

# ProStream X

VIDEO STREAM PROCESSOR & GATEWAY



**The Harmonic ProStream® X software-based stream processing and gateway provides 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, SRT delivery and blackout switching.**

As the successor to the market-leading ProStream 9100 stream processor, the 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 of encapsulating 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 by adding synchronization marks in the DVB-T transport stream. In addition, ProStream X offers DVB-SIS support, allowing DTH and DVB-T2 coexistence on the same platform.

ProStream X runs on a 1-RU COTS HPE® server and pairs with Harmonic's Electra® X2 advanced media processor and XOS 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 as well as 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 bare-metal installation with ProStream Docker.

## Business Benefits

### DVB Single Illumination Service support (DVB-SIS)

ProStream X supports the DVB-SIS standard, that allows the TS to be delivered in parallel to both DTH and terrestrial receivers, fully integrated with Harmonic XOS. The ProStream X is compliant with SFN broadcasting, supporting both single and multiple PLPs. The main benefits of DVB-SIS include bandwidth optimization to reduce opex and using a standardized solution that complies with DTH, DVB-T and DVB-T2 standards. The use of DVB-SIS allows operators to reuse existing equipment instead of doubling the equipment for both DTH and terrestrial distribution. Harmonic offers an end-to-end solution using the company's top-of-the-line products including XOS for best-in-class video quality and SIS reception, ProStream, ProSwitch, all managed by Harmonic NMX.

### 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, it is 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 transport streams 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
- SRT listener/caller gateway for hundreds of streams
- DVB-SIS compliant

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

ProStream statmux also includes a unique target average bitrate application, which enables operators 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, operators can increase average revenue per user by allowing advertisers 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 (RPDs) per single ProStream X server. Content may be pre-encrypted, or scrambled in real time 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 10GbE, 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 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 processors and I/O modules is quick and easy. These thoughtful serviceability features improve system reliability and reduce the chance for downtime, increasing the opportunity to generate revenue.

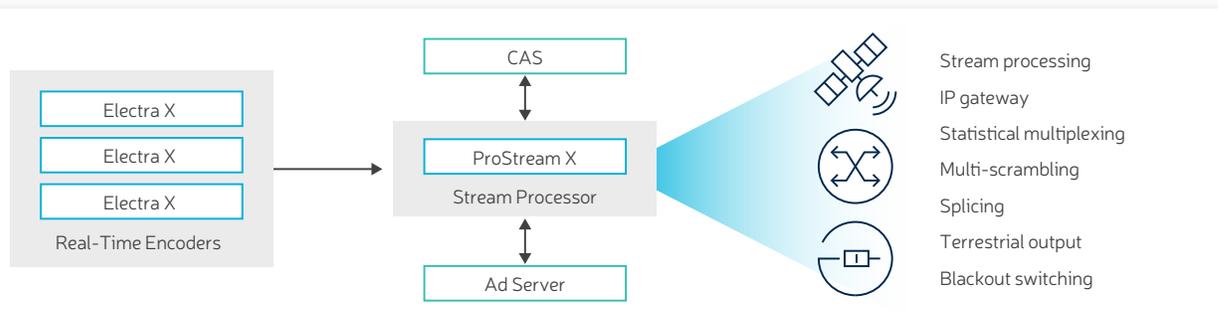
**Control and Management**

Processing on the ProStream X is easily configured and controlled with Harmonic’s NMXTM 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” video 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<br>PCIe option cards for either two or four 10GbE ports<br>SFP (up to three cards per platform)<br>Support for IEEE 802.Q VLAN tagging |
| I/O Speed                  | Up to 10 Gbps  |
| IP Encapsulation           | MPEG TS over RTP/UDP/IP/MAC<br>1 to 7 TS/IP  |
| MPEG Format                | 188 B per TS   |
| MPEG Transport Streams     | MPTS and SPTS  |
| I/O Processing             | 1,000 sockets<br>Up to 10 Gb per platform (configuration dependent)  |
| Maximum Bitrate per Socket | 300 Mbps   |
| Addressing                 | Multicast<br>Unicast   |
| 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<br>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<br>Open CAS<br>DVB CSA2, DVB CSA3, AES-CBC, AES-ECB<br>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

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|--|
| 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 20 DVB-T TSs over ASI or IP  |
| Interface for external PTP (IEEE 1588) Server or 1 PPS/GPS   |

### DVB SIS

|   |
|---|
| Supports DVB-SIS output standard ETSI TS 103 615  |
| Generation of up to eight DVB-SIS output streams, and up to 36 groups per SIS service for regionalization |
| Support of single PLP   |
| Fully integrated with Harmonic XOS, ProSwitch and NMX   |

### REMULTIPLEXING

|                            |  |
|----------------------------|--|
| Routing                    | Any input to any output  |
| PID                        | Remapping, filtering, multicasting   |
| PID Multicasting           | Any input PID can be multicast 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<br>Live-to-live splicing, slate insertion, blackout switching, PID range, Emergency Alert System (EAS) |
| SRT                        | Listener/caller in both source or destination application<br>MPTS and SPTS<br>AES-128 to AES-256 encryption (including AES 192)<br>up to 4 Gbps throughput                       |

### CABLEOS

|   |
|---|
| Emergency Alert 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 the CableOS solution |

### REDUNDANCY

|          |   |
|----------|---|
| Device   | 1:1<br>Under NMX or stand-alone GUI management                                      |
| Internal | Any-to-any input TS<br>TS output mirroring<br>Port redundancy<br>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)<br>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  |
| <b>Operating Temperature</b><br>ASHRAE Class A2 | +50° to +95° F<br>+10° to +35° C   |
| Storage Temperature                             | -22° to +140° F<br>-30° to +60° C  |
| Safety Compliance                               | EN 60950-1:2006 + A1:2009 + A1:2010 + A12:2011<br>+A2:2013<br>EN 62479:2010)     |
| Electromagnetic Compliance (Class A)            | EN 55032:2012 Class A<br>EN 55024:2010<br>EN 61000-3-2:2014<br>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-QUAD-10GBE           | ProStream X G3 stream processing platform with quad -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. Only 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  |
| LIC-PRM-X-COLD-SPARE       | ProStream X cold spare license for G3 platform for all ProStream functions for a period of 90 days  |
| 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 one 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 six 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   |
| FW-PRM-X-SRT          | ProStream X firmware license for Secure Reliable Transport (SRT) connection for one Transport Stream  |

### SCRAMBLING

| Part Number           | Description   |
|-----------------------|---|
| LIC-PRM-X-SCRAMBLING  | Software license for ProStream X platform enabling scrambling for one channel. The license allows one 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 one 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                        |
| FW-PRM-X-SIS       | FW license for single illumination (SIS) service                    |
| FW-PRM-X-SIS-LOCAL | ProStream X Single Illumination service license for local channels. |