monitoring system - Compression equipment ( EPG & PSI/SI Generator , NTP Server and IP Input Streaming for Radio Service)**



# Suggestive Block Schematic for SITC of DD DTH expansion by upgradation of existing four compression chain and monitoring system - Confidence Level Monitoring Setup



# Suggestive Block Schematic for SITC of DD DTH expansion by upgradation of existing four compression chain and monitoring system for 1Nth Stream (Same for 2N, 3N & 6N stream)

60 cm & 120 cm Ku band Receive Antenna

RF Splitter

Demodulator with/and Descrambler

55" professional LCD Display with Backlit LED

Stream -1N (Input Source)

55" professional LCD Display with Backlit LED

Stream – 1N Output (D/L)

42" Display & Alarm Playout System of 1N, 2N, 3N & 6N stream

Input Stream 2N, 3N & 6N

D/L Stream 2N, 3N & 6N

48 Port IP Data Switch shared with other D/L DEMOD

MPEG-2 TS over IP

WFM

DVI

Display

Radio Service embedded on SDI from DRG no. 6

SDI

IP Module with MPEG-2, MPEG-4 & HEVC decoder for 40 Channel SD-SDI including 16 HD-SDI with Dolby digital (AC-3) 5.1 Audio & Plus; DVI and 8 Radio Service embedded on SDI

**Multi - Viewer** Software Control for video wall

MPEG-2 TS over IP Input from DRG no. 4

RCP

Work Station for Input Multiviewers

Multiviewer for input Service Monitoring

**Multi - Viewer** Software Control for video wall

Display

DVI

SDI

IP Module with MPEG-2, MPEG-4 & HEVC decoder for 40 Channel SD-SDI including 16 HD-SDI with Dolby digital (AC-3) 5.1 Audio & Plus; DVI and 8 Radio Service

RCP

To Existing Data Switch of Radio Services

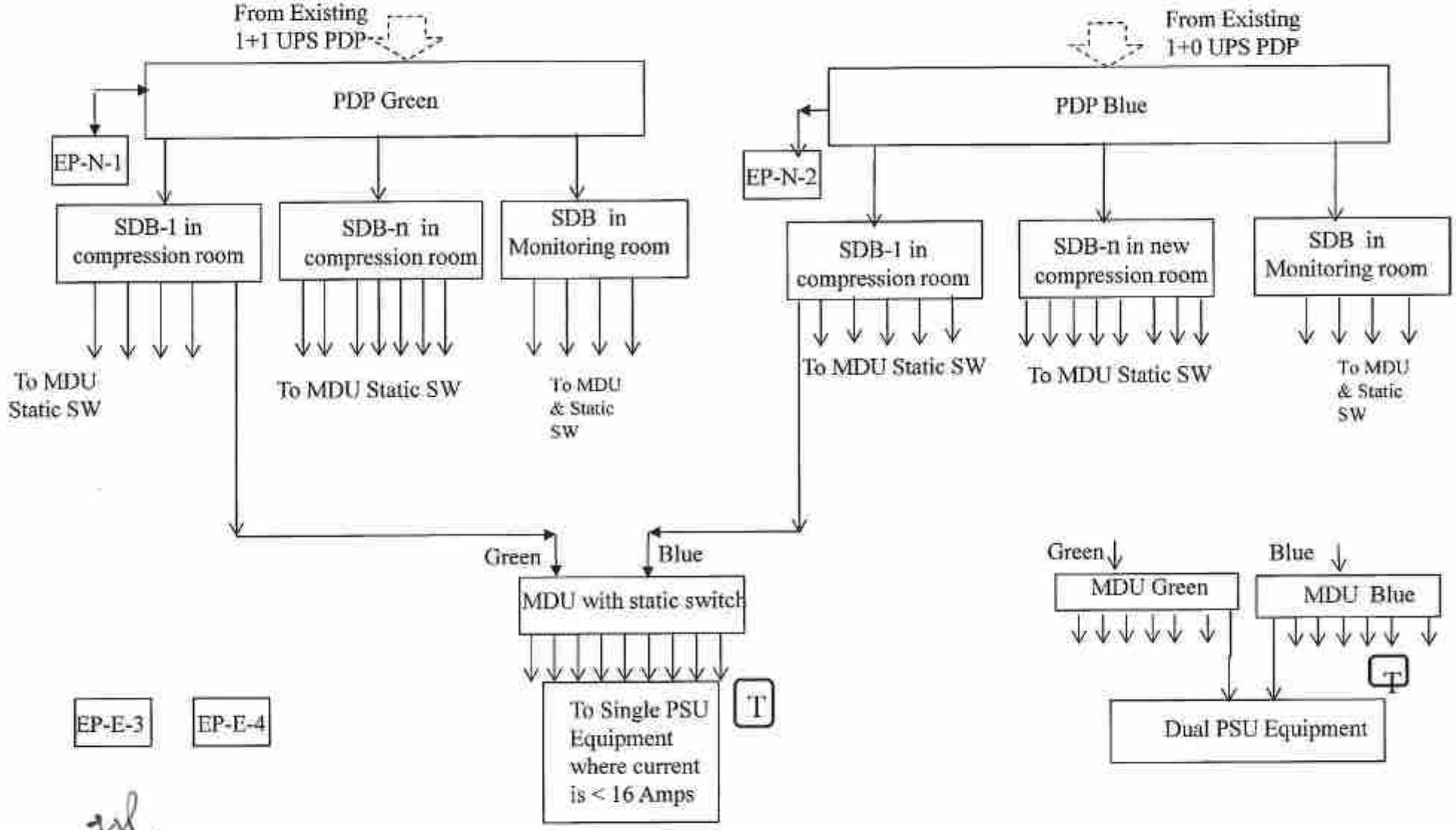
To existing Video Logger

Work Station for Downlink Multiviewers

Multiviewer for downlink Signal Monitoring

DRG: 12

# Suggestive Block Schematic for SITC of DD DTH expansion by upgradation of existing four compression chain and monitoring system - Power Supply Arrangement

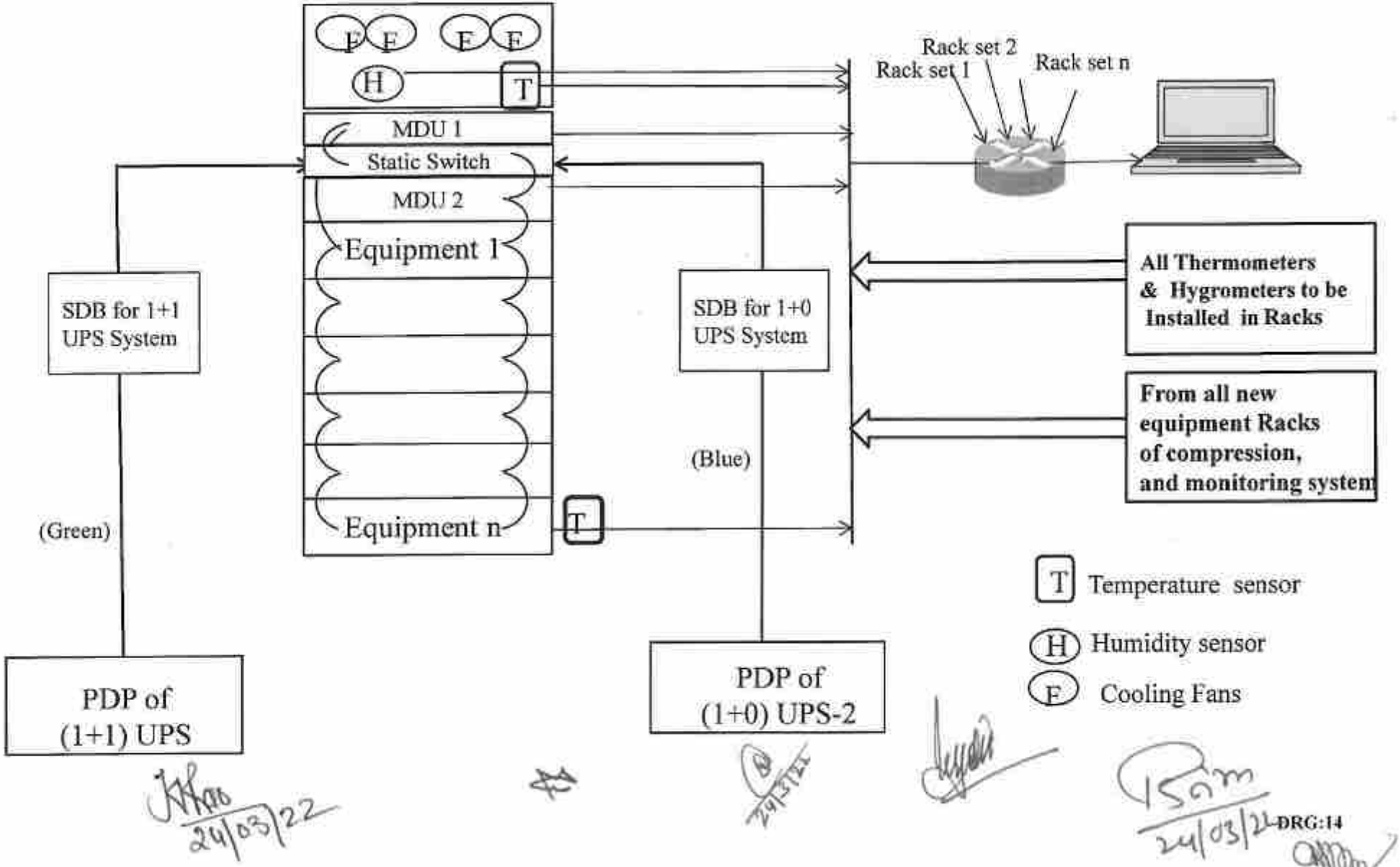



Similarly other MDUs shall be connected to all Equipment rack

**Note: Each rack should have both Green and Blue Supply.**
**N = no. of SDBs required to feed Power Supply to each rack.**
**EP-N=Earth Pit Neutral, EP-E=Earth Pit Equipment**

DRG:13

# Suggestive Block Schematic for SITC of DD DTH expansion by upgradation of existing four compression chain and monitoring system - Power Distribution, Temp & Humidity Monitoring in Racks



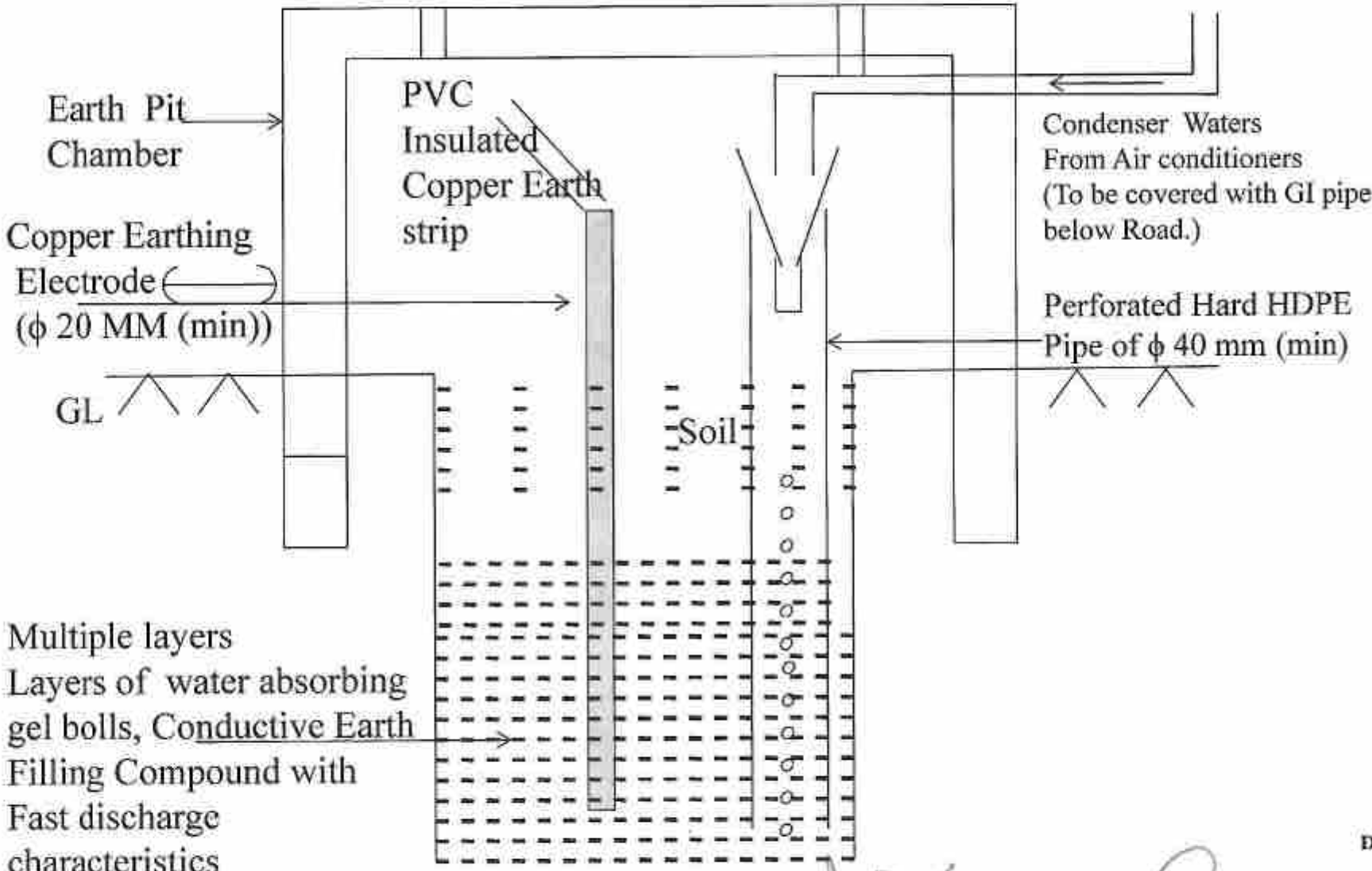

24/03/22

24/3/22

24/03/22

DRG:14

**Suggestive Block Schematic for SITC of DD DTH expansion by upgradation of existing four compression chain and monitoring system - Earth Pit**

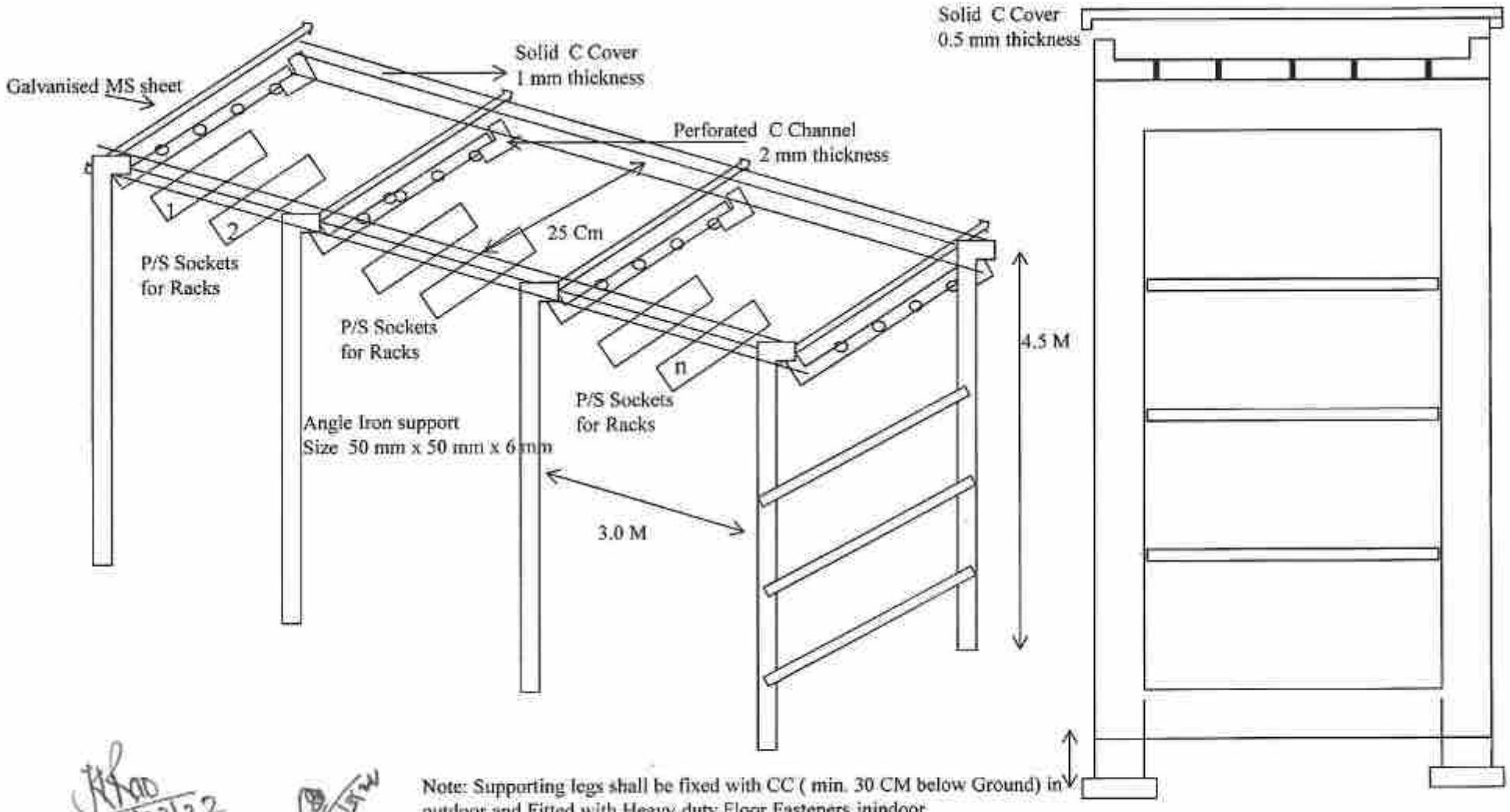



DRG: 15

24/03/22

24/03/22

# Suggestive Block Schematic for SITC of DD DTH expansion by upgradation of existing four compression chain and monitoring system - Cable Support System




Note: Supporting legs shall be fixed with CC ( min. 30 CM below Ground) in outdoor and Fitted with Heavy duty Floor Fasteners inindoor.

DRG:16

**479570/2022/Sat. Design Section - DG DD**

Annexure-I

## Suggestive Bill of Material (BOM) for SITC of Expansion of DD DTH Platform by Upgradation of Existng Four Compression Chain and Monitoring system at DD DTH TODAPUR

| Sl. No. | Description of Item as per Specification (Suggestive BOM) | Quantatiy as per suggestive BOM | | Budgetory Cost in Rs. |
|---|---|---|---|---|
| | | Total Qty | Unit | |
| A | **INPUT AND BASE BAND SYSTEM** | | | |
| 1 | **L band Optical Fiber Link consisting of:** | | | |
| a | Single mode, dual channel L band to Optical Transmitter module for 20 Independent signal per set | 2 | Sets | |
| b | Single mode, dual channel Optical Receiver to L band module for 20 Independent signal per set | 2 | Sets | |
| c | Inbuilt hot swappable Frame contoller card for Remote Configuration and Monitoring of signal | 4 | Sets | |
| d | 19" Rack Frame/ Chassis with hot swappable dual Redundant power supply unit and Rack mounting Kit for mounting of L band Optical Fiber Link | 4 | Sets | |
| e | 16 x 2-way passive L-band splitter (950 MHz to 2150 MHz) with one port DC block modules mounted on 19" rack mountable panel | 3 | Sets | |
| f | 20 Port, F type Female L band Patch panel with 19 " Rack mounting kit | 1 | Sets | |
| g | Low loss L band cable and matching connector with Gold plated Pin as per site requirement (12 meters per signal i.e. 2x6x12 =144 mtrs (min.) to be connected from L band Patch Panel to L band splitter, L band splitter to OFC TX unit in Porta Cabin and OFC RX unit to L band Routers in new Compression Room as per DRG no. 01 & 03. | 1 | Lot | |
| h | Low loss L band cable and matching connector with Gold plated Pin as per site requirement (12 meters per signal i.e. 2x14x12 =336 mtrs (min.) to be connected from existing patch panel to L band splitter, L band splitter to OFC TX unit in Porta Cabin and OFC RX unit to L band Routers in new Compression Room as per DRG no. 01, 02, 2A & 03. | 1 | Lot | |
| i | Provision of 24 Core , single mode, Outdoor type, optical Fibre cable as per site requirement with termination box at both end and OFC Patch cord with SC/APC or LC/APC connector in each core between Porta Cabin to new Compression Room (Length-120 mtr (min) per set) as per DRG no 01 & 02. | 4 | Sets | |
| 2 | **Dual channel L band Amplifier consisting of:** | | | |
| a | Dual channel L band amplifier with built-in LNB power module for 20 Independent signal per set | 3 | Sets | |
| b | Inbuilt hot swappable Frame contoller card for Remote Configuration and Monitoring of signal | 3 | Sets | |
| c | 19" Rack Frame/ Chassis with hot swappable dual Redundant power supply unit and Rack mounting Kit for mounting of dual channel L band amplifier with in-built LNB power supply module | 3 | Sets | |
| d | Low loss L band cable and matching connector with Gold plated Pin as per site requirement (50 meters per signal i.e. 2x6x50 =600 mtrs (min.) to be connected from L Band splitter connected in output of New Receive Antenna to Dual channel L band Ammplifier; and from Dual channel L band Ammplifier to existing L band Splitter in old Compression Room as per DRG no. 01, 02 & 2A. | 1 | Lot | |
| e | Low loss L band cable and matching connector with Gold plated Pin as per site requirement (40 meters per signal i.e. 2x20x40 =1600 mtrs (min.) to be connected from existing L band Router to dual channel L band Amplifier and Dual channel L band Amplifier to to New L band Routers in new Compression Room as per DRG no. 03. | 1 | Lot | |
| 3 | **L band Router (64x192) with dual redundant power supply consisting of :** | | | |
| a | Fully wired base unit with 64x192 populated L band router including Crosspoint Matrix module/Mid Matrix cards/Central Switch Board, Hot swappable input cards; Hot swappable output cards; hot Swappable frame controller /Hot swappable CPU card; Hot swappable dual redundant power supply unit etc. | 2 | Sets | |
| b | Additional Cross Point Matrix module/Mid Matrix Card/Central Switch Board | 2 | Nos. | |
| c | Additional hot swappable Frame Controller Card/CPU Card | 2 | Nos. | |
| d | X-Y/Router control panel with cable | 2 | Sets | |
| e | Necessary power supply to LNBCs ( one set with each Router) | 2 | Sets | |
| f | Low loss RF cable and matching F/BNC type connector with Gold plated pin as per site requirement (5 meters per signal i.e. 5 x 2x (40+136)=1760 mtrs (min.) to be connected from OFC Receive Unit to L band routers & IRDs as per DRG No. 1, 2, 2A, 3, 4 & 5. | 1 | Lot | |

| | | | | |
|---|---|---|---|---|
| 4 | **Professional IRDs consisting of:** | | | |
| a | Professional IRDs with L-band inputs of DVB-S & DVB-S2, DVB-ASI & IP Input compliance decoder (MPEG 2 TS over IP) and DVB-ASI, HD-SDI, SD-SDI, AES/EBU, HD-SDI embedded audio, SD-SDI embedded audio, One downconverted SD-SDI of HD-SDI, Dolby digital (AC-3) 5.1 audio and Dolby Digital Plus 5.1 Audio (E-AC-3) output, MPEG-2 TS over IP output with Multi service filtering facility and having 4:2:0 & 4:2:2 compliant for MPEG-2, H.264/MPEG-4-AVC and 4:2:0 compliant for H.265/HEVC decoding and Common Interface slot hardware, BISS mode-1 & BISS-E Compliant) and dual Redundant Power supply unit | 128 | Nos | |
| b | Low loss RF cable and matching F/BNC type Connector with Gold plated Pin as per site requirement<br>(20 meters per signal i.e. 2x20 x 136= 5440 mtrs (min.) to be connected from both L Band Router to IRD Racks as per DRG No. 4 & 5 | 1 | Lot | |
| c | HD-SDI Video cables with matching connectors as per site Requirement (DRG No. 4 & 5) between the HD SDI output port of all IRDs to HD-SDI Patch Panel | 1 | Lot | |
| d | HD-SDI Video cables with matching connectors as per site Requirement (DRG No. 4 & 11) between the ASI output port of all IRDs to HD-SDI Patch Panel for Monitoring | 1 | Lot | |
| 5 | **IP Data Switches and Network Switches consisting of:** | | | |
| a | (1+1) IP Data Switch 48 port with inbuilt dual power supply unit and rack mounting kit.(2 Nos. per set) | 4 | Sets | |
| b | IP Network Switch 48 port with inbuilt dual power supply unit with rack mounting kit. | 4 | Sets | |
| c | Indoor type CAT-6 Cable with connector as per site requirement and drawing no 4 & 5<br>(Min 10 mtr x 3 nos x 34 nos =1020 meter per set) | 4 | Sets | |
| 6 | **8 AES/EBU SD-SDI & HD-SDI Emmbedder and associated Accessories for Radio Service consisting of:** | | | |
| a | 8 AES/EBU Digital audio and SD-SDI & HD-SDI Emmbedder | 8 | Sets | |
| b | Audio cable with matching XLR Audio connector as per site requirement | 8 | Sets | |
| c | 19" Rack Frame mounting with Frame controller for remote configuration & monitoring, and auto switchable dual redundant power supply unit. | 4 | Set | |
| d | 16 port XLR type, 19" rack mounting Audio Patch Panel | 4 | Sets | |
| 7 | Essential items/works(If any) to complete the installation of Input and Baseband system | 1 | Set | |
| 8 | Installation , testing and system integration of Input and Baseband System | 1 | job | |
| B | **Compression System** | | | |
| 9 | **64 x 64 SD & HD-SDI router wired for all input and out put consisting of:** | | | |
| a | Base unit Fully wired for 64x64 Input and Output | 4 | Sets | |
| b | Inbuilt hot swappable redundant Cross Point module for 64 x 64 | 4 | Sets | |
| c | Inbuilt hot swappable redundant controller/ logic modules | 4 | Sets | |
| d | Inbuilt hot swappable Redundant Power supply unit | 4 | Sets | |
| e | X-Y control panel with cable | 4 | Nos | |
| f | Single Bus remote control panel with cable | 4 | Nos | |
| 10 | **HD-SDI Patch Panel and Patch cord consist of:** | | | |
| a | HD-SDI Patch Panel , 75 Ohm Impedence for all input and output ports of SDI Router as per DRG no. 4 & 5. ( 1RU, Normal Through, self terminating type ) | 4 | Sets | |
| b | HD-SDI Video cables with matching connectors as per site Requirement (DRG No. 4 & 5) between the HD SDI Input Patch Panels to Output Patch Panel via 64x64 SDI Router and upto the Input of Encoders. | 4 | Lots | |
| c | HD-SDI Patch Cord (Impedence -75 Ohm, Cable Length- 3 feet (Minimum)) matching with Patch panel | 100 | Nos | |
| d | HD-SDI Patch Cord (Impedence -75 Ohm, Cable Length- 10 feet (Minimum)) matching with patch panel | 32 | Nos | |

24/03/22

24/03/22

| | | | | |
|---|---|---|---|---|
| 11 | **Digital Encoder operating on 4:2:0 mode with MPEG-2, H.264/MPEG-4 and H.265/HEVC compression without any limitation by way of hardware & software upgradation (including Stat Mux support) consisting of :-** | | | |
| a | Digital encoder with SDI Input signal for 40 SDTV channels in MPEG-2 & H.264/MPEG-4 compression including 16 HDTV channels in H.264/MPEG-4 & H.265/HEVC compression without any limitation by way of hardware & software upgradation. Each encoder chassis shall also be capable to take IP Input (MPEG-2 TS over IP, RTMP, HLS, SRT & ZIXI ) and decode & re-encode SD & HDTV channels as per technical specification of tender document without any limitation by way of hardware & software upgradation. Noise reduction hardware/ software for SD &HDTV, Four stereo audio channel including Dolby Digital (AC-3) 5.1 audio (Decoding & Encoding) & Dolby Digital Plus 5.1 audio (decoding & Encoding) with audio level processor & loudness control, logo inserter, Ancillary data facility in all encoders and Dual redundant power supply units with all encoder chassis | 4 | Sets | |
| b | Two Redundant Digital encoder chassis similar to Main Chassis per set without any limitation by way of hardware & software upgradation. | 4 | Sets | |
| 12 | **IP Data and Network Switches Consisting of:** | | | |
| a | IP Data Switch 48 port with inbuilt dual power supply unit in (1+1 ) configuration ( 2 Nos per set) | 4 | Sets | |
| b | IP Network Switch 48 port with inbuilt dual power supply unit with Rack mounting kit. | 4 | Nos | |
| c | Indoor type CAT-6 Network Cable with connector as per site requirement and drawing no 8 & 9 ( min. 5 mtr x 10 nos x 3 nos =150 mtr per set) | 4 | Sets | |
| 13 | **IP Encapsulator with Multiplexer for Statistical Multiplexing in (1+1) configuration consisting of:** | | | |
| a | IP Encapsulater with Multiplexer in (1+1) configuration for Statical Multiplexing having:<br>i) Minimum Four Independent ASI Input Port with Licenses<br>ii) Minimum Four independent ASI output port with licenses and option of generating free to air ASI Output for monitoring.<br>(iii) Minimum Eight Independent IP data Port (bi-directional) with licenses (for Input data, Independent MPEG-2 TS over IP Output for transmission, Anncellary data, Control & Management)<br>(iv) Minimum four nos 10 Gigabit SFP Port (Bi-directional) with device<br>(v) DVB- CSA(V1 & V2 ) compliant iCAS encryption and Minimum two DVB-CAS simulcrypt scrambler licenses with ECM & EMM and iCAS enabled ASI Outputs | 4 | Sets | |
| 14 | **8x8 or better matrix ASI router (SDI compatible) wired for all input and out put consisting of:** | | | |
| a | Base unit fully wired for 8x8 or better matrix Input and Output | 4 | Sets | |
| b | Inbuilt controller/ logic modules | 4 | Sets | |
| c | Inbuilt auto switchable Redundant Power supply unit | 4 | Sets | |
| d | X-Y control panel with cable | 4 | Sets | |
| e | Single Bus remote control panel with cable | 4 | Sets | |

24/03/22

24/03/22

| | | | | |
|---|---|---|---|---|
| 15 | **Network Management System(NMS) for Compression equipment consisting of:** | | | |
| a | Compression equipment control system Software | 4 | Sets | |
| b | Compression equipment control system Hardware consisting of rack mounted main server in 1+1 master -slave configuration or Cluster configuration with client license, each server with dual power supply modules, and KVM switch, Integrated Key Board , mouse & rack mount foldable display monitor. | 4 | Sets | |
| c | Client work station with required licenses for remote monitoring of all NMS | 4 | Sets | |
| d | 24 port IP Network switch for NMS monitoring with Client Work station in remote locations | 4 | Sets | |
| e | Indoor type CAT-6 Cable with connector as per site requirement and drawing no. 8 & 9 (Min 100 meter per set) | 4 | Sets | |
| 16 | **GPS Enabled NTP Server and associated accessories consisting of:** | | | |
| a | Two nos. GPS enabled NTP servers with dual redundant Power supply and GPS Antenna with associated accessories for network time synchronization of all broadcast equipment and servers installed in the earth station. | 1 | Sets | |
| b | 24 port IP Network switch to be connected in the output of NTP Server for network time synchronisation of all IP Network switches of four new compression system and two old compression system, Monitoring system and other associated equipment | 1 | Set | |
| c | Indoor type CAT-6 Cable with connector as per site requirement and drawing no. 10 (Min 3x10 meter per set for four new Compression system and 3x50 mtr per set for two old Compression system cable i.e. (3x10x4)+(3x50x2)=420 mtr | 1 | Lot | |
| 17 | **EPG and PSI/SI Generator/Server consisting of:** | | Sets | |
| a | EPG and PSI/SI Generator/Server, in (1+1) configuration with associated hardware & software, for Insertion of EPG on weekly basis for 175 TV channel and Insertion of private data of DVB compliant Conditional Access System (CAS) in symulcript mode into multiple transport stream | 1 | Sets | |
| b | Hot Swappable Dual Redundant Power Supply Unit in each Chasis | 1 | Lot | |
| c | 48 port IP Data switch in (1+1) configuration to be connected with EPG and PSI/SI Generator/Server for feeding data to IP data switches & IP Encapsulator of four new compression system and two old compression system; and Multiviewer for monitoring of IP streams | 1 | Set | |
| d | Indoor type CAT-6 Cable with connector as per site requirement and drawing no. 10 (Min 3x10 meter per set for four new Compression system and 3x50 mtr per set for two old Compression system cable i.e. (3x10x4)+(3x50x2)=420 mtr | 1 | Lot | |
| e | 24 Port IP Router with inbuilt dual power supply unit in (1+1 ) configuration ( 2 Nos per set) | 1 | Set | |
| f | Indoor type CAT-6 Cable with connector as per site requirement and drawing no. 10 (Min 4x10 meter per set for four new Compression system and 4x50 mtr per set for two old Compression system cable i.e. (4x10x4)+(4x50x2)=560 mtr | 1 | Lot | |
| 18 | Essential items/Works (If any) to complete the installation of Compression system | 1 | Set | |
| 19 | Installation , testing and system integration of Compression System | 1 | job | |
| (D) | **Receive Parabolic Dish Antenna System:** | | | |
| 20 | **Receive Parabolic Dish Antenna and accessories consisting of:** | | | |
| a | C & Ku band 4.5 to 4.8 meter Manual drive motorized Receive Parabolic Dish Antenna System | 6 | Sets. | |
| b | C-Band and Ku Band or dual combined C-Band and Ku Band Linear orthogonal feed | 6 | Sets | |
| c | C-Band LNBC | 12 | Nos. | |
| d | Ku Band LNB | 12 | Nos | |
| e | Out door type Manual Antenna control unit with connecting cable for manual orientation of the above PDA | 6 | Sets. | |
| f | Low loss L band cable with matching connector with Gold plated Pin as per site requirement (50 meters per antenna 50x6x2=600 mtrs (min.) with laying overhead/matching with existing covered channel from LNBC of Receive PDAs to L-band Patch Panel in Porta cabin. | 1 | Lot | |
| g | Cable Lables to Delineate on all RF Cables to be place at every 5 meters | 1 | Set | |
| h | Installation of above PDA including foundation , Earthing, Lightening arrester (Material and labour) . Armoured Power cable with copper conductor from PDA to Controller. | 1 | job | |
| i | 16 sq mm 4 core , Armoured copper , power supply cable, MCBs as per site requirement from existing PDP to Receive antenna control panel. (Min length 70 mtr per set) | 6 | Sets | |
| j | Providing & installing support tray & cable tray with cover as per site requirement between new Receive Antenna and existing cable tray and integrated with existing cable tray for laying of cables minimum 50 meter distance | 1 | job | |

24/03/22

24/03/22

| | | | | |
|---|---|---|---|---|
| 21 | **Ku- Band receive setup for down link monitoring consisting of** | | | |
| a | Ku- band receive antenna 120 cm with LNBF | 4 | Set | |
| b | Ku- band receive antenna 60 cm with LNBF | 4 | Set | |
| c | Installation of 8 sets Antennae supplied above under line item (a) & (b) | 1 | job | |
| d | RF cables with connector as per site requirement (minimum 240 mtrs) | 1 | lot | |
| 22 | Essential items/Works (if any) to complete the installation of Receive Parabolic Dish and Ku band Receive Antenna system | 1 | Set | |
| 23 | Installation , testing and system integration of Receive Parabolic Dish and Ku band Receive Antenna System | 1 | job | |
| C | **Monitoring System** | | | |
| 24 | **Confidence level Monitoring system consisting of:** | | | |
| a | 17 Inch (Nominal) LCD (TFT )Professional Broadcast Colour Monitor with integrated speakers | 2 | Nos | |
| b | Professional grade Integrated Audio/video Monitor with >= 3.4" TFT/OLED/LCD screen of high resolution and integrated speakers. It should accept 2 HD/SD-SDI Inputs with reclocked output, including audio De-Embedder, decoding of Dolby digital (AC-3) 5.1 audio and Dolby Digital Plus 5.1 Audio | 2 | Nos | |
| c | Prof. IRDs {with **L-band inputs of DVB-S & DVB-S2, DVB-ASI & IP input (MPEG 2 TS over IP)** } with DVB-ASI, SD-SDI, HD-SDI, AES/EBU, HD SDI embedded audio, SD-SDI embedded audio, One downconverted SD-SDI of HD-SDI, Dolby digital (AC-3) 5.1 audio & Dolby Digital Plus 5.1 Audio (E-AC-3) output, MPEG-2 TS over IP output with Multi service filtering facility and having 4:2:0 & 4:2:2 compliant for MPEG-2, H.264/MPEG-4-AVC and 4:2:0 compliant for H.265/HEVC decoding and Common Interface slot hardware, BISS mode-1 & BISS-E Compliant and dual Redundant Power supply unit | 2 | Nos | |
| d | Prof. IRDs {with **DVB-ASI & IP input (MPEG-2 TS over IP)** } with DVB-ASI, SD-SDI, HD SDI, AES/EBU, HD SDI embedded Audio, SD-SDI embedded audio, One downconverted SD-SDI of HD-SDI, Dolby digital (AC-3) 5.1 audio & Dolby Digital Plus 5.1 Audio (E-AC-3) output, MPEG-2 TS over IP output with Multi service filtering facility and having 4:2:0 & 4:2:2 compliant for MPEG-2, H.264/MPEG-4-AVC and 4:2:0 compliant for H.265/HEVC decoding and Common Interface slot hardware, BISS mode-1 & BISS-E Compliant and dual Redundant Power supply unit. | 2 | Nos | |
| e | 64 x 32 SDI Router with one X-Y pannel, one Single Bus Remote Control Panel, dual Redundant power supply and accessories | 1 | set | |
| f | 32x2 HD-SDI/ASI Patch Panel , 75 Ohm Impedence as per DRG no. 11 ( 1RU, Normal Through, self terminating type ) | 7 | Nos | |
| g | 19" Rack mount 24 Port IP Patch Panel with RJ 45 Connector | 1 | Set | |
| h | IP Patch cord with connector (RJ-45) | 2 | Sets | |

24/03/22

24/03/22

| | | | | |
|---|---|---|---|---|
| 25 | **Input and Downlink Monitoring of SDTV and HDTV Channels consisting of:** | | | |
| a | Multi viewer display system with remote panel for IP Input (MPEG-2 TS over IP, RTMP, SRT, HLS) streams of Input Source signal + 1 no DVI Input+2 Nos SDI Input. Each set of Multiviewer shall have inbuilt MPEG-2 & MPEG-4 decoders of 40 SDTV with enmbedded audio including MPEG-4 & HEVC Main-10 decoders of 16 HDTV with Dolby Digital (AC-3) 5.1 audio/ Dolby Digital Plus 5.1 audio Channels. Multiviewer shall have two independent video display outputs; and display the name of all channels with their alrams including major alarms on separate monitor as per DRG no. 12 | 4 | Sets | |
| b | Work station with software licences including one client Licence for controls and configuration of Multiviewer System and Display on 55" Display system | 1 | Set | |
| c | De-Modulator cum Descrambler unit (DVB-S & S2) with Common interface slot hardware ( Max 8 Service per CI slot) for 40 TV service and 8 Radio service per Stream per set ( one chassis should consist of multiple modules ). If De-Modulator & Descrambler offered in separate chassis shall also be acceptable. | 5 | Sets | |
| d | Multi viewer display system with remote pannel for IP Input (MPEG-2 TS over IP, RTMP, SRT, HLS) streams of Down link signal + 1 no DVI Input+2 nos SDI Input. Each set Multiviewer shall have inbuilt MPEG-2 & MPEG-4 decoders of 40 SDTV with enmbedded audio including MPEG-4 & HEVC decoders of 16 HDTV with Dolby Digital (AC-3) 5.1 audio/ Dolby Digital Plus 5.1 audio Channels. Multiviewer shall have two independent video display outputs; and display the name of all channels with their alrams including major alarms on separate monitor as per DRG no. 12. | 4 | Sets | |
| e | Work stations with software licences including one client licence for controls and configuration of Multiviewer System and Display on 55" Display system | 1 | Set | |
| f | Active splitter(L- band) 1-input and 12 output with DC Block and dual Redundant Power Supply | 10 | Sets | |
| g | 1:4 ASI splitters | 8 | Nos | |
| h | Professional Broadcast 55" LCD display wall system along with mounting kit | 16 | Sets | |
| i | Interconnecting cables from Multi viewer system to 55" LCD display wall system for display of each Multiviewer output as per DRG no. 12 | 1 | Set | |
| j | Dismantaling of old 55" LCD Monitor and Installation of new 55" LCD Monitors with required modification of existing monitoring stand with matching material. | 1 | job | |
| k | 42/40 inch (nominal) LED display system with mounting stand | 2 | Sets | |
| 26 | Essential items/Works (If any) to complete the installation of above Mmonitoring System | 1 | Sets | |
| 27 | Installation , testing and system integration of Monitoring System | 1 | job | |
| D | **MEASURING EQUIPMENT** | | | |
| 28 | Multi format Digital SD & HD Video & Audio Test pattern geacrator | 1 | Sets | |
| 29 | Colour laser Printer with network printing facility for A4 size | 1 | Sets | |
| 30 | B/W laser printer with network printing facility for A3 size | 1 | Sets | |
| 31 | Any other essential items/Works to complete the Measuring system | 1 | Sets | |
| 32 | Installation , testing and system integration of Measuring System | 1 | job | |
| E | **POWER SUPPLY SYSTEM** | | | |
| 33 | SDBs with industrial MCCBs & MCBs, PDPs and Power supply cables to meet the requirement of all supplied equipment with 30% (Nominal) spare capacity to connect additional rack load in future consisting of: | | | |
| a | Power Distribution Panels with suitable rating MCCBs and Bus Bar of (1+1) UPS system to feed Power supply to all SDBs in new Compression room as per DRG No.13. | 1 | Set | |
| b | Supply, Laying and Integration of Power supply Cables (4 Core Copper ) with connectors between existing (1+1) UPS PDP and above said PDP in new Compression room; and from new PDP to all SDBs in new compression room & Monitoring room ( Minimum length-100 mtr) | 1 | Sets | |
| c | Power Distribution Panels with suitable rating MCCBs and Bus Bar of (1+0) UPS System to feed Power supply to all SDBs in new Compression room as per DRG No.13 | 1 | Sets | |
| d | Supply , Laying and Integration of Power supply Cables (4 Core Copper ) with connectors between existing (1+0) UPS PDPs and above said PDP in new Compression room; and from new PDP to all SDBs in new compression room & Monitoring romm ( Minimum length-100 mtr) | 1 | Sets | |
| e | SDBs with industrial MCCBs & MCBs and three core copper power supply cables to meet the requirement of all equipment supplied in new compression room connected with (1+1) UPS power supply system and (1+0) UPS power supply system as per DRG No.13 | 1 | Sets | |
| f | SDBs with industrial MCCBs & MCBs and three core Copper power supply cables to meet the requirement of all equipment in monitoring room connected with (1+1) UPS power supply system and (1+0) UPS power supply system as per DRG No.13 | 1 | Sets | |
| 34 | Essential items/Works (if Any) to complete the Power Supply system | 1 | job | |
| 35 | Installation , testing and system integration of Power Supply system | 1 | job | |

24/03/22

24/03/22

**479570/2022/Sat. Design Section - DG DD**

| | | | | |
|---|---|---|---|---|
| F | MISCLLANEOUS ITEMS | | Sets | |
| 36 | Control & operators table made of powder coated MS sheet or aluminium matching with existing table to install remote operations & control computer, Remote Control panels, digital waveform monitors, Picture monitors, monitoring panel with stereo Loud speaker and other relevant equipments. | 1 | job | |
| 37 | i)Supply and installation of electronic thermometer & electronic hygrometere inside on top of each rack along with remote configuration and alarm monitoring system. Qty: 1 Set<br>ii) 48 port IP switch for control of temperature and humidity. Qty: 1 Set | 1 | Sets | |
| 38 | Required no. of 19 ", 1000 mm (depth) equipment rack frames (min 27 nos rack ) including Installation material audio video cables and matching HD connectors, CAT-6 cable with RJ-45 connectors, Power Supply cable with connectors etc. | 1 | Sets | |
| 39 | Required no of Mains Distribution Units and Single Phase Auto Changeover Switch (Min 1 no. Single Phase Auto Changeover switch and 2 nos of MDUs per Rack i.e. Total Min. 27 Single Phase Auto changeover Switch and 54 Nos MDUs) with sequential delayed output on start up, output status LED and IEC-3 pin ( for those equipment which have single power supply input) for each equipment in every rack. | 1 | Sets | |
| 40 | Industrial type 3 pin Male-Female connector ( Min 54 nos ) as per site requirement | 1 | Sets | |
| 41 | Earthing system and earth pits (minimum 16 Nos i.e. 12 nos for Receive Antenna +4 nos for Power Supply and equipment<br>(Earth Resistance of each pit < 1 ohm)*Sample picture is enclosed at Drwg No.15* | 1 | Sets | |
| 42 | Installation material and laying of cables protection pipes | 1 | job | |
| 43 | Providing & installing cable tray with cover on top of equipment racks as per site requirement for laying of all cables in new Compression room as per drawing. 16 | 1 | job | |
| 44 | Providing & installing cable tray with cover as per site requirement for laying of all cables between old Compression room to new Compression Room. | 1 | job | |
| 45 | One raised platform/ trolley with wheel and braking arrangements to reach up to overhead cable tray in compression room | 1 | Sets | |
| 46 | Set of tools consisting of video connectors crimping tools with suitable die-sets of all used connectors, BNC puller, cable strippers of all use cables, RJ 45 crimping tool, set of screw drivers and spanners, Allen key set, DC powered screw and nut openers, digital multimeter, digital clamp on meter, weller soldering station and other essential tools required to be used during installation. | 1 | Sets | |
| 47 | Installation , testing , system integration and commissioning of all equipment supplied for Input Base Band System, Compression System, Monitoring System, Receive Antenna System and Power Supply System for expansion of DTH system | 1 | job | |
| G | DOCUMENTATION | | | |
| 48 | Technical manuals ( Hard Copy) for all the equipment supplied | 2 | Sets | |
| 49 | Technical manuals (Softcopy) for all the equipment supplied on DVDs/USBs(with Search facility etc) for the station | 2 | Sets | |
| 50 | All software backups are to be supplied on DVDs/USBs. | 2 | Sets | |
| H | TRAINING | | | |
| 51 | Five separate Seminars (including theoretical & Practical training, hands on experience) for Doordarshan personnel at site. Atleast , One working day Training of each module shall be delivered by the factory Engineer/personnel of OEM. ( This training period is not part of Delivery period). | 1 | job | |
| a | General Layout and Receive Antenna System (01 working day) | 1 | job | |
| b | Base band Equipment (02 working day) | 1 | job | |
| c | Digital compression system including NMS (04 working days) | 1 | job | |
| d | Monitoring and measurement equipment (02 working day) | 1 | job | |
| e | Power Supply System (01 working day) | 1 | job | |

24/03/22

24/3/22

24/03/22