ProStream X

VIDEO STREAM PROCESSOR & GATEWAY

The Harmonic ProStream® X software-based stream processing and gateway provides the best-in-class, high-performance stream processing for mission-critical broadcast, cable, satellite, terrestrial, IPTV, and OTT delivery applications. Benefit from a variety of advanced video processing capabilities, including multiplexing, scrambling, splicing, and blackout switching.

As the successor to the market-leading ProStream 9100 stream processor, the software-based ProStream X system allows users to leverage the versatility and agility of software-based infrastructure. The platform integrates 10Gbps throughput with a variety of advanced video processing applications, including multiplexing, splicing, blackout switching, and DVB CSA3 encryption. ProStream X also serves as a high-throughput video gateway featuring socket address flipping and ASI-to-IP conversion.

On top of the high throughput and remultiplexing, ProStream X can be used as a DVB-T2 gateway. ProStream X is capable to encapsulate a multiplex into a DVB T2-MI stream, providing signalization, transmission, and synchronization parameters to DVB-T2 modulators. It also has the capability to apply DVB-T MIP insertion which inserts synchronization marks in the DVB-T transport stream.

ProStream X runs on a 1-RU COTS HPE® server and pairs with the Harmonic Electra® X2 advanced media processor to deliver a compact solution for encoding and distributing superior-quality IP and ASI video streams. This high-density architecture reduces the amount of rack space required to meet fluctuating stream processing requirements, helping operators reduce CAPEX and OPEX. High reliability and simplified serviceability result in an all-in-one-box experience for high-throughput stream processing at low TCO.

SD, HD, and UHD formats, and MPEG-2, MPEG-4 AVC, and HEVC codecs are all supported on ProStream X. This appliance is available in several deployment models for a perfect fit with infrastructure requirements, including a server with ProStream X, a virtual machine with XVM, and a baremetal installation with ProStream Docker.

Business Benefits

Scrambling

ProStream X integrates with major conditional access systems (CAS) and is the first stream processor to offer 128-bit DVB CSA3 encryption support, integrated and certified by Cisco and Irdeto, making it the most secure stream processing solution for distributing UHD broadcast services. DVB CSA2, AES, and BISS fixed key scrambling are also supported, as well as trick mode for video on demand.

ProStream scrambling technology is known in the industry for its stability and high performance. The ProStream X platform can scramble any format of video, audio and data elementary stream (e.g., MPEG-2, MPEG-4 AVC, HEVC, AC-3, AAC, HE-AAC), as well as multiplex MPEG TS. The solution easily integrates into existing architectures and reduces cost and complexity by eliminating the need for multiple devices in distributed cable, satellite, or telecom networks.

Statistical Multiplexing

Harmonic's DiviTrackIP™ option integrates statistical multiplexing and IP switching by connecting ProStream X systems with remote Harmonic Electra X2 encoders across a LAN or WAN, allowing any ProStream X in the network to efficiently manage the encoders' statmux pools. ProStream X also supports regional statmux capability for the terrestrial market, allowing a single encoding instance to be part of multiple DiviTrack IP pools. This capability answers the need to encode and generate regionalized TS's with both common (shared) national and unique regional channels. The use of the regional statmux feature reduces the number of encoders required to support regionalized feeds and eliminates unnecessary national common program duplication.

HIGHLIGHTS

- Multiplexing and scrambling of up to 2,000 simultaneous broadcast services
- High-throughput 10Gbps video gateway
- Advanced multiplexing of any service from any input to any output
- Target Average Bitrate
- DataTrack
- IP networking and mirroring
- DiviTrack IP statistical multiplexing with remote distributed encoders
- Live-to-live splicing for MPEG-2, MPEG-4 AVC, and HEVC video streams
- DVB CSA3, DVB CSA2, and AES scrambling
- Slate insertion for service disruption messages
- Emergency Alert System (EAS) compliance including SCTE-18 Trigger

In addition, ProStream X enhances statmux with DataTrack capability, which allows non-video PIDs (e.g: audio, ancillary data, teletext, subtitling) into the statmux pool. When not in use, the ProStream X statmux mechanism, frees up the bandwidth provisioned for these PIDs, allowing it to be reallocated to video to improve video quality. The DataTrack capability is valid also in CBR systems where no advanced allocation is required anymore for these occasional PIDs without risking of an overflow.

ProStream statmux also includes a unique Target Average Bitrate application, which provides the ability to apply the long-term average bitrate for each video based on the user configured bitrate. For operators that have multiple customers sharing channels in the same statmux pool, the feature will secure the average bitrate customers are paying for, over the long term, while maintaining high video quality.

Linear Ad Splicing
Linear ad splicing, or digital program insertion, on ProStream X enables the GOP-accurate insertion of local and regional ads directly into live-to-air MPEG-2, MPEG-4 AVC, and HEVC SD/HD transport streams. With this capability, broadcasters and service providers can increase average revenue per user by offering their advertisers the ability to reach differentiated viewers with targeted ads.

The powerful capability enables broadcasters to implement advanced advertising capabilities for hundreds of channels without needing to purchase a standalone, box-level splicing solution, saving costs while simultaneously opening up new revenue streams. In addition, by eliminating the need to decode signals to insert ads, workflows are optimized, and video quality is maintained at the highest possible level.

ProStream X supports live-to-live splicing, which allows ProStream X to switch between main and alternative live feeds seamlessly, with no ETR 290 errors at output. In statmux applications that include switchover to an alternate program, the alternate programs become part of the statmux VBR pool.

Digital Turnaround
With standard IP and DVB input and output interfaces, the ProStream X processor is easily incorporated into existing headend environments and supports multiple digital turnaround applications. The platform's robust, extensible, and highly scalable design supports MPEG remultiplexing, including PID remapping, prioritizing and filtering, insertion and generation of PSI/SI tables, and PID multicast. Device, port, and Input TS redundancy are supported, as well as multiple IP sockets for MPTS and SPTS applications. The compact platform not only reduces rack space and power requirements, but also simplifies network infrastructure while delivering a high-availability solution.

High-density software-based R-PHY Video Engine
When operating as part of Harmonic's innovative CableOS vCCAP solution, ProStream X serves as a powerful Video Engine that feeds both Broadcast and VoD content to as many as 100 R-PHY devices (RPD's) per single ProStream X server. Content may be pre-encrypted, or real-time scrambled by ProStream X.

"Pay As You Grow" Scalability
As processing needs evolve, the ProStream X platform makes it easy to incrementally add or upgrade I/O modules and firmware licenses, simplifying scalability and extending the system's value.

Technical Benefits

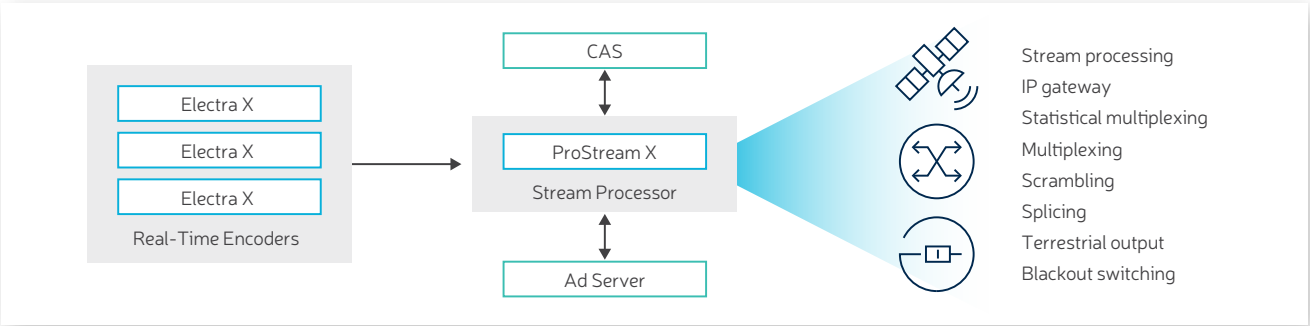
High-Throughput Video Processing
ProStream X offers the choice of quad 1GbE, dual 10GbE, or ASI I/O. The high-throughput 10GbE option supports up to 1,000 transport streams and 2,000 simultaneous multiplexing and scrambling services. Video gateway capabilities include socket address flipping, ASI-to-IP conversion, and IP mirroring. The dual 10GbE interfaces also reduce the number of required router ports and enable a simplified IP addressing scheme.

High Reliability, Simplified Serviceability
Maintenance on the ProStream X platform is simplified with hot-swappable fan assemblies and dual redundant power supplies. Changing of processors and I/O modules is quick and easy. These thoughtful serviceability features improve system reliability and reduce the chance for down time, increasing the opportunity to generate revenue.

Control and Management
Processing on the ProStream X is easily configured and controlled with Harmonic's NMX™ Digital Service Manager video management system, a service-oriented solution for mass configuring, monitoring, and automated redundancy in centralized or distributed architectures. An intuitive and user-friendly web-based GUI is also available.

World-Class Service and Support
Harmonic stands behind the ProStream X system with comprehensive service and support programs, including system design, service deployment, technical support, and network maintenance. World-class service plans and a global network of flexible and responsive support professionals help ensure your ability to deliver outstanding "anytime, anywhere, any-device" customer experiences.

ProStream X: The Heart of the Headend



SPECIFICATIONS

10GBE IP I/O

Type	IEEE 802.3z
IP Ports	Four independent
Connectors	Four 10GbE ports, RJ45 on board PCIe option cards for either two or four 10GbE ports SFP (up to three cards per platform) Support for IEEE 802.Q VLAN tagging
I/O Speed	Up to 10 Gbps
IP Encapsulation	MPEG TS over UDP/IP/MAC 1 to 7 TS/IP
MPEG Format	188 B per TS
MPEG Transport Streams	MPTS and SPTS
I/O Processing	1,000 sockets Up to 10 Gb per platform (configuration dependent)
Maximum Bitrate per Socket	300 Mbps
Addressing	Multicast
Management	IGMPv2/v3

ASI I/O

Type	ASI input/output
ASI Ports	Eight ports per card, up to three cards per platform
Connectors	Eight mini-DIN ports
I/O Direction	Configurable, input or output, per port
MPEG Format	188/204 B per TS
I/O Processing	One MPTS/SPTS per port Up to 213 Mbps per input or output

MANAGEMENT INTERFACES

Ethernet	1000Base-TX
Connectors	Two RJ45 (1 management, 1 CAS)

SCRAMBLING

SCS	Internal
Standards	DVB common scrambling Open CAS DVB CSA2, DVB CSA3, AES-CBC, AES-NSA2 scrambling AES descrambling Fix Key scrambling and descrambling
CAS connections	Simultaneous connections to 30 different CA systems
BISS Encryption	Mode 1
Number of ECMs	2,000 ECMs per platform

STATMUX CONTROL

Codecs Supported	MPEG-2, MPEG-4 AVC, HEVC
Formats Supported	SD, HD, UHD, interlaced, progressive
Frame Rates Supported	PAL, NTSC

DVB-T2 GATEWAY

Encapsulation of any generated multiplex into DVB-T2 frames
Generation of up to eight DVB T2-MI streams over ASI or IP
Interface for external PTP Server or 1 PPS/GPS
Support of single and multi-PLP

DVB-T SFN ADAPTATION

Supports MIP Insertion for an SFN network based on the DVB-T standard ETSI TS 101 191 V1.4.1 (2004-06)
Generation of up to twenty DVB-T TSs over ASI or IP
Interface for external PTP (IEEE 1588) Server or 1 PPS/GPS

REMULTIPLEXING

Routing	Any input to any output
PID	Remapping, filtering, multicasting
PID Multicasting	Any input PID can be multicasted to multiple TS outputs with different remapping and processing (different CW, if scrambled)
PSI/SI	Extraction, injection, spooling, regeneration
Output Mirroring	Any to any
Advanced Stream Processing	Linear ad-insertion splicing, SCTE-35 triggering for hundreds of channels Live-to-live splicing, Slate insertion, Blackout switching, PID range, Emergency Alarm System (EAS)

CABLEOS

Emergency Alarm System (EAS) with SCTE-18 Triggering
PTP (IEEE 1588) clock synchronization
UDP-based VoD routing, as part of CableOS solution over 1G/10G Ethernet connection
Tier-based and Session-based DVB scrambling of up to 2,000 VoD streams, as part of CableOS solution

REDUNDANCY

Device	1:1 Under NMX or stand-alone GUI management
Internal	Any-to-any input TS TS output mirroring Port redundancy Service redundancy
Triggers	ETR 290

SYSTEM MANAGEMENT

NMX™ Digital Service Manager 8.7.0 or later
Stand-alone web user interface

PHYSICAL

Dimensions (W x H x D)	17.11 in x 1.69 in x 27.83 in (1 RU) 43.46 cm x 4.29 cm x 70.7cm
Weight	35.86 lbs /16.26 kg

POWER

Power Supplies	Dual redundant
Voltage	100 V to 240 V
Line Frequency	50-60 Hz
Actual power consumption	295W without optional card

ENVIRONMENTAL

Cooling	Seven fans, hot-swappable
Operating Temperature ASHRAE Class A2	 +50° to +95° F +10° to +35° C
Storage Temperature	-22° to +140° F -30° to +60° C
Safety Compliance	EN 60950-1:2006 + A11:2009 +A1:2010 +A12:2011 +A2:2013 EN 62479:2010)
Electromagnetic Compliance (Class A)	EN 55032:2012 Class A EN 55024:2010 EN 61000-3-2:2014 EN 61000-3-3:2013

ORDERING INFORMATION

PLATFORM

Part Number	Description
PRM-X-G3-AC-DD	ProStream X G3 stream processing platform with AC dual PSU
PRM-X-G3-DC-DD	ProStream X G3 stream processing platform with DC dual PSU
PRM-X-DUAL-10GBE	ProStream X G3 stream processing platform with dual-port 10GbE optical NIC with SFP+
PRM-X-OCTO-ASI	ProStream X optional ASI card, with up to eight ASI I/O ports
LIC-PRM-X-BASE	ProStream X base license enabling basic mux function. One license only per platform. This license includes ProStream X RESTful Firmware License.
FW-PRM-X-LAB	ProStream X firmware license for lab license
FW-PRM-X-DEMO	ProStream X firmware license for all functions for 90-day demo usage; for none commercial use only
FW-PRM-X-SPARE	ProStream X cold spare firmware license for all ProStream functions; 30 days; one per chassis
FW-PRM-X-DEVICE-REDUNDANCY	ProStream X standalone device redundancy firmware license; one per chassis required

MULTIPLEXING

Part Number	Description
LIC-PRM-X-SWITCHING	Software license for ProStream X platform switching one channel. The license allows 1 video channel switching for the following switching options: EAS, EAS SCTE-18 Triggering, Blackout, BDS, ESAM, Slate Switching, and Live to live switching (service substitution). This license is limited by one platform capacity
LIC-PRM-X-ADVANCED-SM	Software license for Base ProStream XVM enabling processing. The license allows 6 video channels with Target Average Bitrate and one DataTrack (1 TS). For enabling DiviTrack statmux (per pool), a separate license should be quoted. This license is limited by one VM capacity

SCRAMBLING

Part Number	Description
LIC-PRM-X-SCRAMBLING	Software license for ProStream X platform enabling scrambling one channel. The license allows 1 video channel scrambling for the following scrambling options: DVB CSAv2, AES, EHP, Fixed key DES/SCR, BISS scrambling, selective encryption, and Pandora. This license is limited by one platform capacity
FW-PRM-X-DVB-CSAv3-CW	ProStream X DVB CSA3 scrambling firmware license; one per service required

HIGH THROUGHPUT

Part Number	Description
FW-PRM-X-2G-GATEWAY	ProStream X 2Gbps throughput firmware license

SPLICING

Part Number	Description
LIC-PRM-X-SPLICING	Software license for ProStream X platform enabling splicing (Ad Insertion) one channel. The license allows 1 video channel splicing for MPG-2/AVC HD/SD Channel. This license is limited by one platform capacity

TERRESTRIAL

Part Number	Description
FW-PRM-X-T2MI-GTW	Generation of one DVB T2-MI stream over ASI or IP
FW-PRM-X-SFN	Generation of one DVB T SFN MIP Insertion TS