HARRIS®

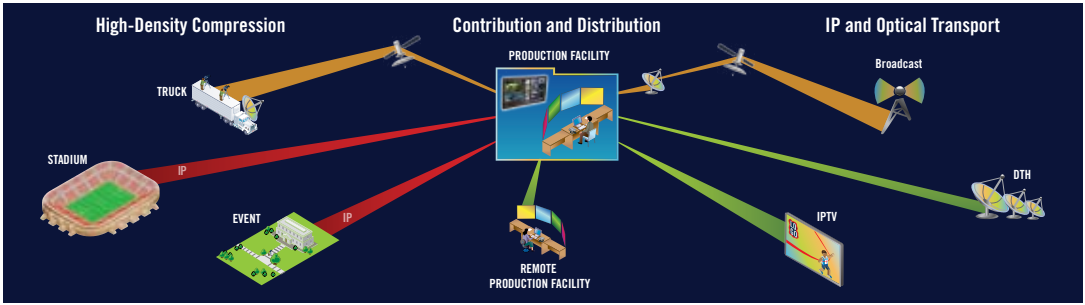
VIDEO NETWORKING GUIDE

Connectivity Without Complexity

INTRODUCTION

As today's demand for rich media continues to grow, consumers require various types of content — originated from around the world — delivered to them in multiple formats, on multiple devices and at anytime. Harris helps broadcasters and service providers meet these demands with the NetVX™ video networking system and the 6800+™ core processing platform. These easy-to-use, flexible networking and encoding products deliver best-in-class audio, video and data network management.

The diverse Harris networking and encoding portfolio enables you to customize a solution to meet your particular requirements quickly and easily, whether the need is compressed or uncompressed transport, MPEG-2 or JPEG 2000, H.264, SD or HD.



To learn more about our video networking applications, products and modules, please visit www.broadcast.harris.com or www.netvx.com.

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NetVX™ — Video Networking Platform

The NetVX video networking system is a modular integrated high-speed video networking device providing connectivity without complexity. NetVX modules combine standards-compliant audio, video and data networking interfaces to integrate with any video plant and expand its reach to broader, even global data networks.

With a totally modular architecture, NetVX can be configured to support any contribution and/or distribution application. Select either a 5RU chassis with slots for up to 17 modules (15 applications, 2 control) or a 1RU chassis that holds up to three modules. Then choose the modules you need for your specific application. As your needs expand, upgrades are as simple as plugging in additional application modules.

Main Features

- H.264 (MPEG-4) HD/SD audio and video encoding
- MPEG-2 HD/SD audio and video encoding
- MPEG-2 SD audio and video decoding
- Statistical multiplexing(MPEG4 and MPEG 2)
- Networking (IP, ATM, DS3/E3, OC-3/STM-1)
- Fully SFN-capable and proven, over ATM and IP
- Ability to transport video and data services over same links
- Video and audio can be mapped to multiple network outputs simultaneously
- Ability to schedule services for small or large network deployments
- Multiplexing and De-multiplexing

Applications

- IPTV
- ATSC
- DVB-[T/C/S]
- ISDTB-Tb
- Cable
- Satellite
- Contribution
- Distribution

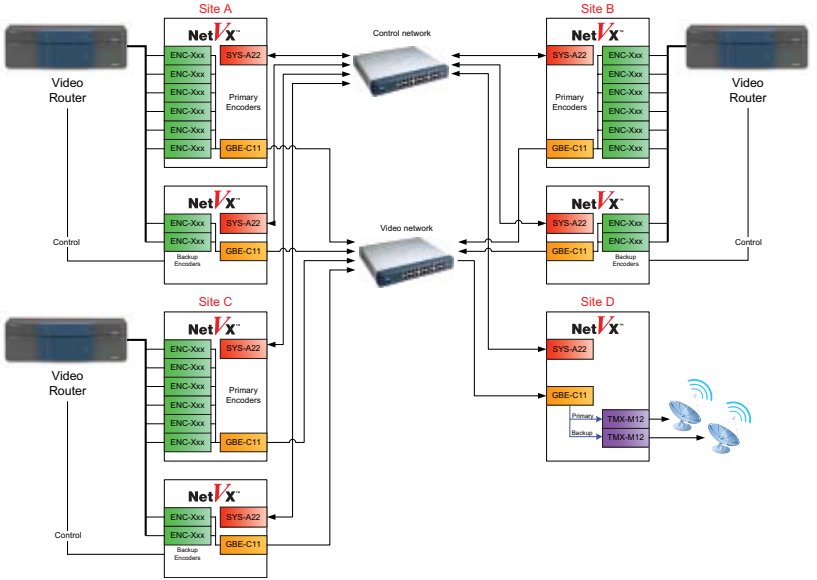
NetVX Redundancy

NetVX provides a comprehensive solution for multiple redundancy models. These solutions range from a basic 1:1 backup to a distributed redundancy. In a simple solution, such as 1:1 or 1:N, NetVX can provide a virtually seamless automatic switch-over. In the more complex solution, N:M redundancy not only ensures backup to individual primary modules, but also provides redundancy to the backup modules. The last form of redundancy is distributed redundancy. Multiple systems can be protected by one dedicated system.

NetVX Distributed StatMux

The acceptance of IP networks for video transport has created a need for statistical multiplexing (statmux) capability between facilities. The NetVX statmux architecture provides the flexibility to create a statmux group regardless of whether the chassis are co-located or span multiple networks. NetVX supports several statistical multiplexing applications including ATSC and DVB. Not only is it capable of supporting traditional MPEG-2 SD and HD, but it also can be used with MPEG-4 or a combination of both.

Distributed Statistical Multiplexing and Redundancy



Main Features

- Interconnection via IP or ASI
- Up to 63 channels in one multiplex
- Mixed encoding (MPEG-2 and -4)
- Distributed encoders across local or remote sites
- Final output over ASI, ATM or IP
- Redundancy at a board, path or system level
- System level redundancy utilizes IP networking

ENC-A21 HD/SD MPEG-4/H.264 Encoder Module

The ENC-A21 module is a single-program H.264 (MPEG-4 Part 10) software upgradeable baseline (Level 1.3), standard (Level 3) and high-definition (Level 4) encoder. It generates a low-resolution secondary stream for use in picture-in-picture (PIP) electronic program guides (EPG). The ENC-A21 accepts SMPTE 259M and SMPTE 292M SDI component video and encodes stereo pairs of audio using MPEG-4 AAC-LC, MPEG-4 HE-AAC, MPEG-4 AAC 5.1, Dolby® AC-3, MPEG Layer II, or the lossless SMPTE 302 audio format. The card accepts audio via three AES stereo audio inputs or embedded sources.

FEATURES

- Advanced H.264 HD encoder
  - Up to 17 Mb/s
  - Multichannel operations
  - Latest filtering and multi-pass technology
  - Statistical multiplexing
- Video encoding
  - Main Profile Level 4
  - Picture-in-Picture
  - SMPTE 292 video inputs with loop through
  - VANC and VBI support
- Audio encoding
  - AAC-LC 2.0 / 5.1
  - HE-AAC 2.0 /5.1
  - Dolby® AC-3 2.0
  - MPEG Layer II
  - Embedded audio
  - Three SMPTE 276 (AES) audio inputs
- IPTV, M/H and ISDB-Tb support
- Low bit-rate encoding
- Software-upgradeable codec for fast changes as standard evolves
- BISS-E encryption

ENC-H11 HD MPEG-2 Encoder Module

The ENC-H11 module uses the latest in VLSI technology to bring stunning high-definition video to the NetVX platform. It is the smallest, lowest-power, full-featured professional MPEG-2 HD encoder on the market today and is suitable for a broad range of applications including post production, surveillance, contribution, distribution and final emission.

FEATURES

- Video encoding
  - MPEG-2 4:2:2/4:2:0 profile HD encoder
  - SMPTE 292 video input with loop through
- Audio encoding
  - MPEG Layer II
  - Dolby® AC-3 2.0
  - SMPTE 302 (Dolby® E passthrough)
  - Embedded or AES external
  - Three SMPTE 276 (AES) audio inputs
- ATSC and DVB support
- Contribution and distribution rates
- Extensive VANC and VBI support
- BISS-E encryption

ENC-S11 MPEG-2 Multipurpose Encoder Module

The ENC-S11 MPEG-2 encoder module can encode both Main Level/Main Profile 4:2:0, CIF and Main Level/Professional Profile 4:2:2 video. It accepts analog composite as well as SMPTE 259M SDI component video. The ENC-S11 also encodes two stereo pairs of audio using Dolby® AC-3 2.0 or MPEG-1 Layer II compression, SMPTE 302 or pre-compressed pass-through audio. Primary and secondary stereo audio are accepted as AES3, balanced analog or embedded.

FEATURES

- Video encoding
  - MPEG-2 4:2:2/4:2:0 profiles SD encoder
  - Up to 50 Mb/s
  - Contribution/distribution
  - Statistical multiplexing
  - Low delay mode
  - SDI and analog video inputs
  - NTSC and PAL
- Audio encoding
  - Dual stereo audio encoding
  - MPEG-1 Layer II and Dolby® AC-3
  - SMPTE 302 (Dolby® E passthrough)
  - Embedded, AES and analog inputs
- ATSC and DVB support
- Contribution and distribution rates
- Extensive VBI support
  - Data passthrough
- BISS-E encryption

ENC-S21 High-Performance SD Encoder Module

The ENC-S21 is an ultra low-bitrate MPEG-2 SD encoder incorporating the latest filtering, multi-pass technologies and statistical multiplexing to achieve unprecedented bitrate performance.

FEATURES

- Video encoding
  - High-performance SD encoder
  - MPEG-2 4:2:0 profile SD encoder
  - Up to 15 Mb/s
  - Multichannel operations
  - Latest filtering and multi-pass technology
  - Statistical multiplexing
  - SDI and analog video inputs
  - NTSC and PAL
- Audio encoding
  - Dual stereo audio encoding
  - MPEG-1 Layer II
  - Dolby® AC-3 2.0
  - SMPTE 302 (Dolby® E passthrough)
  - Embedded, AES and analog inputs
- ATSC and DVB support
- Distribution rates
- Extensive VBI support
- Data passthrough
- BISS-E encryption

DEC-S11 MPEG-2 Decoder Module

The DEC-S11 MPEG-2 decoder module handles Main Level/Main Profile 4:2:0, CIF and Main Level/Professional Profile 4:2:2 video, and provides both analog composite and SMPTE 259M SDI component video. The DEC-S11 also decodes Dolby® AC-3 or MPEG-1 Layer II audio and supports SMPTE 302 and precompressed audio formats. Primary and secondary stereo audio outputs are provided as AES3, balanced analog or embedded audio.

FEATURES

- MPEG-2 4:2:2/4:2:0 Profile SD decoder
  - Up to 50 Mb/s
  - Contribution/distribution
- SDI and analog video outputs
  - NTSC and PAL
- Dual stereo audio decoding
  - MPEG-1 Layer II and Dolby® AC-3
  - SMPTE 302, Dolby® E passthrough
  - Embedded, AES and analog
- Extensive VBI support
- ATSC and DVB support
- Data passthrough
- BISS-E decryption

AUD-D14 Audio Processing Module

The AUD-D14 audio processing module extends the audio capabilities of NetVX by providing up to four additional channels (stereo pairs) of audio input and output. Audio codecs include MPEG Layer II and Dolby® AC-3. SMPTE 302 is also provided to support Dolby® E & AAC 5.1 passthrough processing.

FEATURES

- Enables point-to-point audio encoding and decoding
- Encodes additional audio channels for association with video programs
- Provides four AES ports that can be used for either encoding or decoding (model dependent)
- Supports industry-standard DVB fixed-key encryption and decryption
- Supports BISS-E encryption
- Encodes and decodes MPEG compliant audio transport streams
- Encodes and decodes MPEG Layer II and Dolby® AC-3 2.0
- Uses SMPTE 302 for Dolby® E and AAC 5.1 passthrough
- Operates in either ATSC or DVB multiplex modes

TMX-M12 MPEG-2 Transport Stream Multiplexer Module

The TMX-M12 makes it easy to de-multiplex and re-multiplex ASI transport streams. The TMX-M12 enables incoming programs to be repurposed into new programs, local content to be added, and new transport streams to be generated. The TMX-M12 features two independent inputs and outputs and can handle either the DVB-ASI or the SMPTE 310M protocols.

FEATURES

- MPEG-2 transport stream
  - Multiplexer/de-multiplexer
  - 64 programs/1024 PIDs
  - Two external Rx/Tx ports, 16 internal paths
  - SMPTE 310 (19.39 Mb/s)
  - DVB-ASI (214 Mb/s)
  - ISDB-Tb support
  - Statistical multiplexing
  - Multi (MPTS) or single (SPTS) transport streams
  - Global PCR extraction
  - Transport stream passthrough
  - SI table localization
  - Multiplex of both MPEG-2 and MPEG-4 streams
- IP over ASI*
  - Line-rate
  - Bidirectional
- Inputs and outputs
  - Two software-selectable DVB-ASI or SMPTE 310 inputs
  - Two software-selectable DVB-ASI or SMPTE 310 outputs

*used in conjunction with the GBE-C11

TMX-M14 MPEG-2 Transport Stream Multiplexer Module

The TMX-M14 makes it easy to output multiple ASI transport streams and features four independent DVB-ASI outputs.

FEATURES

- MPEG-2 transport stream
  - Four external Tx ports
  - DVB-ASI (214 Mb/s)
  - Multi (MPTS) or single (SPTS) transport streams
  - Transport stream passthrough
- Outputs
  - Four software-selectable outputs
  - Configurable for DVB-ASI or SMPTE 310M

TMX-M12-SCR Simulcrypt Scrambler and Conditional Access Module

The NetVX platform can now address market segments such as Direct-to-Home (DTH), non-free-to-air DVB-T, and select business-to-business applications with the addition of new DVB scrambling and Conditional Access (CA) capabilities enabled by a Simulcrypt interface.

The new TMX-M12-SCR can accept unencrypted programs from a variety of sources such as local encoders to network interfaces, including ASI, Gigabit Ethernet, or DS3/OC-3/E3/STM1. It interfaces with the Simulcrypt Synchronizer on the control module to access Control Word (CW), CA and Entitlement Control Messages (ECMs). Each program is encrypted using DVB common scrambling, and ECMs are multiplexed into each stream to provide a DVB-compliant output.

Based on the TMX hardware, the TMX-M12-SCR runs on new software and a unique firmware load that turns the TMX into an encryption engine supporting 63 simultaneous programs at a combined rate of up to 200 Mb.

In addition to the encryption hardware, the TMX-M12-SCR contains a hardware random number generator known as the Control Word Generator (CWG) by Simulcrypt. The Simulcrypt Synchronizer requests a new CW from the CWG on the TMX-M12-SCR each Crypto Period.

FEATURES

- DVB Scrambler
- Simulcrypt Synchronizer
- CWG
- Integration with multiple CA headend systems
- Connection to multiple simultaneous CA systems
- Simulcrypt integration
  - TMX DVB Common Scrambling
  - CWG
  - Simulcrypt Synchronizer <-> ECM Generator protocol
  - Simulcrypt Synchronizer ECM transmission and CW management
  - MUX <-> EMM Generator protocol
  - Compliant with ETSI TS 103 197 V1.1.1 (2000-06)
  - Compliant with ETSI TS 101 197 V1.2.1 (2002-02)

ATM-X11 ATM Network Interface Module

The ATM-X11 module provides a full-duplex 155 Mb/s SONET/SDH optical interface and a full-duplex 35/45 Mb/s PDH electrical interface. These interfaces support Asynchronous Transfer Mode (ATM) circuit connections. A building integrated timing supply (BITS) master clock interface is also provided for either sending or receiving Stratum clock timing signals.

FEATURES

ATM network adapter

- Full-duplex SONET/SDH and PDH
  - OC3/STM-1 and DS3/E3
- Software-selectable framing
- SFP Types
  - Single-mode
  - Multi-mode
  - Long Reach
  - STM-1e

Advanced circuit processing

- MPEG over AAL-1 with FEC or AAL-5 w/o FEC
- ITU J.82
- 192 simultaneous AAL-5 IP SAR operations
  - LLC/SNAP
- ATM PVC
  - 63 AAL-1 or 255 AAL-5
  - Per VC ingress policing
  - 3-Level QoS priority tagging

GBE-C11 Gigabit Ethernet Module

The GBE-C11 module brings unparalleled data support to the NetVX multiservice platform. In addition to supporting video over IP, the GBE-C11 can be used to aggregate voice and data traffic more efficiently using private or leased IP networks.

FEATURES

- Up to 1000 Mb/s of IP connectivity
  - 10/100/1000 manual/auto-negotiate
  - TOS priority tagging
- Video over IP
  - 127 bidirectional streams
  - MPEG over UDP or RTP over UDP mapping
  - Four levels of FEC (COP3 R2/SMPTE 2022-1)
- LAN extension, VLAN
  - Static or dynamic routes (RIPv2)
- IP over ASI (bidirectional) used in conjunction with the TMX-M12
- RJ-45 electrical and optional optical interface (SFP)

SYS-A22 System Controller Module

The SYS-A22 system controller module provides control and management functionality to the NetVX system. SYS-A22 functions include provisioning, status, fault management and supervisory control. The SYS-A22 is designed to provide redundant system control. Systems configured for redundancy use two SYS-A22 modules installed in slots one and two. A SYS-A22 can also operate as a redundant back-up for a SYS-A12 system controller.

FEATURES

- Provisioning and fault management
- Storage for previous, current and next firmware releases
- SNMP agent
- Alarms, status, history
- Harris router protocol support
- Four GPI/GPO
- Two serial ports
- Genlock input
- 10/100 base-T Ethernet
- Redundancy option

NetVX™ SYS-H264 HD/SD H.264 4:2:2 Profile Standalone Encoder

The SYS-H264 is the industry's first H.264 4:2:2 profile encoder. Incorporating the latest in H.264 encoding technology, this 1RU product supports both HD (1080i/720p) and SD (480i/576i), as well as up to 16 channels of audio input capability, with both DVB-ASI and IP outputs. With its low latency of 350 ms, the SYS-H264 can be used in a variety of contribution applications, including sporting events and ENG/SNG. The intuitive front panel display makes it easy to set up and operate the system. Network maintenance is provided through the built-in SNMP functionality or the Web-based graphical user interface.

FEATURES

- Up to 80 Mb/s
- H.264 4:2:2P@ L3 and L4
- 16-channel audio
- AAC-LC (1,2,4,5.1 and 6ch), HE-AAC (2ch & 5.1), MPEG, Dolby® E passthrough and SMPTE 302 audio
- Low latency mode (~350 ms)
- VBI and VANC support
- IP and ASI outputs
- Optional BISS encryption
- HTTP support

NetPlus™ M400 Integrated Receiver/Decoder

The NetPlus™ M400 is a broadcast-grade integrated satellite receiver/decoder (IRD) that supports a wide range of global standards for video and audio compression. It sports a highly robust set of standard features, including DVB-S/S2 demodulation capabilities and inputs for DVB-ASI and IP. Every unit supports MPEG-2 and H.264 video compression — from the 4:2:2 format to SD and HD formats — as well as MPEG, Dolby® Digital AAC and SMPTE-302 audio systems.

FEATURES

- Bitstream Input/Output Capabilities
  - DVB-S, DVB-S2 Satellite Demodulator (standard)
  - Advanced RF Demodulator (option) for 16/32QAM and DSNG
  - DVB-ASI input and output (standard)
  - Dual IP SMPTE 2022-1 inputs and outputs (standard)
  - DVB Fixed-Key (BISS) decryption (standard)
  - DVB Common Interface module slot (option)
  - Smart PID filtering to output selected streams on ASI or IP

- Video Compression Formats
  - MPEG-2 MP@ML, MP@HL (standard)
  - MPEG-2 422P@ML, 422P@HL (option)
  - H.264 MP@L3, MP@L4.1 (standard)
  - H.264 422P@L3, 422P@L4.1 [8-bit] (option)
- Audio Compression Formats
  - AAC-LC, HE-AAC v2 2.0 and 5.1 decode (standard)
  - MPEG-1 Layer II decode (standard)
  - Dolby® Digital (AC-3) 2.0 and 5.1 decode (standard)
  - SMPTE-302 PCM and Dolby® E pass-through with AVTrack™ (standard)
  - One or two Dolby® E integrated decoders (option)
- Data/Ancillary Capabilities (standard)
  - VANC processing, AFD and WSS, Teletext, VBI
- Video/Audio Output Capabilities
  - Dual SDI/HDSDI video outputs 1080i/720p/625i/525i 50/59.94 Hz
  - Eight stereo pairs of assignable embedded audio
  - Four assignable separate AES outputs

NetPlus™ M300 High-Definition Satellite IRD

The NetPlus™ M300 high-definition integrated satellite receiver/decoder provides contribution-quality audio and video performance over the widest variety of signals and formats.

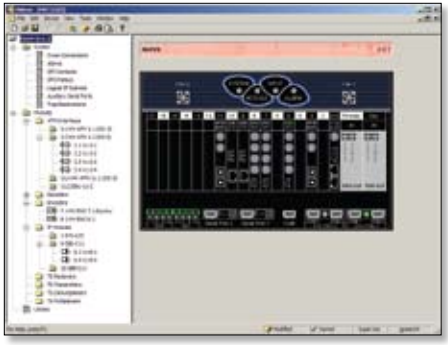
The NetPlus M300 receiver/decoder features industry-standard transport stream interfaces and an L-Band DVB-S2-capable tuner/demodulator with up to four inputs. The NetPlus HD-IRD also includes options for DVB-compliant descrambling, integrated Dolby® E audio decoding, and multiple methods of system configuration and control. NetPlus is the industry-proven solution for high-performance satellite distribution and delivery.

FEATURES

- Decodes a range of worldwide video industry formats
  - MPEG-2 4:2:2/4:2:0 video profile
  - 1080i and 720P at 50 Hz and 59.94 Hz
- L-Band satellite tuner DVB-S (QPSK)/DVB-S2 (QPSK and 8PSK)
- DVB fixed-key decryption
  - BISS modes 0, 1, and E
- DVB conditional access systems
  - Support for IRDETO encryption
- Video outputs
  - Dual HD-SDI SMPTE 292M
  - Embedded audio and VANC data reinsertion
  - Resynchronized to house reference input
- Audio outputs
  - Two streams internal audio decoding supporting Dolby® AC-3 and MPEG audio formats
  - Optional integrated Dolby® E decoding capability for four stereo pairs

Vidiem™ EMS Element Management System

The Vidiem™ element management system is the graphically based element management platform designed to support NetVX video networking systems. Vidiem can configure and monitor multiple NetVX systems simultaneously using SNMP. Vidiem configuration dialogs provide the means to configure node-specific values. Each dialog uses SmartValidation™, which cross-checks and validates settings to reduce the chance of error and ensure compatibility with other system parameters.



FEATURES

- Status of multiple NetVX and FlexiCoder® systems can be viewed simultaneously
- Graphical representation of system
- Configurable system parameters
- Multiple units configurable from the same interface
- "Drag and drop" tools enable easier configuration
- SmartValidation™ ensures setting compliance with other system parameters
- Real-time trap monitor continuously monitors and logs alarms
- Ability to connect to multiple systems using SNMP

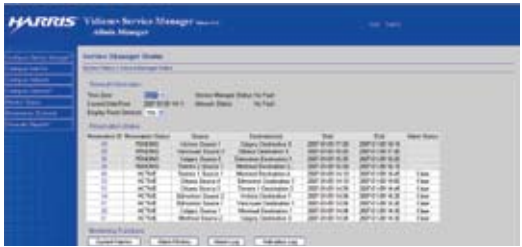
Vidiem™ Service Manager Customer Network Reservation Scheduling System

The Vidiem™ Service Manager provides full service scheduling and management of connections in a network of NetVX systems. It schedules, routes and monitors point-to-point and point-to-multipoint video service connections all via a Web-based multi-concurrent user interface. The Vidiem Service Manager enables customers to maximize the use of their networks, resulting in improved network efficiency.

Vidiem Service Manager is a stand-alone Windows® server-based application that runs on an instance of Oracle®. It uses SNMP to "bring up" and "tear down" connections between remote NetVX endpoints. Endpoints can also include Harris routers connected to the NetVX and supported by the NetVX system's serial port router control function.

FEATURES

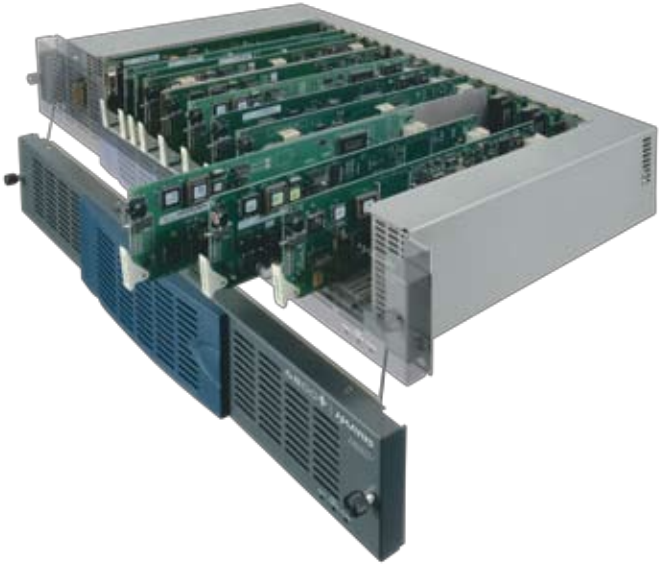
- Reservation-based scheduling and management
- Allows non-technical users to easily route video across complex network paths
- Avoids resource conflicts
- Able to schedule reservations months in advance
- Able to schedule activation and teardown of connections between NetVX endpoints
- Point-to-point services with "most direct" routing
- Point-to-multipoint reservations
- Enables management of fixed services (immediate start, no end time)
- Interfaces with external automation/scheduling systems via XML
- Routes circuits over IP, ASI or ATM
- Web-based administrator and operator interfaces
- Controls NetVX and Harris routers
- High-availability database (Oracle®)



6800+™ Core Processing Platform

The industry-leading 6800+ core processing platform defines the world standard in meeting the operational needs in broadcast television applications: breadth of functions, multiformat flexibility, space conservation and integrated control/monitoring. Offering hundreds of modules, 6800+ provides core functions of fiber optic transport, distribution, 3G/HD/SD conversion, encoding/decoding, multiplexing/demultiplexing, compression, synchronization and more. 6800+ offers a choice of frames, from a desktop form factor to the popular rackmount form factor which includes various control options, including SNMP and HTTP with an on-board Web server.

The following pages highlight many of the video networking features of this platform.



FR6822+QXFE 2RU 6800+ Frame, Q-SEE™-Compliant

The new FR6822+QXFE, featuring an integrated Ethernet resource card, is the next-generation platform in the best-selling 6800+ modular core processing series. It features full Q-SEE™ support including thumbnails, customizable alarms, waveform and vectorscope, and offers broadcast facilities advanced baseline communication and control of their networks via a built-in Web server.

The FR6822+QXFE frames are capable of housing any mix of signal types, including HD-SDI, SDI, DVB-ASI, SMPTE 310M, single-mode and multi-mode fiber optics, AES/EBU (balanced and unbalanced), analog video and analog audio. There are 20 slots for single- or multi-slot modules, with mating back connectors providing superior density of up to 20 modules in a single 2RU frame.

FEATURES

- Direct Ethernet connectivity (10/100BT) to the frame
- Module communication via an internal high-speed data bus for Q-SEE thumbnail transport, upgrades, control, monitoring
- Capacity to hold up to 20 single-slot modules
- Support for a wide array of input/output types
- Hot-swappable front and back modules
- HTTP Web server for browser-based control/configuration
- Backward-compatibility with all modules that operate on 6800+ QXF, XF and DM frames
- Light weight for outside broadcast applications
- Frame video genlock loop, high-performance passive loop-through
- Support for two hot-swappable, redundant power supplies, each independently able to handle the complete frame power load (120 W)

FR6822+QXFE 2RU 6800+ Frame, Q-SEE™-Compliant

CTT6800+T JPEG 2000 Compressed Transport Transceiver

The CTT6800+ JPEG 2000 codec is ideal for applications requiring compressed transport of video, audio and data signals. It can encode and decode baseband media to/from a 270 Mb/s DVB ASI transport stream. The CTT6800+ supports the following input signal formats:

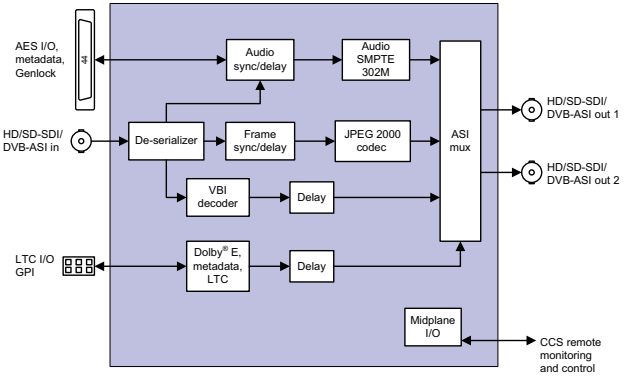
- SDI (270 Mb/s SMPTE 259M or 1.5 Gb/s SMPTE 292M)
- Four AES audio pairs
- LTC
- GPI
- Dolby® metadata

FEATURES

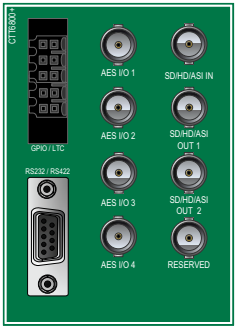
- Configurable as an encoder or decoder, allowing switching of two CTT6800+ codecs, operating as an encode/decode pair, for content transport in either direction
- Compression of baseband media utilizing advanced JPEG 2000 codec, including 270 Mb/s or 1.5 Mb/s SDI, AES and embedded audio, LTC, GPI and serial Dolby® metadata with encoding onto a 270 Mb/s DVB-ASI transport stream
- Encoding and decoding of up to four lines of user-selectable ancillary data
- Automatic or user-selectable video compression data rates of up to 200 Mb/s
- On-screen display for simplified setup and configuration
- Support for Q-SEE thumbnail and alarm monitoring
- Remote control and monitoring via CCS™, HTTP or SNMP

CTT6800+T JPEG 2000 Compressed Transport Transceiver

BLOCK DIAGRAM



BACK MODULE



IPA6800+D IP Video Gateway — ASI-to-IP Encapsulator

The IPA6800+ IP video gateway module is an extension of the comprehensive set of line cards in the 6800+ series. The IPA6800+ links traditional ASI-based video plants with modern Gigabit Ethernet networks and provides a cost-effective alternative to expensive satellite-based ASI links.

Take advantage of your existing Gigabit Ethernet network by transporting compressed signals from a satellite receiver or encoder simultaneously to multiple locations over your wide area network (WAN), and reverse the process at the other end with the same card.

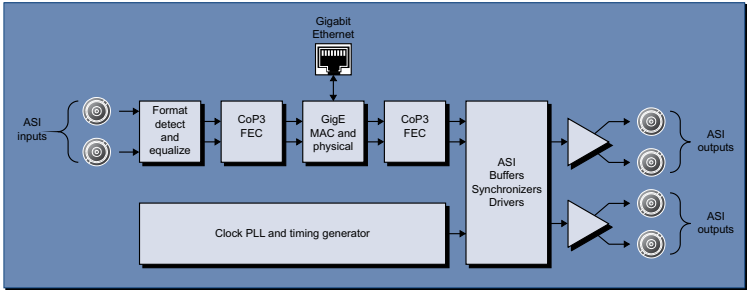
Share or pass through single or multiple program streams over IP, and have the extra protection of Pro MPEG COP-3 forward error correction (FEC) to guard against network shortcomings.

FEATURES

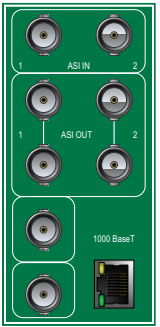
- Transmit ASI to and from IP, bidirectionally
- Utilize two independent transmit and receive channels
- Send or receive simultaneously, in either direction, without interference
- Add forward error correction (FEC) for robust data transmission
- Transmit or receive IP uni-cast or multicast video streams
- Perform remote control and monitoring via CCS, HTTP or SNMP
- Encapsulate up to two ASI streams, and transmit them over IP
- De-encapsulate ASI streams from an IP transport

IPA6800+D IP Video Gateway — ASI-to-IP Encapsulator

BLOCK DIAGRAM



BACK MODULE



IPS6800+D IP Video Gateway — SDI-to-IP Encapsulator

The IPS6800+ IP video gateway module is an extension of the comprehensive set of line cards in the 6800+ series. The IPS6800+ links traditional SDI-based video plants through modern Gigabit Ethernet networks and provides a cost-effective alternative to other, more expensive links such as satellite or ATM.

Take advantage of your existing Gigabit Ethernet network by transporting high-quality uncompressed SDI signals to multiple locations over your wide area network (WAN).

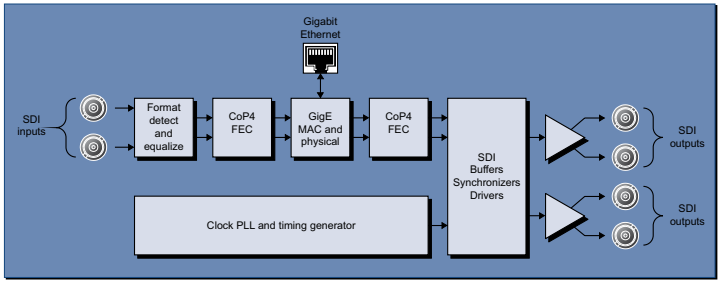
Extend your coaxial by carrying uncompressed SDI signals from source to destination over IP, and have the extra protection of Pro MPEG COP-4 forward error correction (FEC) to guard against possible network shortcomings.

FEATURES

- Transmit SDI to and from IP, bidirectionally
- Utilize two independent transmit and receive channels
- Send or receive simultaneously, in either direction, without interference
- Add forward error correction (FEC) for robust data transmission
- Transmit or receive IP uni-cast or multicast video streams
- Perform remote control and monitoring via CCS, HTTP or SNMP
- Encapsulate up to two uncompressed SDI (SMPTE 259M) video signals into RTP packets, and transmit them over IP
- De-encapsulate uncompressed SDI (SMPTE 259M) streams from an IP transport

IPS6800+D IP Video Gateway — SDI-to-IP Encapsulator

BLOCK DIAGRAM



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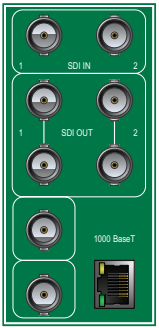


MFD6800+T Multiformat Decoder

The MFD6800+ is a multiformat decoder that extends the flexibility of the 6800+ series platform by adding multiformat video decoding functionality to the line of modules. The MFD6800+ is a single 6800+ module that decodes either H.264 or MPEG-2 HD and SD video signals and their commonly associated audio signals.

There is no need to purchase multiple cards to decode different flavors of audio and video. The MFD6800+ provides the flexibility of decoding multiple standards without resorting to an assortment of different card types.

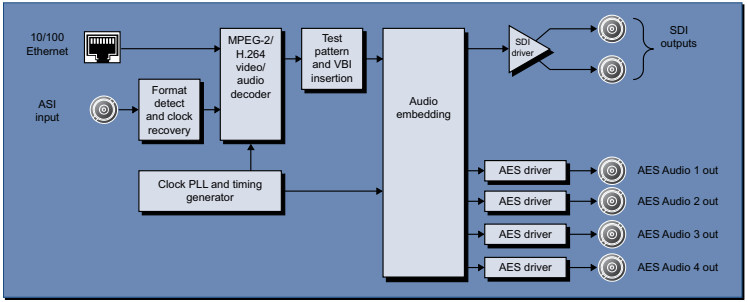
The flexibility of the MFD6800+ makes it ideal for production and distribution applications. Coupled with other modules in the 6800+ series, the MFD6800+ multiple-function decoder is ideal for applications such as multiformat satellite decoding, confidence monitoring and much more.

FEATURES

- Supported video decoding formats
  - HD H.264/MPEG-4 part 10 decoding
  - SD H.264/MPEG-4 part 10 decoding
  - HD MPEG-2 decoding
  - SD MPEG-2 decoding
- Supported audio decoding/processing formats
  - AAC-LC 2.0
  - HE-AAC 2.0
  - Dolby® AC-3 2.0
  - SMPTE 302
- Supported input formats
  - DVB-ASI
  - IP inputs (up to 15 Mb/s)
- Supported output formats
  - High-definition (SMPTE 292M)
  - Standard-definition (SMPTE 259M)
- Extensive VBI processing support
- External reference input
- Remote control and monitoring via CCS, HTTP or SNMP

MFD6800+T Multiformat Decoder

BLOCK DIAGRAM



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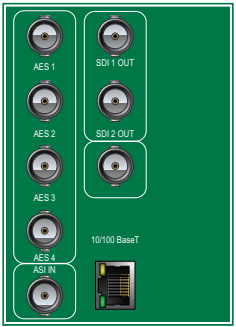


SRD6800+ Satellite Receiver and Demodulator

The SRD6800+ satellite receiver and demodulator module provides a cost-effective alternative to more expensive single-function satellite demodulation units.

Packed with a rich list of features, the SRD6800+ is capable of receiving various types of satellite signals and provides an industry-standard ASI output for distribution or decoding.

The SRD6800+ is fully interoperable with other modules in the extensive 6800+ line.

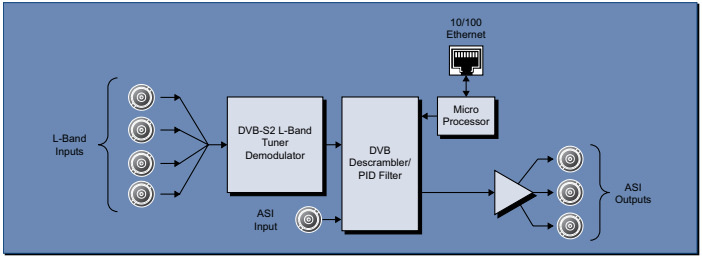
When used with the IPA6800+, the SRD6800+ allows the distribution of satellite signals anywhere over a wide area network (WAN).

FEATURES

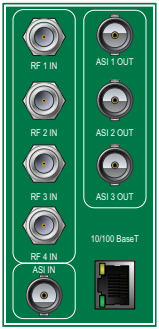
- L-Band satellite tuner supports:
  - DVB-S (QPSK)
  - DVB-S2 (QPSK and 8PSK)
- Four active software selectable F-type inputs
- 950-2150 MHz input frequency selection
- DC power and 22 Hz tone configurable on selected input
- Conditional access (CA) support
  - DVB fixed-key decryption (BISS modes 0, 1, and E)
  - Integral smart-card reader
- PID filtering
- ASI input for CA decrypting or PID filtering
- Remote control and monitoring via CCS, HTTP or SNMP

SRD6800+ Satellite Receiver and Demodulator

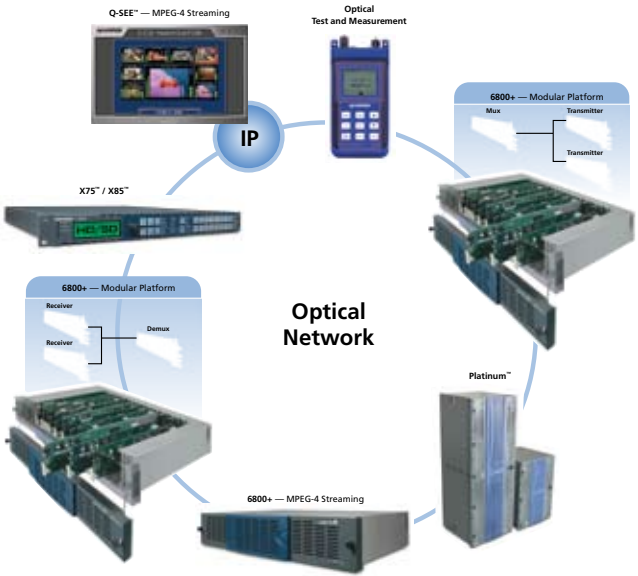
BLOCK DIAGRAM



BACK MODULE



OPTO+™ Fiber Optic Systems



With today's broadcast workflow often extending across multiple locations, and high-bandwidth signal transport requirements becoming the norm, broadcasters are increasingly looking at fiber optic systems as a more efficient way to manage signal transport. OPTO+™ fiber optic products address the transport of broadcast-quality audio and video signals, as well as a complete set of other signal types, including GPI, Ethernet, L-Band, SONET format and DVI. Flexible, cost-effective solutions are available for a range of applications including post production, satellite and cable facilities, telecommunications, outside/truck-based broadcasting — anywhere that SD/HD/3 Gb/s transmission over fiber is required.

To learn more, visit www.broadcast.harris.com/opto.

OPTO+™ Product Portfolio (For a sample of OPTO+™ products, see pages 38-47)

Audio/Video

OP+AVT/+2, OP+AVR/+2.. Analog Video, Audio Fiber Transmitter/Receivers

OP+DAS..... Composite Analog A/V Decoder/Synchronizer/Multiplexer, Optical Output

OP+HMT, OP+HDR..... Single-Channel HD/SD TDM Fiber Transmitter/Receivers

OP+SMT, OP+SDR..... Single-Channel SD TDM Fiber Transmitter/Receivers

OXS+OP+, OXS+2+OP+ ... 3 Gb/s/HD-SDI/SDI/DVB-ASI Fiber Receivers (1310 nm/CWDM)

XOS+OP+, XOS+2+OP+ ... 3 Gb/s/HD-SDI/SDI/DVB-ASI Fiber Transmitters (1310 nm/CWDM)

OP+EOT ..... 3 Gb/s/HD-SDI/SDI/DVB-ASI Fiber Transmitters

OP+OER..... 3 Gb/s/HD-SDI/SDI/DVB-ASI Fiber Receivers

CWDM/DWDM Multiplexers, Demultiplexers

HOMS/OHDS+OP+CXXD ... Active Multiplexers/Demultiplexers

ODS6800+CXXD..... Passive CWDM Single-Mode Optical Demultiplexers

OMS6800+CXXD..... Passive CWDM Single-Mode Optical Demultiplexers

OP+DWDM40..... 40-Channel DWDM Multiplexer/Demultiplexer

Data

OP+DAT ..... Serial Data, GPI Transceiver

OP+ETH ..... 10/100/1000Base-T Ethernet Switch Transceiver

OP+HBD, OP+OHB..... HD/SD/ASI, AES, RS-232/RS-422/RS-485, GPIO, Intercom Tx/Rx

Intercom

OP+HBD, OP+OHB..... HD/SD/ASI, AES, RS-232/RS-422/RS-485, GPIO, Intercom Tx/Rx

RF

OP+LBR ..... L-Band Satellite Optical Receiver

OP+LBT..... L-Band Satellite Optical Transmitter

Splitters/Combiners

OBS6800+CD..... Passive Full-Spectrum Optical Splitter and Combiner

OPSS+OP+D,
OBS+OP+5050D..... Optical Protection Switch/Power Splitters

TDM Multiplexers, Demultiplexers

OP+HMT, OP+HDR..... Single-Channel HD/SD TDM Fiber Transmitter/Receivers

OP+SMT, OP+SDR..... Single-Channel SD TDM Fiber Transmitter/Receivers

OXS+OP+, OXS+2+OP+ 3 Gb/s/HD-SDI/SDI/DB-ASI Fiber Receivers

The OXS+OP+ and the OXS+2+OP+ are industry-leading 3 Gb/s fiber modules capable of receiving optical inputs from single-mode or multi-mode fiber and converting them back to 3 Gb/s HD-SDI (SMPTE 424M), HD-SDI (SMPTE 292M), SDI (SMPTE 259M, SMPTE 297M) or DVB-ASI (DVB-A010) electrical signals. These modules come standard with 270 Mb/s SD-SDI support and are upgradeable to 1.5 Gb/s HD-SDI and 3 Gb/s HD-SDI support via optional software keys, eliminating equipment replacement costs when upgrading to these standards.

OXS+OP+ accepts one optical input and provides two identical re-clocked 3 Gb/s/HD/SD BNC outputs. OXS+2+OP+ accepts two independent fiber inputs and provides two independent re-clocked 3 Gb/s/HD/SD BNC outputs. Both modules are available with standard PIN optical receivers or a high-sensitivity APD optical receiver. Occupying a single slot in 6800+ frames, these modules allow for up to 40 independent 3 Gb/s signals in a single 2RU frame.

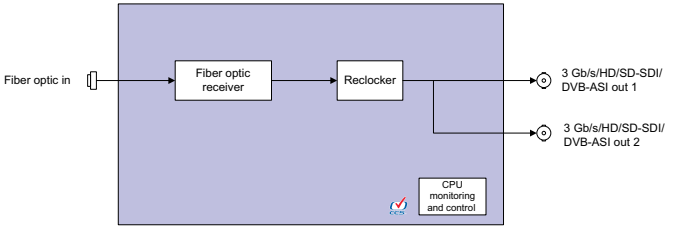
FEATURES

- Future proof; software-upgradeable — SD to HD to 3 Gb/s
- Wavelengths in 1260-1620 nm range accepted
- Support for single-mode or multi-mode fiber
- PIN or high-sensitivity APD receiver options
- User-selectable re-clocking modes to meet exact needs
- Automatic detection: 270 Mb/s, 1.485 Gb/s or 2.97 Gb/s
- Manual settting: 270 Mb/s, 1.485 Gb/s or 2.97 Gb/s
- Automatic bypass of re-clocker when signal does not lock
- Enforced bypass mode
- Complete module status monitoring via card-edge LEDs
- Fully hot-swappable

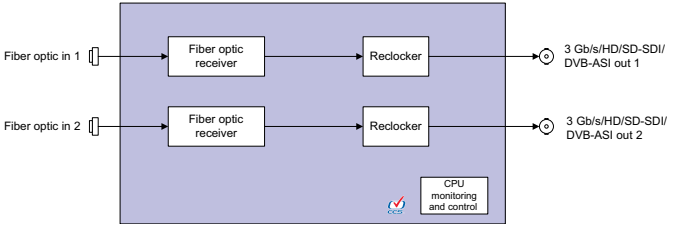
OXS+OP+, OXS+2+OP+ 3 Gb/s/HD-SDI/SDI/DB-ASI Fiber Receivers

BLOCK DIAGRAM

OXS+OP+



OXS+2+OP+



BACK MODULE

XOS+OP+, XOS+2+OP+ 3 Gb/s/HD-SDI/SDI/DB-ASI Fiber Transmitters

The XOS+OP+ and the XOS+2+OP+ are the industry-leading 3 Gb/s-capable electrical-to-optical conversion modules able to convert any incoming 3 Gb/s HD-SDI (SMPTE 424M), HD-SDI (SMPTE 292M), SDI (SMPTE 259M, SMPTE 297M) or DVB-ASI (DVB-A010) electrical signal to an optical signal for transmission on single-mode or multi-mode fiber. These modules come standard with 270 Mb/s SD-SDI support, and are upgradeable to 1.5 Gb/s HD-SDI and 3 Gb/s SDI support via optional software keys. Output optical option of 1310 nm FP laser, or CWDM DFB laser make these modules suitable for a wide variety of applications.

The XOS+OP+ module accepts one electrical input and provides one fiber output along with an equalized and re-clocked electrical output for monitoring and distribution purposes. The XOS+2+OP+ module accepts two electrical inputs and provides two optical outputs. These modules occupy a single slot in a 6800+ frame, allowing for the high density of up to 40 independent 3 Gb/s signals in a 2RU frame.

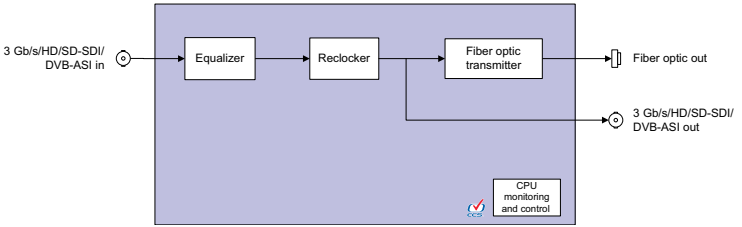
FEATURES

- Future proof; software-upgradeable — SD to HD to 3 Gb/s
- Support for single-mode or multi-mode fiber
- 1310 nm FP and DFB CWDM wavelength options
- User-selectable re-clocking modes to meet exact needs
- Automatic detection: 270 Mb/s, 1.485 Gb/s or 2.97 Gb/s
- Manual setting: 270 Mb/s, 1.485 Gb/s or 2.97 Gb/s
- Automatic bypass of re-clocker when signal does not lock
- Enforced bypass mode
- Complete module status monitoring via card-edge LEDs
- Fully hot-swappable

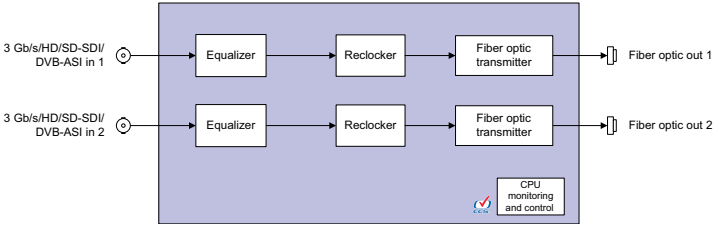
XOS+OP+, XOS+2+OP+ 3 Gb/s/HD-SDI/SDI/DB-ASI Fiber Transmitters

BLOCK DIAGRAM

XOS+OP+



XOS+2+OP+



BACK MODULE

OP+HBD, OP+OHB HD/SD/ASI, AES, RS-232/RS-422/RS-485, GPIO, Intercom Tx/Rx

The OP+HBD/OP+OHB family of fiber modules aggregates different types of signals into and from the fiber domain utilizing a single module. Each card is capable of integrating audio, video and data applications, and supports intercom, RS-232/422/485 and GPIO bidirectional data flow, as well as unidirectional transport of HD/SD/SDI video and balanced/unbalanced audio signals.

The OP+HBD/OP+OHB modules enable broadcasters and production facilities to migrate all the signal types needed in a studio application onto fiber utilizing one OPTO+ module. This highly dense solution provides significant space and cost savings, while maximizing quality and reliability through simplifying the fiber handling requirements.

These products are ideal for any application requiring the transfer of audio, video and data information over fiber.

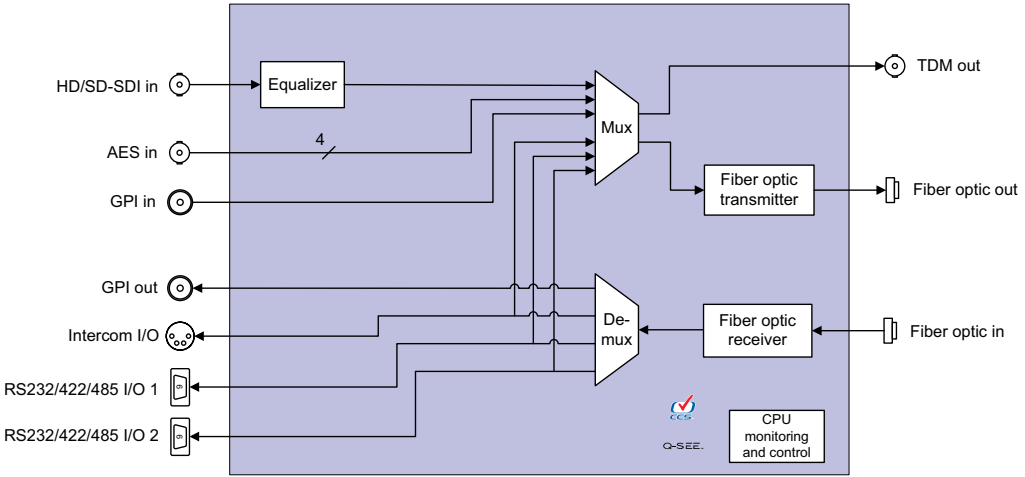
FEATURES

- One unidirectional SDI channel — HD-SDI, SD-SDI, SDI or DVB/ASI signal
- Four unidirectional AES channels, user-selectable balanced or unbalanced
- Two bidirectional RS-232/422/485 data ports
- Four GPI interface channels, user-selectable direction
- Configurable, two-wire and four-wire bidirectional intercom channel — compatible with RTS®, Telex® and Clear-Com® matrices
- Single fiber output — either single-mode or multi-mode, available in 1310 nm FP and CWDM DFB wavelength options
- Single fiber input — either single-mode or multi-mode
- Accepts any wavelength in 1260-1620 nm range, available with PIN or high-sensitivity APD receiver options
- Standard SC/PC-type fiber optic connector, optional FC/PC-type or ST/PC-type fiber optic connector
- Hot-swappable
- Complete module status monitoring via card-edge LEDs

OP+HBD, OP+OHB HD/SD/ASI, AES, RS-232/RS-422/RS-485, GPIO, Intercom Tx/Rx

BLOCK DIAGRAM

OP+HBD

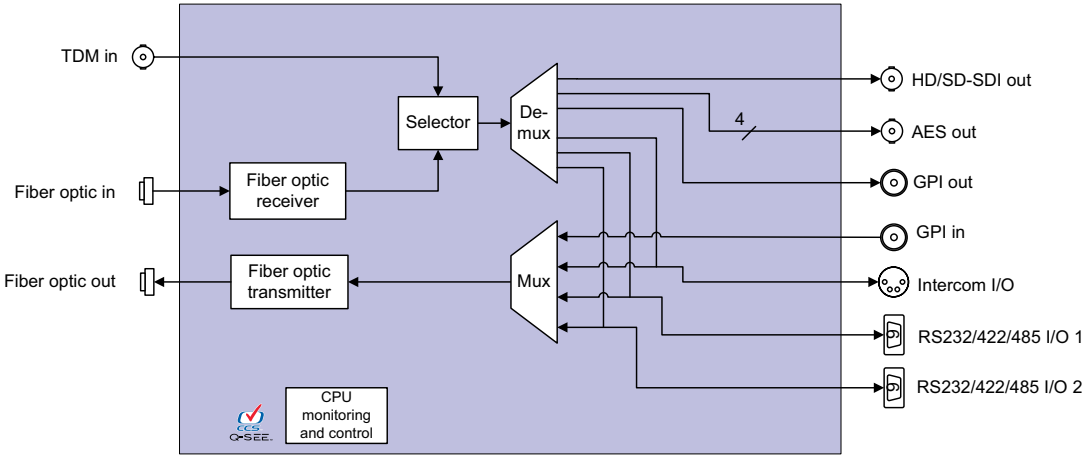


Connectors shown using unbalanced breakout cable

OP+HBD, OP+OHB HD/SD/ASI, AES, RS-232/RS-422/RS-485, GPIO, Intercom Tx/Rx

BLOCK DIAGRAM

OP+OHB



Connectors shown using unbalanced breakout cable

OP+HMT, OP+HDR Single-Channel HD/SD TDM Fiber Transmitter/Receivers

The OP+HMT/OP+HDR modules provide high-density transport of digital video signals over fiber using time division multiplexing (TDM) technology. These modules are capable of transporting up to two HD-SDI or eight SD-SDI/DVB-ASI signals over a single optical fiber. Occupying two slots within the 6800+ frame, this solution allows for up to 20 independent HD-SDI or 80 independent SD-SDI/DVB-ASI signals in a single 2RU frame.

A pair of OP+HMT/ OP+HDR modules can transport:

- Two HD-SDI
- Eight SD-SDI/DVB-ASI
- One HD-SDI plus four SD-SDI

Fiber optic transmitters are available in both 1310 nm FP and 16 Coarse Wavelength Division Multiplexing (CWDM) DFB wavelengths. Fiber optic receivers are available in both PIN (standard) and APD (high-sensitivity) options.

FEATURES

OP+HMT: Single-Channel HD/SD TDM Fiber Transmitter

- One fiber output — either single-mode or multi-mode
- Available in 1310 nm FP and CWDM DFB wavelength options
- Eight BNC inputs with automatic cable equalization and reclocking
- Passing of unmodified vertical and horizontal ancillary data
- Video thumbnail streaming for confidence monitoring

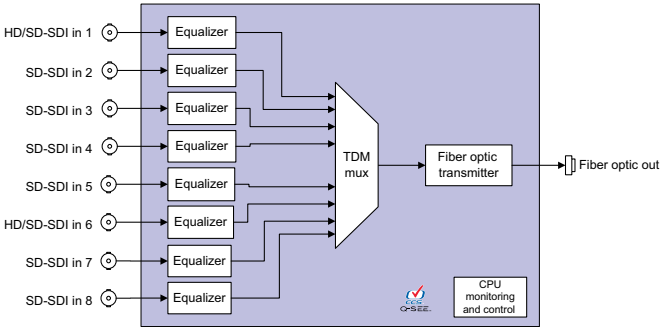
OP+HDR: Single-Channel HD/SD TDM Fiber Receiver

- One fiber input — either single-mode or multi-mode
- Accepts any wavelength in 1260-1620 nm range
- Available with PIN or high-sensitivity APD receiver options
- Eight BNC outputs with automatic cable equalization and reclocking
- Passing of unmodified vertical and horizontal ancillary data

OP+HMT, OP+HDR Single-Channel HD/SD TDM Fiber Transmitter/Receivers

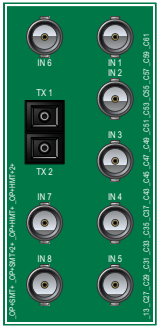
BLOCK DIAGRAM

OP+HMT



BACK MODULE

OP+HMT

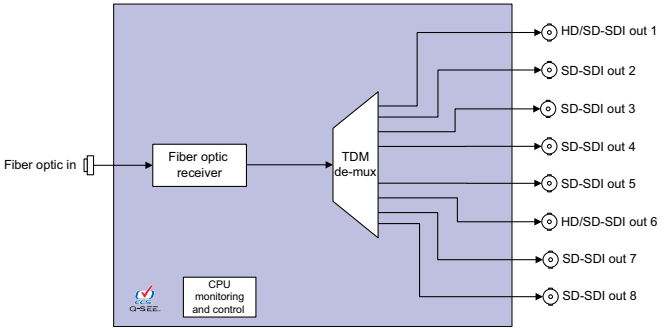


Note: Connectors IN 5 to IN 8 and TX 2 are NOT used in this product.

OP+HMT, OP+HDR Single-Channel HD/SD TDM Fiber Transmitter/Receivers

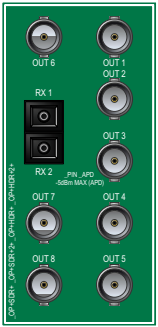
BLOCK DIAGRAM

OP+HDR



BACK MODULE

OP+HDR



Note: Connectors OUT 5 to OUT 8 and RX 2 are NOT used in this product.

North America	+1 800 231 9673
Caribbean and Latin America	+1 786 437 1960
Europe, Middle East and Africa	+44 (0) 118 964 8200
Asia, Pacific Rim	+852 2776 0628

For more information, please visit www.broadcast.harris.com.

HARRIS®
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Broadcast Communications Division
25 Dyas Road | North York, ON Canada M3B 1V7 | Tel: (416) 445 9640
www.broadcast.harris.com