ViBE® CP9000

HD/UHD CONTRIBUTION ENCODER

The Harmonic ViBE® CP9000 encoder enables rapid, reliable deployment of superior-quality HD and Ultra HD content for mission-critical contribution applications.

With the significant increase in UHD TV sets hitting the market, content providers and broadcasters are looking for a solution to address the needs of early adopters of the premium TV standard. Compact and reliable, the ViBE CP9000 contribution encoder is the answer. Superior video quality is a primary objective of the platform, and the ViBE CP9000 delivers with pristine 2160p UHD and 1080p HD content featuring high dynamic range (HDR).

Innovative Compression Technology
The ViBE CP9000 encoder addresses the call for preserving video quality at the front of the broadcast chain with the ability to process uncompressed UHD signals at eight times the bitrate of current HD sources, up to 370 Mbps. The platform encodes content in a single slice in real-time via AVC (H.264) or HEVC (H.265), today's most advanced compression standards. Up to two UHD or eight video channels, and 32 audio stereo channels, can be encoded on the 1-RU chassis. With its wide range of encoding tools, HEVC offers incredible compression efficiency, making distribution and delivery of live UHD content available for satellite, cable, terrestrial and fiber networks.

The ViBE CP9000 encoder employs 4:2:2 10-bit precision encoding technology originally designed for professional transmission. Compatible with the Hybrid Log-Gamma (HLG) and SMPTE ST 2084 (PQ) HDR formats, the platform is also ready for the next phases of UHD content delivery. As a result, image detail, sharpness and color gradients are preserved throughout the distribution process — right up to the consumer's UHD display.

Versatile and Future-Proof
With a depth of just 16.9 inches, the compact and rugged ViBE CP9000 encoder is a perfect fit for DSNG vehicles, teleports and flyaway packages. SDI and all-IP contribution and primary distribution use cases are both supported. A low latency encoding mode offers broadcasters the chance to get a true jump on the competition, and also enables home/remote production application. The encoder can be used to transport pristine live video from a field location to the studio via IP, significantly reducing production costs by cutting the number of vehicles and staff members sent to cover live events.

Simple and cost-effective to deploy, the ViBE CP9000 encoder is interoperable with most professional decoders, including the Harmonic ProView™ 7100 IRD. It integrates seamlessly with the Harmonic ProSwitch smart redundancy switch as well, enabling a compact 1+1 UHD redundant solution in just 3 RU. DVB/SMPTE standards are supported. The small system footprint and low power consumption of the ViBE CP9000 ensures exceptional ROI and helps assure that your investment will pay off well into the future.

Pay-As-You-Grow Scalability
License-based pricing assures that customers pay only for the features they need. Video and audio codecs and formats are easily added to the ViBE CP9000 encoder via firmware upgrade, enabling a scalable migration path that provides operational flexibility and business continuity, and extends the system's value.

World-Class Service and Support
Harmonic stands behind the ViBE CP9000 platform 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.

HIGHLIGHTS

- Ultra HD and HD single-slice encoding
- Superior real-time HEVC/H.264 420/422 10-bit encoding
- Up to two UHD or eight HD channels per chassis
- Up to 32 audio stereo channels per chassis
- Compliant with EBU UHD Phase-1 specifications
- HLG, PQ10, HDR10 and S-Log3 HDR support
- Front-panel and web-based user interfaces

SPECIFICATIONS

INPUT

Inputs	Up to 8 x 3G-SDI or 2 x 12G-SDI Four quadrants or 2 Sample Interleave Dual SFP+ (10 GbE) interfaces SMPTE-2022-6 video over IP SMPTE-2110 video over IP

VIDEO

HEVC (H.265/MPEG-H)	Profiles: Main, Main 10 and Main 10 422 Level: up to level 6.2
AVC (H.264)	Profiles: High, High 10, High 10 422 Level: Up to 5.2
Encoding Scheme	CBR (seamless bitrate change) UHD single slice or multi-slice
Chroma Sampling	4:2:0, 4:2:2
Bit Depth	8-bit, 10-bit
Resolution	3840x2160p (UHD) 1920x1080, 1280x720
Frame Rates	50i, 59.94i 50p, 59.94p
Downscaling	UHD to HD, 1080p to 720p
Video Scanning	Progressive, Interlaced
GOP Structure	I-only, IPPP, IBBB Fixed/Adaptive GOP Hierarchical GOP Open/closed GOP
Encoding Latency	Ultra low, low, standard, long encoding modes
Encoding Bitrate	Up to 370 Mbps
Pre-Processing	Deblocking filter Sample Adaptive Offset (SAO) Asynchronous Motion Partitioning (AMP) Coding Tree Block (CTB) from 16x16 to 64x64
Dynamic Range	SDR, HDR, Dynamic HDR
Wide Color Gamut	BT.709, BT.2020
Color Space	DCI-P3 D65, DCI-P3 Theater, Custom
High Dynamic Range (HDR)	BT-2020/HLG BT-2020/SMPTE-2084 HDR-10 & PQ10 HDR custom mode

AUDIO

Audio Input Formats (Embedded in SDI)	PCM embedded Dolby® Digital (AC-3), Digital Plus (E-AC-3), AC-4 pre-compressed Dolby E
Performance	Up to 32 audio stereo channels Up to 10 audio 5.1 surround channels
Encoding Formats & Bitrates	MPEG-1 Layer II 2.0: 64-384 kbps AC-3 2.0: 128-448 kbps AC-3 5.1: 384-640 kbps E-AC-3 5.1: 192-448 kbps AAC-LC/HE-AAC 2.0: 32-160 kbps AAC-LC/HE-AAC 5.1: 96-448 kbps
Passthrough	Linear PCM, uncompressed Dolby E AAC-LC/HE-AAC AC-3, E-AC-3, AC-4
Processing	Dolby E to AC-3 transcoding Dolby E to E-AC-3 transcoding AC-3 to E-AC-3 transcoding Dolby E to HE-AAC transcoding Jünger Level Magic automatic loudness control

ANCILARY & DATA

Closed Caption	EIA608 & EIA708
Teletext	SMPTE-2031 & OP-47
DPI	SCTE-104 to SCTE-35
Transparent Ancillary	SMPTE-2038
Timecode ATC	SMPTE-12M-2

PROCESSING

Multiplexing	SPTS or MPTS Up to 8 x SPTS MPTS of up to 8 x services PSI/SI generation
Scrambling	BISS 1 mode 1, E BISS 2 mode 1, E, CA*

OUTPUT

Outputs	Dual GbE interfaces TS over IP (SMPTE ST 2022-2), SPTS or MPTS UDP, UDP/RTP Synchronous RTP output for hitless redundancy (SMPTE 2022-7) Unicast or multicast FEC generation (SMPTE ST 2022-1) ZIXI, SRT output Up to 4 x ASI outputs (optional)

CONTROL & MONITORING

Dual GbE interfaces for C&C
Embedded web server
SNMP agent
Front-panel with keyboard and LCD

POWER

Power Supply	Dual hot-swappable AC PSU
Input Voltage Range	100-240 VAC
Power Consumption	80 W

PHYSICAL

Dimensions (HxWxD)	1.7 in x 17.2 in x 16.9 in (1 RU) 4.3 cm x 43.7 cm x 42.9 cm
Weight	26.7 lbs/12 kg

ENVIRONMENTAL

Cooling	Front to rear airflow
Operating Temperature	+41° to 104° F 5° to 40° C
Storage Temperature	+23° to 113° F -10° to +70° C
Maximum Humidity	<90% non-condensing
Electromagnetic Compliance	CE marked in accordance with the 93/68/EEC (22/07/93) directive EN 55022 EN 55024 EN 61000-3-2
Safety	IEC 60950 and EN 60950 UL 60950

* Check with your Harmonic representative for availablity.

ORDERING INFORMATION

HARDWARE

Part Number	Description
CP9000-1U-2AC-V2	ViBE CP9000 platform 1 RU with dual AC
CP9X00-HW-HEVC-IP-V2	AVC/HEVC card with SDI in and 2 x10 Gbps SFP+
CP9X00-HW-ASI ASI-4	Card with 4 x ASI outputs

VIDEO SOFTWARE LICENSES

Part Number	Description
CP9X00-LIC-ENC-HD	HEVC/AVC HD 4:2:0/4:2:2 encoding license 3 x licenses to enable one UHD channel

AUDIO SOFTWARE LICENSES

Part Number	Description
CP9X00-LIC-ENC-MP1L2-AAC	One stereo MPEG-1 LII or AAC/HE-AAC encoding license (three licenses for surround)
CP9X00-LIC-ENC-DD	One stereo DD-DD+ encoding license (three licenses for surround)
CP9X00-LIC-TRX-DDTODD+	One stereo DD to DD+ transcoding license
CP9X00-LIC-DEC-DE	One Dolby E decoding license
CP9X00-LIC-JUNG	One stereo Jünger Level Magic auto loudness control (three licenses for surround)

FEATURE SOFTWARE LICENCES

Part Number	Description
CP9X00-LIC-FEC	FEC SMPTE 2022-1 generation
CP9X00-LIC-HDR	HDR Hybrid Log-Gamma (HLG), HDR10, PQ10 (SMPTE 2084)
CP9x00_LIC_SCTE	SCTE-104 TO SCTE-35 conversion

ProView™ 7100

INTEGRATED RECEIVER-DECODER, TRANSCODER AND STREAM PROCESSOR
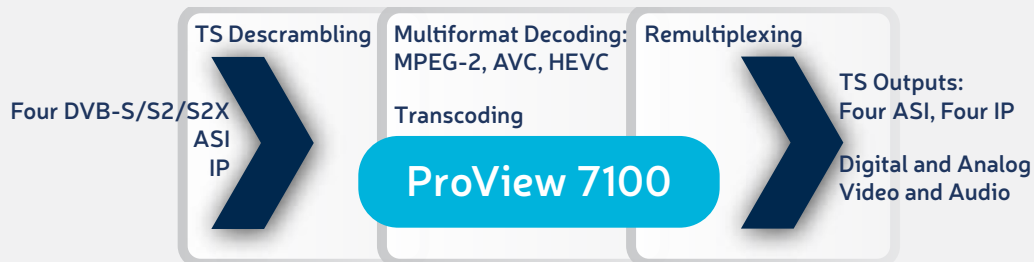
Harmonic's ProView™ 7100 is the industry's first single-rack-unit, scalable, multiformat integrated receiver-decoder (IRD), transcoder and MPEG stream processor.

Leveraging Harmonic expertise in Intelligent Function Integration™, the ProView 7100 adds broadcast-quality SD/HD MPEG-2 and MPEG-4 AVC 4:2:0/4:2:2 10-bit decoding and video transcoding to the feature-rich ProView IRD platform, allowing content providers, broadcasters, cable MSOs and telcos to easily and cost-effectively streamline their workflows and decrease operating costs. For applications in which preserving pristine video quality is paramount, the ProView 7100 supports HEVC 4:2:2* 10-bit decoding of resolutions up to 1080p60.

The ProView 7100 IRD harnesses a flexible and modular design to address the vast spectrum of content reception applications, from decoding, descrambling and multiplexing of multiple transport streams to MPEG-4 to MPEG-2 transcoding. With an advanced and dense multichannel descrambler, the ProView 7100 simplifies the deployment of (or migration to) an all-IP headend solution and powers the launch of added-value services. The flexible hardware design is easily reconfigured with firmware upgrades, enabling seamless adaptation to new inbound video formats and codecs, such as MPEG-4 AVC and HEVC.

The ProView 7100 utilizes powerful processing capabilities to multiplex transport streams that include local and regional data, and also to perform deterministic remultiplexing for SFN distribution. It supports transcoding of up to eight channels of AVC to MPEG-2, allowing programmers to efficiently distribute superior-quality video content while using minimal satellite transponder capacity. Content can be received and transcoded to any resolution required.

A rich set of options includes input of multiple DVB-S/S2/S2X, IP and DVB-ASI feeds. Support for advanced content delivery redundancy schemes includes the ability to provide simultaneous primary satellite and backup IP network feeds.

TS Descrambling	Multiformat Decoding: MPEG-2, AVC, HEVC	Remultiplexing
Four DVB-S/S2/S2X ASI IP	Transcoding **ProView 7100**	TS Outputs: Four ASI, Four IP / Digital and Analog Video and Audio

High-end IRD, transcoder and stream processor

HIGHLIGHTS

- Four TS descramblers with four integrated DVB-CI slots
- MPEG-2 4:2:0 8-bit and MPEG-4 AVC 4:2:2 10-bit decoding
- HEVC decoding of 1080p60 media
- Broad SD/HD format support
- Up to eight channels of MPEG-4 AVC to MPEG-2 transcoding with down-conversion option

- Single/dual-channel decoder in 1 RU
- Four stereo pairs of audio decoding
- Four independent ASI outputs
- Four IP outputs with 1+1 redundancy support
- HD-SDI, SD-SDI, HDMI and analog video outputs
- Any-to-any remultiplexing capabilities

- Deterministic remultiplexing for SFN distribution
- T2-MI deframing to MPEG TS
- Regeneration of PSI/SI and MPEG tables
- Graphical user interface provides easy drag-and-drop management

Marketing Benefits

Lower CAPEX
Integrating and combining multiformat decoding, multi-program descrambling and remultiplexing capabilities, the ProView 7100 dramatically streamlines system architectures. Its unequalled density and flexibility makes it the clear choice for CAPEX investment.

Business Continuity
The trend towards HD and AVC content distribution creates business continuity issues with legacy receivers. The ProView 7100 can be repurposed via hardware options and firmware upgrades for different uses and new applications, such as migration from SD MPEG-2 to HD AVC. It can also support the emerging HEVC codec via a simple software update, paving the way for highly efficient HEVC workflows and 1080p HD and 2160p Ultra HD content distribution.

Expanding Channel Lineup
By integrating DVB-S/S2/S2X demodulation with the streaming of descrambled content over IP, ProView 7100 enables operators to quickly and cost-effectively launch new services while leveraging their existing IP or legacy ASI infrastructure.

OPEX Friendly
Able to house a multiformat decoder and descramble up to four full Multi-Program Transport Streams (MPTS) in a 1-RU chassis, the dense ProView 7100 is perfectly suited for operators mindful of their energy cost and rack space.

Lower OPEX
Harmonic's unique DSR technology can save up to 90% of satellite or IP bandwidth and increase architecture flexibility in regional DVB-T SFN distribution networks. The common national programs do not need to be retransmitted in each region, and both the national and regional signals can be distributed over different networks.

Applications

- Contribution and distribution
- Decoding for re-encoding
- Digital turnaround
- DVB descrambling
- All-IP headends
- DTT distribution — MFN and SFN

Technical Benefits

Fully Integrated Platform
The ProView 7100 combines all headend reception functionality — such as multiple transport-stream descrambling, multiformat and codec decoding, and any-to-any transcoding — with full remultiplexing capabilities, including PID filtering, remapping and table regeneration.

High-Fidelity Decoding
The ProView 7100 offers integrated MPEG-2 4:2:0 8-bit and AVC and HEVC 4:2:2 10-bit precision decoding for DVB-S/S2, DVB-ASI and IP applications, enabling content providers to decode content up to 1080p60** with pristine picture fidelity.

Superior Transcoding
The ProView 7100 can be equipped with two decoding or transcoding cards for SD/HD MPEG-2 and AVC formats. Harmonic's industry-leading compression algorithms assure the distribution of superior-quality video for all added-value services, including HD and VOD.

Expanded Input Options
Able to simultaneously receive content over DVB-S/S2, ASI and IP, the ProView 7100 allows operators to maximize flexibility and optimize redundancy schemes.

Support for All-IP Infrastructures
The ProView 7100, in combination with the integrated Harmonic FLEX® decoder, enables an all-IP headend architecture, resulting in a more scalable and lower-cost transition to IP-based services.

T2-MI Deframing to MPEG TS
The ProView 7100 converts the PLPs (physical layer pipes) in a T2-MI stream into a regular transport stream. Up to four simultaneous T2-MI-to-TS conversions can be performed, eliminating the need to distribute separate TS for baseband decoding and for feeding the headend.

Broadcast-Quality Down-Conversion
The ProView 7100 performs HD down-conversion and aspect ratio adaptation to generate broadcast-quality baseband analog video and audio that can be easily integrated with existing cable network infrastructures.

Friendly Management
The ProView 7100 can be simply configured through a stand-alone interface or with Harmonic's NMX™ Digital Service Manager for mass configuring, monitoring and automated redundancy in centralized or distributed architectures.

Advanced DSR Processing
The ProView 7100 performs regional program insertion in a national common multiplex at each DVB-T SFN transmission site. DSR supports CBR and VBR content replacement or insertion of any number of programs or PIDs. A special EAS mode is provided for emergency alert program switching.

* Check availability

SPECIFICATIONS

RF INPUT INTERFACES[1,2] — DVB-S/S2/S2X[2]

Number of Inputs	Four L-band (optional)
Connectors	Four F-type, 75 Ω (working simultaneously)
Frequency Range	950-2,150 MHz
RF Input Level	(-25) to (-65) dBm
LNB Power	13 VDC, 18 VDC / 350 mA

TRANSPORT STREAM INPUT INTERFACES

DVB-S
Constellation	QPSK
Symbol Rate	1-45 Msym/s
FEC	All ratios compliant with standard

DVB-S2
Constellation	QPSK, 8PSK 1[1], 16APSK[1,6],32APSK[1,6]
Symbol Rate	1-45 Msym/s[7]
FEC Blocks	All ratios compliant with standard
Blocks off	Short and normal
Roll Off	0.2, 0.25 and 0.35
Mode	CCM, VCM
Pilots	On & off

DVB-S2X[2]
Constellation	8PSK[1],16APSK[1],32APSK[1]
Symbol Rate	1-64 MSym/s 1.7
FEC Blocks	8PSK: 3/5, 2/3, 3/4, 5/6, 8/9, 9/10, 23/36, 25/36, 13/18 8PSK-L: 5/9, 26/45
	16APSK: 2/3,3/4,4/5,5/6,8/9,9/19 26/45,3/5,28/45,23/36,25/36,13/18,7/9,77/90 16APSK-L: 5/9, 8/15, 1/2, 3/5, 2/3
	32APSK: 3/4, 4/5, 5/6, 8/9, 9/10, 32/45, 11/15, 7/9 32APSK-L: 2/3
Roll Off	0.05, 0.1, 0.15, 0.2, 0.25 and 0.35
RF Input Max Bitrate	160Mbps per port
Mode	CCM, VCM
Pilots	On & off

ASI
Number of Inputs	Four
Connectors	BNC, 75 Ω
Packet Length	188 byte packets
TS Max Bitrate	160 Mbps
	Compliant with CENELEC EN 50083-9

MPEG over IP1
Number of Inputs	Four simultaneous SPTS/MPTS
Sockets	Four
Encapsulation Protocols	MPEG-2 TS over UDP
Addressing	Multicast/unicast
Connectors	Two 100/1000 Base-T RJ45 for redundancy

G.7032
Connectivity	DS3
Number of Ports	Two
Input Data Rate	44.736 Mbps
Levels (Compliance)	ITU-T G.823/G.824
	ANSI T1.102-1993
Interface	B3ZS

TRANSPORT STREAM OUTPUT INTERFACES

ASI
Number of Outputs	Four (duplicate or independent)[1]
Connectors	BNC, 75 Ω
Packet Length	188
TS Maximum Output Bitrate	108 Mbps
	Compliant with CENELEC EN 50083-9

MPEG Over IP
Number of Inputs	Four simultaneous SPTS/MPTS[1]
Sockets	Four
Encapsulation Protocols	MPEG-TS over UDP
Redundancy	1+1 physical layer support
Addressing	Multicast
Connectors	100/1000Base-T, RJ45
FEC[1]	SMPTE-2022 FEC

TRANSPORT STREAM PROCESSING

Four TS multiplexing (any to any)[1]
Seamless switching between two incoming, identical TS on different networks[1]
Service-level remultiplexing from any input to any output
Service-level filtering
High-accuracy PCR restamping
PSI /SI processing and regeneration
T2-MI deframing to MPEG TS[1]
Auto generation or passthrough of PSI/SI tables
CA signaling removed when descrambling
Deterministic remultiplexing of local content into the national TS for DVB-T SFN content distribution[1]

CONDITIONAL ACCESS[1]

BISS	Embedded, up to full TS
DVB-CI Interface	Two independent CI slots EN-50221, allowing descrambling of up to four TS (number of PIDs dependent on the CAMs)
CA Methods	MultiCrypt, SimulCrypt
CAS	Viaccess®, Irdeto®, Conax®, Nagravision® (partial list)

VIDEO DECODING[2,3]

Configuration	Single or dual channel
Decoding Formats[1]	
MPEG-2 SD	4:2:0 MP @ ML
	4:2:2 @ ML
MPEG-2 HD	4:2:0 MP @ HL
	4:2:2 P @ HL
MPEG-4 AVC SD	4:2:0 MP @ L3
	4:2:2 HP @ L3
MPEG-4 AVC HD	4:2:0 MP @ L4.0 / HP @ 4.1
	4:2:2 @ HiP/Hi10P/Hi422P @ L4.1 (8 and 10 bit)
HEVC HD	Main/Main 10
	1080i/720p 4:2:0 @L4.0
	**1080P and 4:2:2@L4.1 (8 and 10 bit)
Maximum Video Rate	
MPEG-2 SD	4:2:0 – 15 Mbps
	4:2:2 – 50 Mbps
MPEG-2 HD	4:2:0 – 50 Mbps
	4:2:2 – 80 Mbps
MPEG-4 AVC SD	4:2:0 – 10 Mbps
	4:2:2 – 50 Mbps
MPEG-4 AVC HD	4:2:0 – 20 Mbps (MP), 25 Mbps (HP)
	4:2:2 – 100 Mbps (CAVLAC), 50 Mbps (CABAC)
HEVC HD	Up to 50 Mbps (CABAC)
Video Formats	1080p @ 50, 59.94 fps
	1080i @ 29.97, 30, 25 fps
	720p @ 59.94, 50, 60 fps
	480i @ 29.97 fps
	576i @ 25 fps
	480p @ 59.94 fps
Analog Video Output	PAL-B/G/I/M/N/D, NTSC, Russian SECAM

VIDEO PROCESSING[2,4]

HD Video Down Converted to SD with Aspect Ratio Conversion	Letterbox, center cut, AFD
Aspect Ratio Conversion	16:9 to 4:3
VBI Reinsertion	Composite video, embedded in SDI
Descrambling	Four TS with four DVB CAM slots

SPECIFICATIONS

AUDIO DECODING[2,4]

Stereo Pairs per Video Channel	Four[1]
Audio Formats	MPEG-1 Layer-II Dolby® Digital (AC-3) stereo down-mix Dolby Digital 5.1 pass-through Dolby Digital Plus (E-AC-3) Dolby E pass-through AAC Audio leveling

VIDEO AND AUDIO INTERFACES[2,4]

Video Outputs

Composite Video Interfaces	Two (per video channel)
SD/HD/3G-SDI with Embedded Audio	Two (per video channel)
HDMI	One (single-channel decoder only)

Audio Outputs

Stereo Pairs	Four (per video channel)
Analog Audio Stereo Pairs	Four (balanced) 600 Ω
Digital audio (AES/EBU-S/P-DIF)	Four
Digital Audio Interfaces Modes	Four (balanced) Stereo, joint stereo, dual channel, single channel

VIDEO TRANSCODING[2,5]

Number of channels	Up to eight (from the same input TS)[1]

Video Inputs

MPEG-4 AVC SD	MP @ L3
MPEG-4 AVC HD	MP @ L4.0/HP @ 4.0
SD Resolutions and Frame Rates	480i @ 29.97 fps 480p @ 59.94 fps 576i @ 25 fps Vertical: 720/704/544/528
HD Resolutions and Frame Rates	720p: 1280 x 960 @ 59.94, 50, 60 fps 1080i: 1920 x 1440 @ 29.97, 30, 25 fps

Video Outputs

MPEG-2 SD	4:2:0 MP@ML
MPEG-2 HD	4:2:0 MP@HL
MPEG-4 AVC	MP@L3
MPEG-4 AVC HD	MP@4.0/HP@4.0

Output Resolution Conversion
(HD->HD, HD->SD, SD->SD)

MPEG-2 SD	2-15 Mbps
MPEG-4 AVC SD	1-15 Mbps
MPEG-2 HD	6-18 Mbps
MPEG-4 AVC HD	3-18 Mbps

Any to any	
VBI pass-through	
Audio pass-through	

CONTROL AND MONITORING

Web browser interface
Ethernet – RJ45 10/100BaseT control interface
Front panel keypad and LCD
SNMP traps and alarms
Telnet
Terminal via RS-232 or RS-485
Presets

PHYSICAL

Dimensions (H x W x D)	1.75 in x 19 in x 15.5 in (1 RU) 4.4 cm x 48.3 cm x 39.37 cm
Weight	11 lbs / 5 kg
Power Voltage	100 V-240 V AC, 50/60 Hz
Power Consumption	Up to 100 W max

ENVIRONMENTAL

Operating Temperature	0-50° C
Operating Humidity	5-90% (non-condensing)
Storage and Transportation Temperature	-40° C - 70° C
Storage and Transportation Humidity	0-95% (non-condensing)

COMPLIANCE

EMC	EN61000-3-2;-3 EN55022 (CISPR 22) EN55024 (CISPR 24) FCC part 15 (class A)
Safety	EN60950 CB (IEC60950) UL60950 ROHS Directive 2002/95/EC

Notes:

1. Licensed feature
2. Hardware option
3. Requires optional 4:2:0 and 4:2:2 decoding boards
4. Requires optional video decoding board
5. Requires optional video transcoding board
6. Supported only with the new DVB-S/S2/S2X board, PN: HW-PVR-7100-S2X-B-0004

*Contact sales

**Check availability

RD9000

MULTI-FORMAT PROFESSIONAL DECODER

The Harmonic RD9000 multi-format professional decoder enables rapid, reliable deployment of eye-catching UHD content for contribution and primary distribution applications.

With a significant increase in UHD TV sets hitting the market, content providers and broadcasters are looking for a solution to address the needs of early adopters. Compact and reliable, the RD9000 real-time professional decoder is the answer. Designed to ensure high performance, the RD9000 delivers pristine UHD for an immersive, high-resolution experience.

Innovative Technology
RD9000 is software-based multi-format (H.265) professional decoder that is perfect for contribution and primary distribution applications. The platform's software architecture provides content providers and broadcasters with maximum flexibility, which is paramount in today's market.

Contribution encoding is the critical step to achieve a superior end-user experience. With its wide range of encoding tools, HEVC offers incredible compression efficiency, making live UHD delivery achievable for satellite, cable, terrestrial and fiber networks.

Single-slice UHD HEVC technology is a cornerstone of the RD9000, eliminating border compression artifacts and maximizing compression efficiency. This technology is essential to achieving superior video quality in premium contribution applications. In addition, the RD9000 supports HDR (High Dynamic Range) along with WCG (Wide Color Gamut) to ensure drastic contrast and color rendering for "wow" video experience.

Combined with Harmonic's ViBE CP9000 HD/UHD contribution encoder, the RD9000 multi-format professional decoder offers users a pristine UHD contribution solution.

Versatile and Future-Proof
RD9000 software-based decoder featuring any-format and any-codec is the reference decoder for any contribution and primary distribution use case.

Supporting HDR and WCG via a flexible, software-based design, the RD9000 is future-proof .

RD9000 already supports SMPTE-2110 or SMPTE 2022-6 uncompressed video over IP outputs. Additionally, the RD9000 decoder supports DVB/SMPTE standards and is interoperable with professional encoders.

World-Class Service and Support
Harmonic stands behind the RD9000 professional decoder 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 our customers can deliver outstanding "anytime, anywhere, any-device" video experiences.

HIGHLIGHTS

- Up to 4 x HD or 1 x UHD decoding
- Single/multi slice UHD decoder
- Multi-format MPEG-2/H.264/HEVC 4:2:0/4:2:2 8/10 bit

- Two versions up to 80Mbps or up to 160Mbps
- Compact and low-power appliance
- SDR, HDR and WCG BT.2020
- HDMI, 4x3G-SDI or 12G-SDI outputs

- SMPTE 2110 Video over IP outputs
- Down & up-conversion
- Up to 4 x HD or 1 x UHD decoding
- Dual AC PSU

RD9000

MULTI-FORMAT PROFESSIONAL DECODER

harmonic

RD9000 rear panel - 12G-SDI, HMDI & 4x3G-SDI outputs

RD9000 rear panel - 4x3G-SDI & SMPTE 2110 outputs

SPECIFICATIONS

INPUT/OUTPUT

DVB-S2/S2X	4 x RF input L-Band: 950MHz to 2150MHz QPSK, 8PSK, 16APSK, 32APSK
MPEG over ASI	Up to 4 x ASI inputs
MPEG over IP input	RJ-45 10/100/1000 UDP or RTP SRT input Zixi input CBR or Null-stripped TS RTP & SMPTE-2022/Cop3 FEC Unicast / Multicast IGMP V1/V2/V3 Hitless redundancy SMPTE 2022-7
De-scrambling	BISS 1 mode &, E BISS 2 mode 1, E, CA[1]
Outputs	4 x 3G-SDI output & Genlock 12G-SDI & HDMI 2.0 & Genlock 2 x 10G for HD Video over IP SMPTE 2110 2 x 25G for HD/UHD Video over IP SMPTE 2110

VIDEO PROCESSING

Performances	Two models: RD9020: UHD up to 80Mbps RD9080: UHD up to 160Mbps
Nb of services	1 x UHD or up to 4 x SD/HD
Codec	HEVC / H.265 MPEG-4 / AVC / H.264 MPEG-2
Decoding Profiles	HEVC: Main10 422 Level 5.1 AVC/H.264: Up to Hi422@L4.2 MPEG-2: up to 422@HL
Chroma sampling	4:2:0, 4:2:2
Bit Depth	8, 10-bit
Resolution	3840x2160p (UHD) 1920x1080p 1920x1080i 1280x720p 720x576i 720x480i
Frame Rates	60, 59.94, 50, 30, 29.97, 25, 24, 23.97
Down-up conversion	Any format / frame rate above
HDR	HDR10, PQ10, HLG
Wide Color Gamut	BT.709, BT.2020
Ancillary	Closed Caption EIA-608, EIA08 Teletext OP-47, Transparent SMPTE-2038

PHYSICAL

Dimensions (H x W x D)	1.7 x 17.2 x 16.9 in (1 RU) 4.3 x 43.7 x 42.9 cm (1 RU)
Weight	26.7 lbs / 12kg
Power Consumption	190 W
Input Voltage	100-240 VAC
Cooling	Front to rear airflow
Features	Dual AC PSU

ENVIRONMENTAL

Operating Temperature	41° to 104° F 5° to 40° C
Storage Temperature	23° to 113° F -10° to 70° C
Maximum Humidity	90%
Electromagnetic Compliance	CE marked in accordance with the 93/68/EEC (22/07/93) directive EN 55022 EN 55024 EN 61000-3-2
Safety	IEC 60950 and EN 60950 UL 60950

AUDIO PROCESSING

Performances	Up to 8 audio services per video
Audio codecs	MPEG1 Layer 2 AAC-LC, HE-AAC V1, HE-AAC V2 Dolby® Digital (AC-3, E-AC-3)

Decoding Formats and bitrates	
MPEG-1 Layer II 2.0	64-256 kbps
AC-3 2.0	128-448 kbps
AC-3 5.1	384-640 kbps
DD+ (E-AC-3) 5.1	192-448 kbps
AAC-LC/HE-AAC 2.0	32-160 kbps
AAC-LC/HE-AAC 5.1	96-448 kbps

Output format	Linear PCM Pass-through
Embedded audio	Up to 8 audios per video

CONTROL AND MONITORING

WEB-browser User interface

Restful API and SNMP for NMX integration

Firmware update via WEB User Interface

RJ-45 Ethernet 10/100/1000

Note 1: check for availability
Note 2: Front panel not available

ORDERING INFORMATION

HARDWARE ELEMENTS

Part Number	Description
RD9020-1U-2AC-SRV	Decoder Up to 4xHD or 1xUHD AVC/HEVC, 4:2:0/4:2:2, up to 80Mbps
RD9080-1U-2AC-SRV	Decoder Up to 4xHD or 1xUHD AVC/HEVC, 4:2:0/4:2:2, up to 160Mbps
RD9x00-HW-SDI	4 x 3G-SDI output & ASI input card
RD9X00-HW-DVBS2X	DVB-S2X card with 4 x RF input
RD9x00-12GHDMI	1 x 12G-SDI & HDMI 2.0 output card
RD9x00-SMPTE	HD over SMPTE 2110 output card, 2x10Gbps
RD9x00-SMPTE-UHD	HD/UHD over SMPTE 2110 output card, 2x25Gbps

harmonicinc.com

ProView™ 8100

COMMERCIAL INTEGRATED RECEIVER-DECODER

The first member of the all-new Harmonic ProView™ 8000 family of integrated receiver-decoders, the ProView 8100 single-channel commercial decoder and descrambler is a compact, fully featured unit for general-purpose primary distribution applications.

With the ProView 8100, migrating to an all-IP headend and powering the launch of value-added services has never been easier. Users can receive DVB-S/S2, IP or ASI signals, decode SD and HD MPEG-2 and MPEG-4 AVC transport streams to baseband, descramble encrypted programs, and output content to analog or digital. Reception of broadcast-quality video over the Internet is also supported. Harmonic's superior video quality and low latency ensure the timely distribution of content at resolutions up to 1080p50/60.

Workflow efficiency is a key trait of the ProView 8100. The unit provides simultaneous HD-SDI and SD-SDI output with high-quality HD-to-SD down-conversion, allowing operators to use the same device to feed both the HD and SD production chains.

The 1-RU ProView 8100 supports a rich set of interfaces, including two independent RF ports, DVB-ASI and IP inputs and outputs, and 3G HD-SDI and HDMI outputs. This I/O flexibility allows the unit to integrate with any headend architecture and enables support for advanced content delivery redundancy schemes, such as primary satellite and backup IP network feeds. In addition to live broadcasting, the ProView 8100 supports extraction of encapsulated video content as Multiprotocol Encapsulation (MPE) data for offline distribution — a particularly valuable feature for distribution of syndicated content to network affiliates.

Simple front-panel controls on the ProView 8100 and an intuitive web-based interface let users quickly set all system parameters and store presets for fast recall. Integration with the Harmonic DMS™ video distribution management system allows users to deploy and manage a large pool of widely distributed ProView devices from a single interface, resulting in a highly flexible, cost-effective primary distribution solution.

Business Benefits

Lower CAPEX
The ProView 8100 receiver-decoder brings advanced features more often seen in high-end professional contribution IRD designs to the general-purpose distribution market. Integrating multi-format decoding and multi-program descrambling capabilities, the unit streamlines system architectures at an attractive price, making it an ideal choice for CAPEX investment.

HIGHLIGHTS

- Single-channel SD/HD MPEG-2/MPEG-4 AVC decoding and descrambling
- DVB-S/S2, DVB-ASI and IP inputs
- Two independent RF ports
- Reception of broadcast-quality video over the Internet

- Simultaneous HD-SDI and SD-SDI output
- High-quality HD-to-SD down-conversion
- 3G HD-SDI output supports 1080p60 workflows
- ASI, IP, HDMI and analog video outputs

- 4:2:0 subsampling
- Integrated BISS and Verimatrix® support, dual DVB-CI slots
- Front-panel controls and intuitive, web-based GUI
- Compatible with Harmonic DMS video distribution management system

Reduced OPEX
Housing a multi-format decoder and descrambler in a 1-RU chassis, the ProView 8100 is perfectly suited for operators mindful of their energy costs and rack space.

Business Continuity
The trend towards HD and MPEG-4 AVC content distribution creates business continuity issues with legacy receivers. The ProView 8100 can be repurposed via firmware upgrades for different uses and new applications, such as migration from SD MPEG-2 to HD AVC.

Expanding Channel Lineups
Integrating DVB-S/S2 demodulation and the ability to stream descrambled content over IP, the ProView 8100 enables operators to quickly and cost-effectively launch new services by leveraging their existing IP or legacy ASI infrastructure.

Workflow Flexibility
The general-purpose design of the ProView 8100 allows the unit to be used in a wide range of solutions, including basic monitoring up to and including end-point delivery in distribution networks.

Distribution over the Internet
With support for the reception of broadcast-quality video over the Internet, ProView 8100 alleviates a dependence on satellite and fiber transport, dramatically altering the economics of video distribution.

Technical Benefits

Expanded Input Options
Able to simultaneously receive SD and HD MPEG-2 and MPEG-4 AVC content over DVB-S/S2, ASI and IP, the ProView 8100 allows operators to maximize flexibility and optimize redundancy schemes.

Output Format Freedom
The ProView 8100 offers a range of output options, including ASI and IP transport stream, MPE data, 3G HD-SDI, SD-SDI, HDMI, two AES balanced analog audio outputs, two AES digital audio outputs (unbalanced BNC) and genlock.

Friendly System Management
Control options on the ProView 8100 include an easy-to-use front panel with back-lit LCD status display and LED indicators, and an intuitive, web-based GUI. Large ProView 8100 populations can be remotely controlled with Harmonic's DMS video distribution management system.
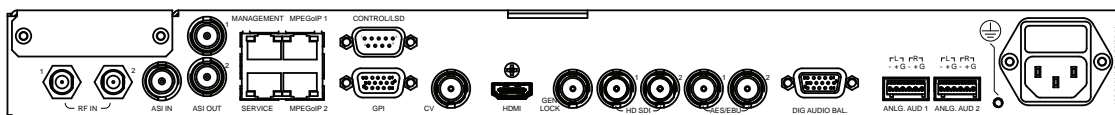
Peace of Mind
To assure the security of content, ProView 8100 offers integrated BISS and Verimatrix descrambling, as well as two CAM slots for use of your preferred DVB-CI vendor.

Configurations
Two ProView 8100 configurations are available to meet a variety of customer applications and price points.
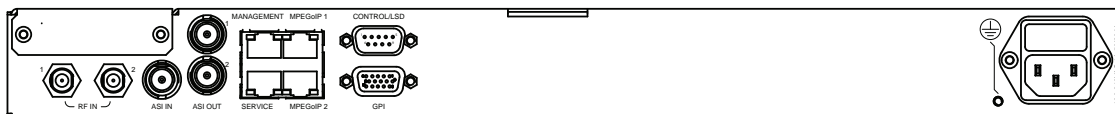
ProView 8105 Descrambler
ASI, IP and MPE data outputs

ProView 8130 Descrambler and Analog/Digital Decoder
ASI, IP, MPE data, composite video, SDI, HDMI, genlock, two balanced analog and two balanced digital audio outputs

SPECIFICATIONS

TRANSPORT STREAM INPUT INTERFACES

DVB-S/S2

RF Ports	Two
Inputs	Single Service
Constellation	DVB-S: QPSK
	DVB-S2: QPSK, 8PSK
Symbol Rate	1-45 Msym/s
Input Level	-65 to -25 dBm
Throughput Range	Up to 108 Mbps
Tuning Step Size	125 kHz
FEC	All ratios compliant with standard
FEC Blocks	Normal
Roll-Off	0.2, 0.25, 0.35 and 0.05
Modes	CCM, VCM
Pilots	On & off

DVB-ASI

Connectors	One BNC, 75 Ω
Packet Length	188 or 204 byte packets
TS Max Input Bitrate	160 Mbps

MPEG over IP[1]

Connectors	Two 100/1000 Base-T RJ45 for redundancy
Sockets	Two
	SPTS/MPTS
Encapsulation Protocols	MPEG-2 TS over UDP, IPv4
	Multicast/Unicast
	SMPTE 2022-1/2
FEC[1]	SMPTE-2022 FEC
	Deep Packet Recovery (DPR) for public Internet delivery (optional)[1]

TRANSPORT STREAM OUTPUT INTERFACES

ASI

Outputs	Single TS
Connectors	Two BNC, 75 Ω
Packet Length	188
TS Max Output Bitrate	160 Mbps

IP

Ports	Two, mirrored
Connector	RJ45, 100/1000 Base-T
Sockets	Two
Maximum Socket Bitrate	120 Mbps
MPEG over IP Encapsulation	Pro-MPEG CoP3
	Multicast
IP Address Type	SPTS/MPTS
TS Type	

PROCESSING/REMULTIPLEXING

Stream and service level remultiplexing with service/unreferenced PID remultiplexing

Service filtering and remapping

ES PID remapping

Unreferenced PID filtering and remapping

High-accuracy PCR restamping

PSI/SI processing and regeneration

CA signaling removed when descrambling

DESCRAMBLING

Embedded Descrambling	BISS, Verimatrix
DVB-CI Interface	Two independent CI slots, EN-50221
CA Methods	Multicrypt, Simulcrypt
Supported CAMs	Aston® Multi™ for Conax™, Irdeto™ and Viaccess-Orca™
	Aston Multi for BISS™
	Aston Duo for Conax, Irdeto and Viaccess-Orca
	SmarDTV® EuroCAM for Irdeto
	SmarDTV WorldCAM™ for Nagra™ (Mediaguard and Aladdin)®
	SCM® Viaccess-Orca
	SMIT® Professional 4/6/8 programs: Irdeto, Viaccess-Orca, Conax, Cryptoworks, NDS™ and Verimatrix
	Phillips® Cryptoworks™
	Rosscrypt® CAMs and encryption
	Neotion® Viaccess-Orca
	DreCrypt® CAMs and encryption
Multi-Channel Descrambling[1]	Variable, depending on the CAM (e.g., Aston Professional enables descrambling of up to 12 services and up to 24 PIDs)

VIDEO DECODING

Number of Channels	One

Decoding Formats

MPEG-2 SD 4:2:0	MP@ML
MPEG-2 HD 4:2:01	MP@HL
MPEG-4 AVC SD	MP@L3
MPEG-4 AVC HD1	MP@L4.0, HP@4.0

Maximum Video Rate

MPEG-2 SD	15 Mbps
MPEG-2 HD	50 Mbps
MPEG-4 AVC SD	10 Mbps
MPEG-4 AVC HD	20 Mbps (MP), 25 Mbps (HP)
Video Formats	1080i @ 29.97, 30, 25 fps
	720p @ 59.94, 50, 60 fps
	480i @ 29.97 fps
	576i @ 25 fps
	480p @ 59.94 fps
Analog Video Output	PAL-B/G/I/M/N/D
	NTSC
	SECAM

VIDEO PROCESSING

HD video down-converted to SD with aspect ratio conversion

Aspect ratio conversion: 16:9 to 4:3

Simultaneous HD-SDI and SD-SDI output[1]

VBI reinsertion in composite video and embedded in SDI

CC CEA 608/708 re-insertion in composite video and SDI VANC

SPECIFICATIONS

AUDIO DECODING

Audio PID Decoding	Two audio PIDs
Decoding Formats	Stereo down-mix MPEG-1 Layer II (Musicam) Dolby® Digital (AC-3)/Dolby Digital Plus (E-AC-3) stereo decode AC-3/E-AC-3 5.1 decode[1] AC-3/E-AC-3 5.1 down-mix, passthrough AAAC/HE-AAC, LC stereo decode[1] AAC/HE-AAC, LC 5.1 decode, down-mix, passthrough[1]

VIDEO AND AUDIO INTERFACES

Video Input	Frame sync1: SD/HD, digital/analog
Video Output	One composite (PAL/NTSC) Two 3G HD-SDI with embedded audio; each can be SD-SDI or HD-SDI HDMI
Audio Output	Two analog audio terminal blocks, 600 Ω
	Two digital audio (AES/EBU-S/P-DIF), embedded SDI Two digital audio, balanced, 15-pin D-connector

CONTROL AND MONITORING

HTTP browser interface

Ethernet: RJ45 10/100BaseT control interface

Front-panel keypad and LCD

SNMP traps and alarms

XML interface for control and monitoring

Harmonic DMS video distribution management system

Control

GPI

PHYSICAL

Dimensions (H x W x D)	1.75 in x 19 in x 15.5 in (1 RU) 4.4 cm x 48.3 cm x 39.37 cm
Weight	11 lbs / 5 kg
Power Voltage	100 V-240 V AC, 50/60 Hz
Power Consumption	Up to 100 W max

ENVIRONMENTAL

Operating Temperature	0-50° C
Operating Humidity	5-90% (non-condensing)

Storage and
    Transportation
    Temperature
	-40° C - 70° C

Storage and
    Transportation
    Humidity
	0-95% (non-condensing)

COMPLIANCE

EMC	EN61000-3-2;-3 EN55022 (CISPR 22) EN55024 (CISPR 24) FCC part 15 (class A)
Safety	EN60950 CB (IEC60950) UL60950 ROHS Directive 2002/95/EC

Notes:

1. Licensed feature