Harmonic

ProStream™ 1000
Stream Processing Platform

Application Brief

May 2007

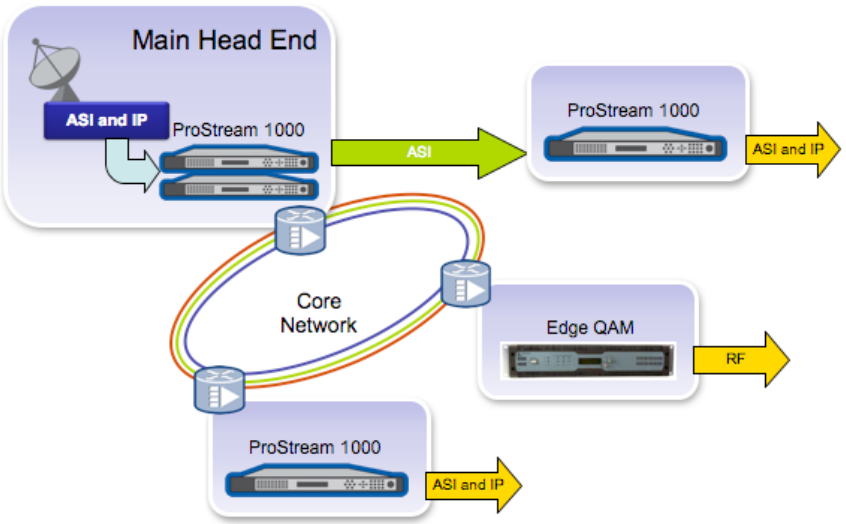
Product Description

Designed to address the increasing demand for advanced video and audio services, Harmonic's IP-based ProStream™ 1000 stream processing platform is the ideal platform for multiplexing, scrambling and advanced processing of MPEG streams. The multi-functional and higly versatile ProStream 1000 is a modular and compact 1-RU system with five slots at the back which can be populated with ASI or IP (Gigabit Ethernet) cards.

Multiplexing

With its standard IP (Gigabit Ethernet) and DVB-ASI input and output interfaces, the ProStream 1000 can be easily incorporated in any existing headend environment or as part of any digital turn around (DTA) architecture. ProStream 1000's robust, extensible and highly scalable design supports MPEG re-multiplexing functionality, including PID remapping and filtering, insertion of PSI/SI tables, PID multicast, and service redundancy, as well multiple IP sockets containing MPTS and SPTS. This configuration not only reduces rack space and power requirements, but also simplifies the network infrastructure while delivering a high-availability solution.

Figure 1. Multiplexing



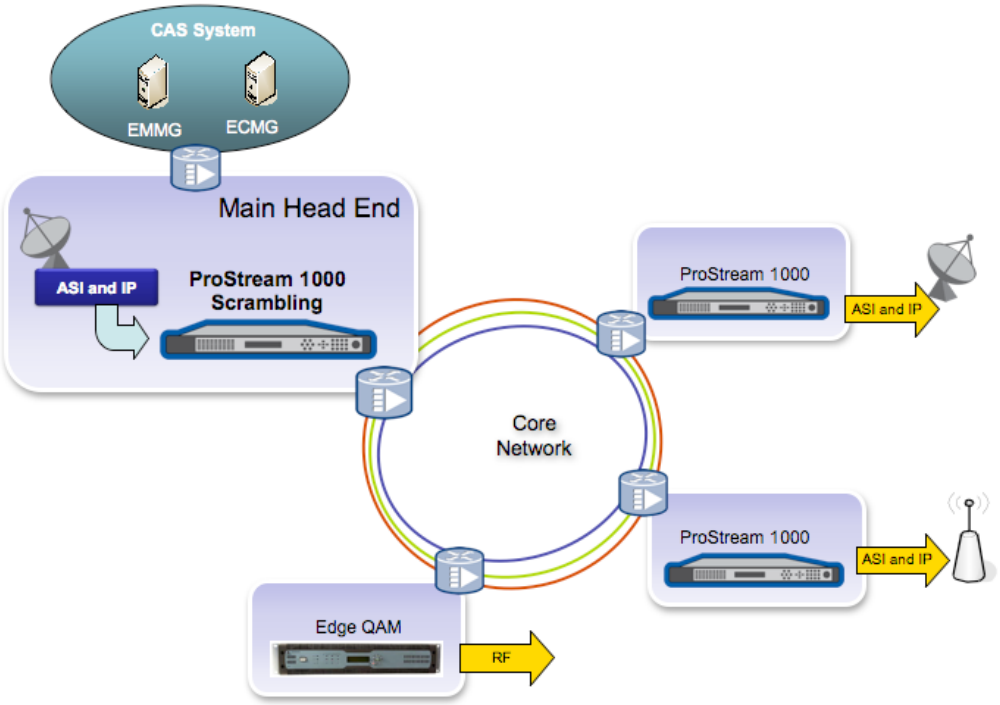
ProCipher™ Scrambling

Fully integrated with all leading CAS vendors and compliant with widely implemented industry protocols, Harmonics's ProStream 1000 with ProCipher™ scrambling technology is known in the industry for its stability, and high performance.

Designed to multiplex and scramble any format of video, audio and data elementary streams (e.g. MPEG-2, MPEG-4 AVC, AC-3, AAC, AACPlus) mapped into a MPEG-2 transport stream, the ProStream 1000 IP scrambler easily integrates into existing or new systems, and reduces cost and complexity by eliminating the need for multiple devices or software-based IP scrambling solutions in distributed cable, satellite or telecom networks. The ProStream is controlled via NMX Digital Service Manager™ or HTTP as a stand-alone device.

The ProStream's industry-leading SymulCrypt Synchronizer core (SCS) supports both DVB SimulCrypt versions 1, 2, 3 and AES encryption technologies and allows for the simultaneous connection of up to ten different conditional access systems (CAS) from different vendors.

Figure 2. Scrambling

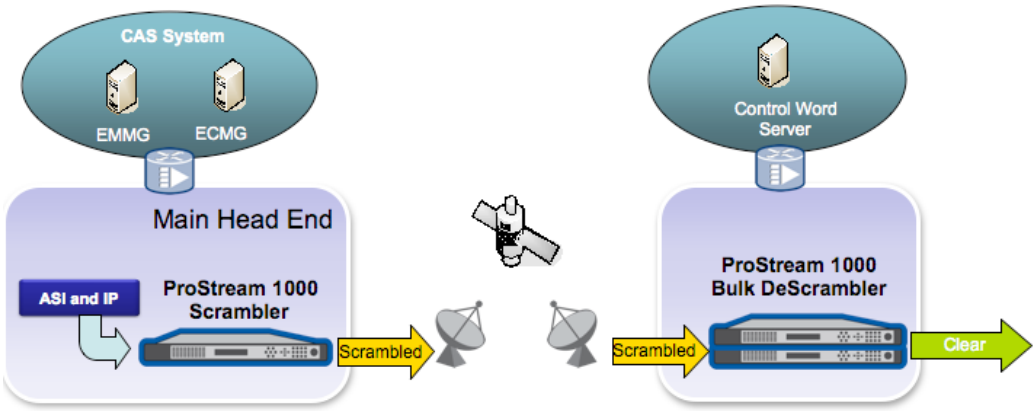


Bulk Descrambler

Content providers are looking for a way to distribute a large amount of content (hundred of services) to small IPTV and cable headends via satellite, in a secure manner. Thanks to the ProStream 1000 Bulk Descrambler, the remote headends can utilize a single platform to descramble up to 128 services, providing a cost-effective solution for a large distribution network.

The ProStream is an ideal platform for descrambling a large number of services in the remote headends while reducing capital and operational expenditures. The alternative solution for descrambling is a legacy integrated receiver decoder (IRD) with a conditional access module (CAM) and a Smart Card. The number of services that can be descrambled by the legacy IRD platform is very limited hence requiring hundreds of units to descramble hundreds of services. In contrast, the ProStream 1000 platform can descramble up to 128 services in a single RU, and supports an interface to the CAS Control Word Server.

Figure 3. Bulk DeScrambler



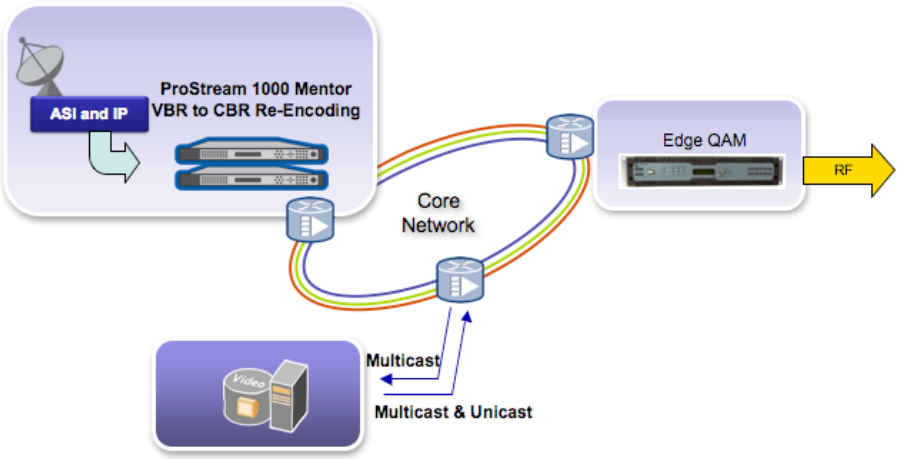
Mentor ™ MPEG-2 Re-Encoding

Designed to address the increasing demand for advanced video and audio services Harmonic's ProStream 1000 with Mentor™ re-encoding technology is the world's first dense MPEG-2 re-encoding platform, including 32 MPEG-2 SD VBR decoders and 32 MPEG-2 SD CBR encoders. The Mentor technology is ideal for operators in multiple applications:

- Delivering multiple switched broadcast services through the existing cable VOD infrastructure by converting VBR services to CBR with video quality superior to legacy rate-shaping technologies
- Delivering second generation on-demand services such as Network PVR by re-encoding existing VBR services to CBR as well as managing GOP structures for simpler ingest into the video server infrastructure.

The Mentor re-encoding technology enables VBR-to-CBR or CBR-to-CBR bit rate adjustments as well format changes to pre-encoded MPEG-2 video streams while maintaining high video quality. Sharing the same technology as Harmonic's award-winning DiviCom® encoder line, the Mentor re-encoding technology leverages the knowledge and experience gained from several generations of encoders.

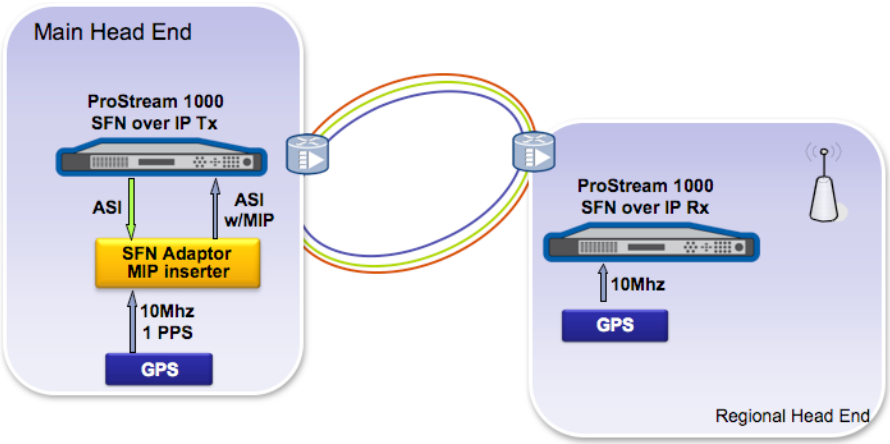
Figure 4. Re-Encoding



Single Frequency Network (SFN) Transmission over IP

Unequalled performance and highly accurate bit-rate control make it possible for the ProStream 1000 to distribute MPEG traffic for Single Frequency Networks (SFN) from one central headend, over an IP network, to multiple remote DVB-T SFN headends. By transmitting services from the central headends to remote transmitter sites over IP, DVB-T network operators can significantly reduce the cost of their network infrastructure when compared to deploying legacy ATM or SDH networks. As DVB-T operators are often required via regulation to reach a high coverage level across the country, being able to reduce the investment and operational costs for the network offers a significant added value as the return on investment in remote locations is limited in its potential. Harmonic's ProStream 1000 with its unique SFN over IP bit rate controlling capability is the right technology to enable DVB-T operators to maximize their profit from their DVB-T service.

Figure 5. SFN over IP

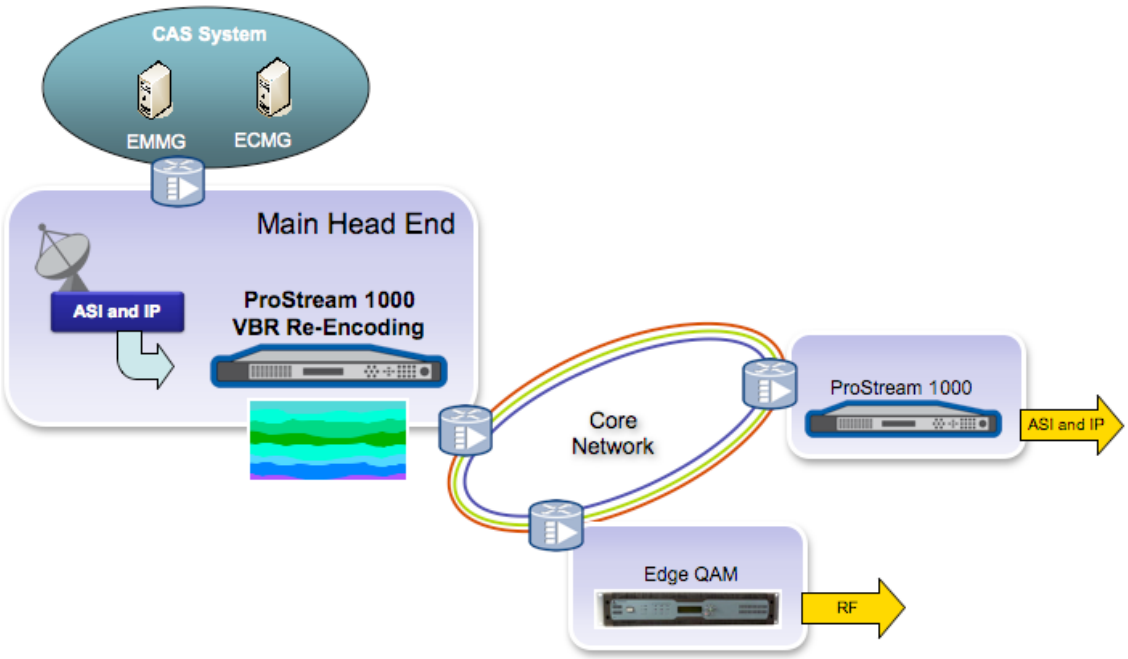


DiviTrackMX™ Statistical Multiplexing

With DiviTrackMX™ statistical multiplexing technology, the ProStream 1000 delivers highly efficient VBR service without the need for any additional equipment—allowing operators to build architectures based on their needs, not budget constraints.

The ability to re-encode up to 64 channels in multiple DiviTrackMX pools in a closed loop manner offers service providers a high quality service in contrast to limited quality service offered by legacy rate-shaping technologies. Together with the platform's advanced multiplexing capabilities (ASI to IP, PID remapping, PID filering, etc.) and scrambling engines the ProStream 1000 is becoming the ideal stream processing platform for DTA systems, essentially creating a "headend In a box" solution.

Figure 6. DiviTrackMX



DiviTrackIP™ Distributed Statistical Multiplexing

DiviTrackIP provides significant operational advantages and cost benefits by connecting encoders and multiplexers via a switched IP network rather than port-to-port ASI interconnects. As a result, any encoder anywhere in a centralized or distributed system can efficiently be part of any multiplex, essentially creating a "virtual headend". The result is a more flexible, scalable and cost-effective architecture than ever before.

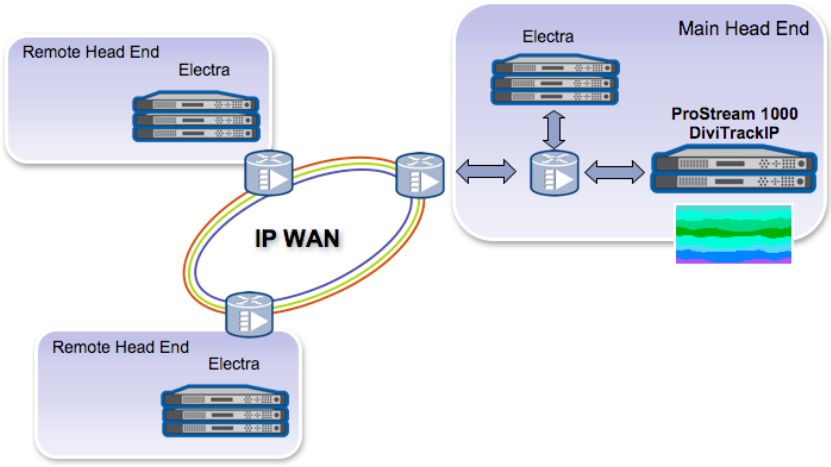
DiviTrackIP support the high efficiency DiviCom family of standard definition and high definition encoders and allows operators to quickly and efficiently launch video services while providing the highest quality viewing experience.

The underlying architecture is based on a closed-loop system with a dedicated return channel to each encoder to enable the multiplexer to orchestrate the process. The transport stream output from each encoder carries MPEG streams encapsulated over IP as well as video complexity statistics to the ProStream 1000 multiplexer. The multiplexer collects and processes the statistics and, via an upstream IP-based connection, provides the encoders rate allocation messages to synchronize the video at the optimal bit-rates. Both the encoders and the multiplexer use IP multicast to enable services to be dynamically assigned to output transport streams.

The patent pending timing and buffering algorithm of complexity and rate messages enables the encoders and the multiplexer to synchronize their outputs to the very tight tolerance required to produce efficient statistical multiplexing, even though these messages are exchanged over a network that is subject to unpredictable delay and jitter.

The DiviTrackIP engine enables the ProStream 1000 to support statistical multiplexing over LAN and WAN networks, including support for up to 24 services per statistically multiplexed pool and support for up to three pools within a single transport stream.

Figure 7. DiviTrackIP

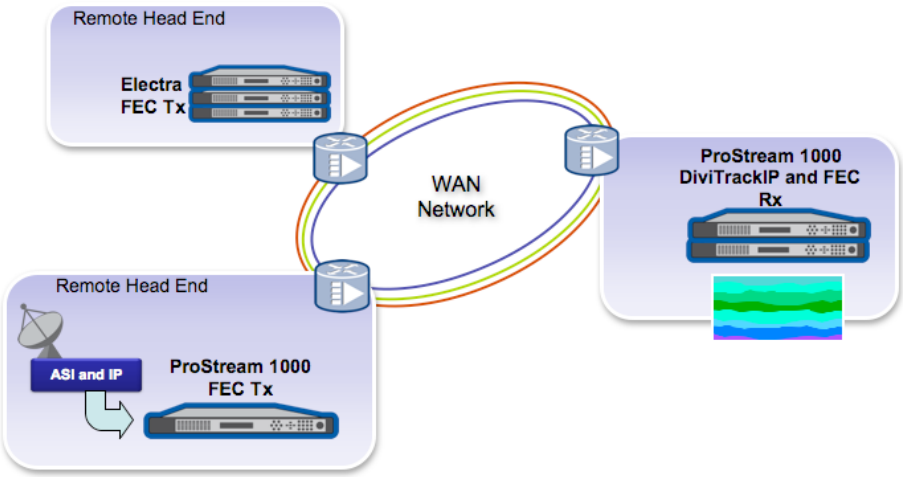


Forward Error Correction (Pro-MPEG COP3 FEC)

Harmonic's ProStream 1000 has been equipped with a Forward Error Correction (FEC) engine, enabling operators to transmit video streams over an IP network with maximum reliability and high performance. The FEC engine helps to overcome IP network problems such as packets drop and packets reordering. By fixing or preventing these problems, the ProStream 1000 ensures high quality real time video transmission over WAN-based IP networks.

The ProStream 1000 can transmit up to 128 sockets (128 SPTS or 8 MPTS) with ProMPEG COP3 FEC. It is also equipped with a ProMPEG FEC decoder.

Figure 8. FEC



Americas

United States and Canada
549 Baltic Way
Sunnyvale, CA 94089 U.S.A.
Phone 1.800.828.5521 inside the U.S.
+1.408.542.2559 outside the U.S.
Fax +1.408.490.6001

Central/South America and Caribbean
Phone +1.760.751.3543
Fax +1.760.751.3508

Asia-Pacific

Asia/Pacific (other than China)
Harmonic (Asia Pacific) Limited
Suite 703-4 Sun Life Tower
The Gateway, 15 Canton Road
Tsimshatsui, Kowloon Hong Kong
Phone +852.2116.1119
Fax +852.2116.0083

China
Harmonic International Inc. Beijing
Representative Office
Suite 912, East Wing Block 1, Office Tower
Beijing Capital Times Square
No. 88 West Chang'an Ave.
Beijing, China 100031 China
Phone +86.10.8391.3313
Fax +86.10.8391.3688

EMEA

U.K., Northern Central Europe, Russia/CIS, Middle East and South Africa
21 Progress Business Center
Whittle Parkway
Slough, Berkshire SL1 6DQ United Kingdom
Phone +44.(0)1.628.600.100
Fax +44.(0)1.628.666.736

France, Benelux, Southern Europe and Africa
Continental Square, 4 Place de Londres
Saturne Building, 2nd Floor
Roissy CDG Cedex, 95727 France
Phone +33.1.49.19.57.70
Fax +33.1.49.19.57.90