

HIGHLIGHTS

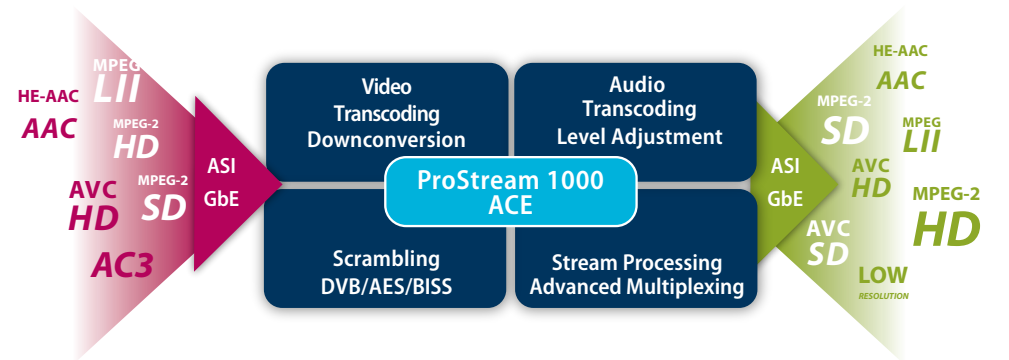
- Multi-codec capable for MPEG-2 to AVC and AVC to MPEG-2 transcoding
- Up to 20 HD or 60 SD channels per chassis
- Multiple output streams per input service to support Simulcast, Triplecast, switched digital video (SDV) and Video on Demand
- Up to 10 integrated statmux pools with DiviTrackMX™
- Mixed pool of transcoded (DiviTrackMX) and encoded (DiviTrackIP™) services
- Audio transcoding and level adjustment
- Market-leading stream processing functionality of the ProStream 1000™

Video consumption is undergoing a massive shift, moving away from the monolithic linear model towards a time-shifted, on-demand, mobile and personalized experience on a growing variety of devices. To foster the “any video to any device” environment demanded by consumers, service providers need a cost-effective and scalable solution, able to mesh with their current infrastructure, seamlessly adapt to codec changes, and repurpose content from different sources, codecs and formats, all while maximizing subscribers’ quality of experience.



Extending the award-winning ProStream 1000™ Stream Processing architecture, ACE™ offers the industry’s first truly converged high-density and high-quality platform for advanced processing and delivery of standard definition (SD) and high definition (HD) MPEG-2 and H.264/AVC video and audio. ACE is a highly versatile and ultra dense processing platform, with functions including

- Any-to-Any and Any-to-Many video/audio transcoding,
- LevelMagic™ automatic audio level adjustment
- Statistical multiplexing
- Advanced re-multiplexing
- Scrambling and de-scrambling
- Program substitution
- Forward Error Correction
- Integrated IRIS™ Video/Audio QoS measurement
- Digital program and ad insertion



Leapfrogging best-in-class stream processing platforms, ACE enables service providers to cost-effectively deploy next-generation HD and SD services and offers unmatched broadcast quality in a highly scalable integrated 1-RU configuration, supporting up to 60 SD or 20 HD services in a single rack unit.

In addition, ACE’s power efficient design helps operators reduce OPEX and their carbon footprint, using only 10W per HD and less than 3W per SD channel.

BUSINESS BENEFITS

- **Best CAPEX investment** – The ACE any-to-any transcoding functionality enhances the already extensive stream processing capabilities of the ProStream 1000 platform. The industry’s first platform with DVB-CSA and AES scrambling, remultiplexing, and splicing, the ProStream 1000 can be easily repurposed via firmware upgrades to support new applications driven by the ongoing evolution of video service delivery.
- **Simulcast for Cable** – Operators increasingly need to re-encode the same content for multiple consumer devices across multiple distribution mechanisms, such as linear broadcast, switched digital video or Direct-to-Edge™ (IPTV over Cable). The ProStream 1000 can simultaneously generate 3:1 HD statmux, SD MPEG-2 for legacy STBs, SD/HD AVC for IPTV and a CBR version for time-shifted TV, all from a single HD input.
- **Edge transcoding and statmux for hybrid operators** – Primary and secondary distribution networks are migrating to the AVC format to enable significant bandwidth savings. With the transcoding capabilities of the ProStream 1000, service providers can cost-effectively transcode at the edge of their network to any codec and format, without compromising video quality.
- **Dense transcoding for IPTV** – The ProStream 1000 can transcode up to 60 SD or 20 HD MPEG-2 channels to AVC without sacrificing video quality. This best-in-class transcoding performance makes it the ideal choice for IPTV operators.

TECHNICAL BENEFITS

- **Leverage the ProStream 1000 feature set** - In addition to unmatched transcoding performance, the ProStream 1000 advanced stream processing core includes multiplexing, scrambling, PSIP and DVB table manipulation and digital ad insertion over IP and ASI.
- **Integrated statistical multiplexing** – ACE streamlines system architectures by enabling “statmux-in-a-box” with Harmonic’s DiviTrackMX.
- **IP-based statistical multiplexing** – ACE supports the DiviTrackIP engine with any Electra™ encoder model, as well as the DiviTrackMX engine for Digital Turn Around services to create pools of encoded and transcoded channels.
- **Enhanced audio processing** - Able to transcode any broadcast audio codec, ACE addresses the most complex audio processing scenarios, such as transcoding from MPEG-1 LII to Dolby Digital or AAC+. Integrated Level Magic audio technology automatically eliminates annoying audio level changes both within a channel (such as during commercial breaks) and when switching from one channel to another.
- **Control and Management** - ACE can be easily configured and operates either through a standalone web interface or with Harmonic’s NMX Digital Service Manager™ for mass configuring, monitoring and automated redundancy in centralized or distributed architectures.
- **IRIS QoS support** - Available as an option, the integrated IRIS engine provides video quality, global channel availability and source profiling metrics for all channels processed by ACE.

Use Case	Input	Output	Problem solved
Cable Simulcast/Triplecast Edge transcoding SDV, time-shifted TV	HD AVC Mezzanine sources HD MPEG-2 Satellite	3:1 HD MPEG-2 16:1 SD MPEG-2 CBR version for SDV and time-shifted TV	Saves satellite/IP network bandwidth to deliver content to the edge High Quality Digital Turnaround
IPTV Transcoding	SD/HD MPEG-2	SD/HD AVC	Long Tail Content
Satellite Mixed pool	HD AVC Encoder HD/SD MPEG-2/AVC DTA	Mixed pool of DiviTrackIP & DiviTrackMX	Local “must carry” content statmuxed with national feeds
Hybrid MSOs Cable and IPTV Edge Transcoding	HD/SD MPEG-2 VBR	HD/SD AVC VBR and CBR	Saves satellite/IP network bandwidth to deliver content to the edge. Encode once and transcode at the edge
Audio Level Adjustment	Different audio levels between channels and within a channel	Same audio level across the channel lineup	Audio level adjustment between channels prevents jumps in audio levels when zapping between channels Maintains same audio level within a channel, preventing “screaming” ads

GIGABIT ETHERNET CARD

Type	Gigabit Ethernet 802.3z
IP Ports	2 independent ports
Connector	2 x SFP (Multi Mode, Single Mode, Copper)
I/O Speed	1 x 1000 Mbps per port
IP Encapsulation	MPEG TS over UDP/IP/MAC 1 to 7 TS/ IP
MPEG Format	188 B per TS
MPEG TS	MPTS and SPTS
I/O Processing	Up to 128 Sockets. Up to 520 Mbps per card
Maximum bit-rate per socket	80 Mbps
Addressing	Unicast and Multicast
Management	IGMPv1, IGMPv2, IGMPv3, ARP, ICMP
Forward Error Correction	SMPTE 2021-1 and SMPTE 2021-2

ASI IO CARD

Type	ASI Input/ Output
Connector	4 x BNC, 75Ω
I/O Direction	Configurable, Input or Output, per port.
MPEG Format	188/204 B per TS
I/O Processing	1 MPTS/SPTS per port. Up to 180Mbps per port.
ASI I/O Ports	4 to 20 (Each ASI card has 4 ports)

MANAGEMENT INTERFACES

Ethernet	100BaseTX
Connector	3 * RJ-45 (1 Management, 1 CAS and 1 not used).

REMULTIPLEXING

Routing	Any Input to Any Output
Redundancy	1:1, N:M, HHP Input Service Redundancy Socket Redundancy IP Port Redundancy
PID	Re-mapping, Filtering, Multicasting
PID Multicasting	Any Input PID can be multicasting to multiple TS outputs with different remapping and processing (different CW if scrambled).
PSI/SI, PSIP	Extraction, Injection, Spooling.
Output Mirroring	Any to any (ASI/IP to ASI/IP)
Advanced Stream Processing	Intelligent Service Substitution, PID Prioritization, PCR Generation, PID range

RE-ENCODING / TRANSCODING

Re-Encoding/Transcoding	Full Decoding and Encoding Up to 60 SD services or 20 HD services
Video Re-Encoding and Transcoding (CBR/VBR) 4:2:0	MPEG-2 MP@ML MPEG-2 MP@HL MPEG-4 AVC MP@L3 MPEG-4 AVC HP@L4
Video Input Filtering	Motion compensated temporal filter (MCTF)
Aspect Ratios	4:3 and 16:9
SD Resolution and Frame Rates	625 Lines (PAL) – 50HZ 720 X 576 @ 25Hz 704 X 576 @ 25Hz 544 X 576 @ 25Hz 528 X 576 @ 25Hz 480 X 576 @ 25Hz 352 X 576 @ 25Hz 525 Lines (NTSC) – 60Hz 720 X 480 @ 29.97Hz 704 X 480 @ 29.97Hz 544 X 480 @ 29.97Hz 528 X 480 @ 29.97Hz 480 X 480 @ 29.97Hz 352 X 480 @ 29.97Hz
Conversions	Horizontal Resolution - Any to any Vertical Resolution –follow the input Frame rate – follow the input Interlaced only
HD Resolutions and Frame Rates	50Hz 720p 1280 x 720 50 Hz 720p 960 x 720 50 Hz 1080i 1920 x 1080 25 Hz 1080i 1440 x 1080 25 Hz 1080i 1280 x 1080 25 Hz 60Hz 720p 1280 x 720 59.94Hz 720p 960 x 720 59.94Hz 1080i 1920 x 1080 29.97Hz 1080i 1440 x 1080 29.97Hz 1080i 1280 x 1080 29.97Hz
Conversions	Horizontal Resolution - Any to any Vertical Resolution – follow the input Frame rate – follow the input
Audio	Audio pass-thru and synchronization with processed video streams (lip sync)
VBI and Data PIDs	VBI and Data PIDs pass-thru.
Video Input Bitrate	
SD MPEG-2	0.5 Mbps – 15 Mbps
HD MPEG-2	0.5 Mbps – 50 Mbps
SD AVC	0.5 Mbps – 12 Mbps
HD AVC	0.5 Mbps – 30 Mbps
VBR Video Output Bitrate (DiviTrackMX™)	
SD	0.5 Mbps – 15 Mbps
HD	2 Mbps – 20 Mbps
Video Output Bitrate (CBR)	
SD MPEG2	1 Mbps – 15 Mbps
HD MPEG2	2 Mbps – 20 Mbps
SD AVC	0.5 Mbps – 12 Mbps
HD AVC	1 Mbps – 20 Mbps

SCRAMBLING

SCS	Internal
Standards	DVB Common Scrambling Open CAS DVB Simulcrypt Version 3. Stream Server Divicom 1.4 AES-CBC, AES-NSA2 Scrambling algorithms
CAS connections	Simultaneous connections to 30 different Conditional Access Systems from different CA vendors
Number of ECMs	900 ECMs per platform

MANAGEMENT

NMS	Control Harmonic NMX Digital Service Manager
Stand Alone GUI	Web browser

POWER/PHYSICAL

Input Voltage	85-264 VAC -48 VDC
Line frequency	47-63 Hz
Cooling	Inhale: Front. Exhale/ Exhaust: Right.
Power Consumption	160W – 380W
Rack Space	1-RU
Dimensions (W x H x D)	19 in x 1.75 in x 24 in 48.26 cm x 4.45 cm x 60.69 cm

ENVIRONMENTAL

Operating Temperature	32° to 122° F/0° to 50° C
Storage Temperature	-40° to +158° F/-40° to 70° C
Relative Humidity	0 to 95% non-condensing
Operating Altitude	Up to 15,000 feet (4,572 meters)
Storage Altitude	Up to 40,000 feet (12,192 meters)

COMPLIANCE/REGULATORY

Emission	EN55022/CISPR 22 Class A EN61000-3-2:1995 = A1:1997 + A2:1998 EN61000-3-3:1995 FCC 47 CFR part 15 Class A
Immunity (Radiation)	EN50082-1:1997 EN55024

UL/ ES (Electrical Safety)

EMC compliant to EU directive 89/336/EEC and 47 DFR part 15, subpart B
 Safety compliant to low voltage directive 72/23/EEC and 50083-1 standard
 EN 60950 (EC)
 UL 60950 (USA/ Canada)

RHOS	DIRECTIVE 2002/95/EC
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