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Broadcast &
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A DIVISION OF WESCO DISTRIBUTION, INC

Data Sheet
PowerVu Professional Receiver (D9800)

Product Overview

The Synamedia® PowerVu Professional Receiver is the most versatile receiver designed offering hardware configurability and Over The Air (OTA) licensing that allows content providers to customize the product to support the gamut of their applications. Designed to support High-Efficiency Video Coding (HEVC) and Ultrahigh-Definition (UHD) delivery over satellite and IP terrestrial content distribution networks requiring Digital Video Broadcasting - Satellite (DVB-S), Digital Video Broadcasting - Satellite - Second Generation (DVB-S2), and IP reception capabilities, futureproofing the next network expansion. The D9800 chassis is available in a single stream variant for decoding to baseband digital or analog video and multi-stream variant for bulk decryption and high-density transcoding applications.

The single stream variant focuses on single service video decode applications. The integrated video decoder can decode an MPEG-2, Advanced Video Coding (AVC), or HEVC video-encoded service and output the Serial Digital Interface (SDI) or composite uncompressed video. The D9800 is capable of outputting simultaneous High- Definition (HD) and down-converted Standard Definition (SD).

The multi-stream chassis is targeted towards applications that require decryption and/or transcoding on multiple video services within a transport stream or multiple transport streams. The optional satellite front end has four demodulators for sourcing content across transponders belonging to the same programmer. The multi-stream chassis can decrypt up to 32 PowerVu services and transcode up to 16 services of AVC to MPEG-2 making it ideal for content providers carrying a high number of channels. The optional high density HEVC card adds the ability to transcode from an HEVC encoded source.

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For content providers exploring migration from satellite distribution to IP, the POWERVU PROFESSIONAL RECEIVER offers several options that enable content providers a path to a graceful migration. MPEGoIP is available for leased line fixed bandwidth applications as well as Adaptive Bit Rate (ABR) and Zixi for transmission over the Content Delivery Networks (CDN). For these use cases, the outputs of the receiver remain transparent so any output application can be served with these new input sources.

Synamedia PowerVu Professional Receiver

Features and Benefits

Digital Program Distribution

The Synamedia PowerVu Professional Receiver offers Asynchronous Serial Interface (ASI) transport output and MPEGoIP output (HW option). These outputs provide a decrypted program for digital distribution when a codec or bitrate change is not needed. This capability provides the original compressed video programs on the outputs.

Digital Program Mapping

Digital program mapping allows programmers to "transparently" substitute programs at the uplink. It maintains predictable and compliant transport output during service replacement, Network Information Table (NIT) retuning, and channel changes, including forced tuning. This feature remaps the Packet Identifier (PID) information from the primary service to an alternate service, allowing downstream devices to continue to operate without headend operator intervention. This helps ensure availability of alternate programming in the digital tier.

Digital Advertisement Insertion

Digital Program Insertion (DPI) information is available along with the video and audio PIDs for external advertisement insertion in compressed digital format.

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Digital Baseband Outputs

The single stream Synamedia PowerVu Professional Receiver is capable of decoding MPEG-2, AVC (if licensed), and HEVC (if licensed) compressed video content and outputting SDI baseband digital video. The decoder will decode any input resolution compliant with the codec standard that is licensed to decode. The SDI and composite outputs will automatically downscale based on the output resolution that the unit is licensed for up to 1080p60. Two SDI ports can be configured mirrored for redundancy or one native and one down-converted from the same input source

Digital Transport Stream Outputs

The multi-stream Synamedia PowerVu Professional Receiver is capable receiving up to 400 Mbps input aggregately and can transcode up to 16 video services. The aggregate output bit rate is 800 Mbps in order to accommodate more than one application per video service. For example, content providers can use the PowerVu Professional Receiver to decrypt 16 services and output the native and transcoded service for each of the input services on one aggregated TS output via MPEGoIP. The full functional multiplex allows for almost limitless applications of services on the digital transport outputs for ASI and MPEGoIP.

Common Features

- Four independent RF inputs with licensable independent tuner/demodulators
- Forward Error Correction (FEC) based on SMPTE 2022 for MPEGoIP input and output
- DVB-S Quaternary Phase Shift Keying (QPSK) demodulation
- Licensable DVB-S2 QPSK and eight-phase shift keying (8PSK)
- Synamedia PowerVu® conditional access with Data Encryption Standard (DES) or DVB descrambling
- Optional DVB-CI support for CAM-based conditional access
- Aspect ratio conversion (4:3, 16:9, 14:9) with Active Format Descriptor (AFD) control for SD programs
- AFD support for down-conversion of HD programs with aspect ratio conversion
- Fingerprint-triggered output to identify piracy sources
- Field-upgradeable software
- Simple Network Management Protocol (SNMP) for setup, control, and monitoring
- Front panel Liquid Crystal Display (LCD) for control and monitoring
- Web browser interface for easy setup, control, and monitoring
- Digital program mapping providing uplink control for service replacements in blackout areas
- Synamedia Live Event Controller support
- Satellite disaster recovery support with Synamedia PowerVu Network Center uplink control (V12.5 or later)
- Onscreen display support on transcoded or baseband output
- Ancillary data support: ST2010, ST2016, ST2031, ST334, OP-47, ST2038

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Single Stream Decoding Specific Features

- User-configurable redundant ASI, SDI, or HD-SDI outputs
- SDI, HD-SDI, or 3G-SDI video output with embedded audio
- 4:2:0 10-bit HEVC decoding up to UHD resolutions
- 4:2:0 AVC decoding up to 1080p60
- 4:2:0 MPEG-2 decoding up to 1080p60
- New H/W with up to 180 Mbps throughput/bandwidth
- MPEGoIP input with redundancy (1 MPTS or 1 SPTS)
- MPEGoIP output with redundancy (1 MPTS or 16 SPTS)
- Closed captioning support for EIA-608 and EIA-708
- MPEG and Dolby Digital audio decoding
- DVB or Imitext subtitling
- Four or eight audio outputs providing either two or four stereo pairs of balanced audio, each with the ability to use part of the output for applications such as Second Audio Program (SAP), cue tones, and so on
- Dolby-E passthrough support
- Uplink-addressable decoder output control, including Vertical Blanking Interval (VBI) data, audio routing, DPI, and ASI output
- DVB-VBI and SCTE-127 support
- Dual-Tone Multi-Frequency (DTMF) cue tone and cue trigger outputs for advertisement insertion
- HDMI monitoring port (controllable over PNC)

Multi-Stream Specific Features

- Optional 8 or 16 channels of AVC to MPEG-2 transcoding
- HEVC to MPEG-2 transcoding supported in specific HW configurations
- 400 Mbps aggregate input and 800 Mbps aggregate output for using content sources for multiple purposes
- Decrypt up to 32 services of PVu content
- User defined TS multiplex on physical output ports (IP or ASI)
- MPEGoIP interface standard
- Select services across transponders with 4 tuners (Only allowed for transponders from the same programmer)
- NEW: Ability to order the D9800-MS with a decoder card (SDI, Analog, HDMI out) as model D9800-MS-MPEGOIP-D. For specs, see D9800-SS decode specs.

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Product Specifications

	Synamedia PowerVu Professional Receiver General Product Specification
System	
Video Standards	• MPEG-2, MPEG-4 (H.264), HEVC (H.265) and DVB compatible EN 300 421, EN 300 468
Tuner RF inputs	
Number of RF inputs	• 4 (default 1 active at a time, or can be licensed as individual tuners)
Input level	• –25 to –65 dBm per carrier
Frequency range	• 950 to 2150 MHz

Symbol rate range	• DVB-S:
	  ◦ 1.0 to 45MS/s
	• DVB-S2:
	  ◦ 1.0 to 45 MS/s

RF Demodulation	• DVB-S QPSK, DVB-S2 QPSK, 8PSK, 16/32APSK, DVB-S2x (with GEN2 Tuner)
Input return loss	• ≥ 18 dB (950–2150 MHz)
Port-to-port isolation	• ≥ 55 dB (58 dB typical) (950–2150 MHz)
Input impedance	• 75 ohm
ASI Input	
	• EN50083-9, DVB-ASI coaxial, 188/204-byte packets
IP Ports	**(Single stream optional, Multi-stream standard)**
Physical	• RJ-45
Ethernet	• 100BASE-T Ethernet and 1000BASE-T Ethernet (2 optional ports for SS, 4 standard ports for MS)
In/Output Modes	• UDP, RTP, FEC (SMPTE2022) ◦ Zixi Input supported (1 stream on D9800-SS, up to 4 streams on D9800-MS) Contact Synamedia for further bitrate details.
Rates	• Input: 400Mbps • Output: 800Mbps
MPE Data	• Up to 10 Mbps
Conditional Access	
Synamedia PowerVu conditional access	• DES/DVB scrambling • 56bit/AES128 bit decryption
DVB-CI	• 2 Common Interface slots: EN 50221 (Optional Module) • Multicrypt and Simulcrypt support • VideoGuard(VG) pairing, VG FingerPrinting, VG On Screen Messaging, VG Transport/Decode controls
Other	• BISS mode 1/E
Other Outputs	
Alarm Output	• 1 Programmable Relay output
Cue Tone Output	• Balanced Audio Output -3dBu +/- 3dB, 600Ohms, Impedance <50 Ohms
Cue Trigger Outputs	• 8 open collector outputs

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Monitoring and Management	
	• Fully documented open API allowing integration with third-party components • SNMP traps/mibs • Syslog • Easy control local web GUI
Device Specifications	
Environmental	• Operating Temperature: 0–50°C (32–122°F), • Storage Temperature: –20–70°C (–4–158°F)
Chassis Mechanical spec.	• Height: 1.72 in. (4.37 cm) 1RU high, 19 in. EIA rack mountable • Width: 17.35 in. (44.07 cm) • Depth: 20.25 in. (51.44 cm) • Weight: 15 lbs (6.8 kg) for single stream chassis, 22 lbs (10 kg) for multi-stream chassis (approx.).
Power	• Voltage Range: 100V to 240VAC • Line Frequency: 50/60Hz • Power Consumption: 70W typical for single stream chassis, 82W typical for multi-stream chassis (without LNB) • LNB Sat input Power: +13V or +18V at 400 mA max. RF input 1 only.

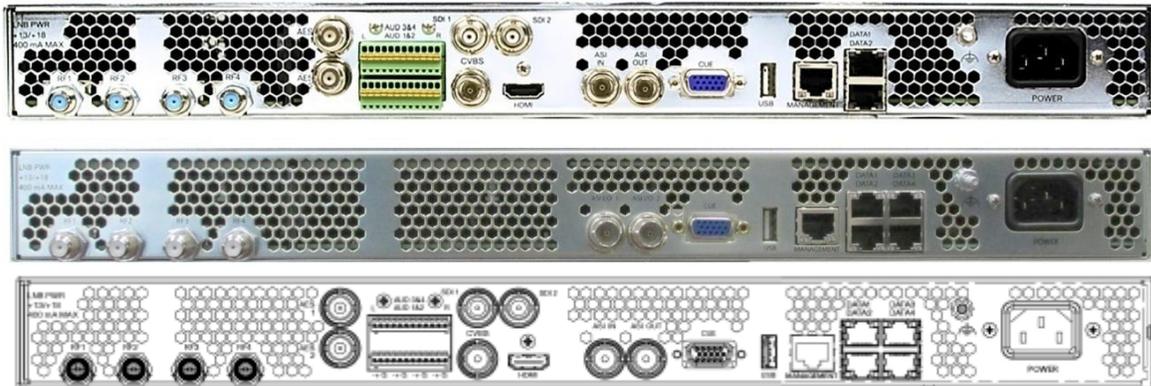| Single Stream and Decoder Card Specific Product Specifications	
Analog SD Video Output	
Number of channels	• 1
Video decompression type	• MPEG-2 4:2:0, MPEG-4 AVC 4:2:0, H.265 HEVC 4:2:0
Video standard	• NTSC and PAL B/G/I/D/M/N
Maximum video resolution	• 720x480 and 576 video output
Audio Outputs	
Number of channels	• 2 stereo pairs or 4 mono channels and 5.1 channel down-mix • 4 stereo pairs or 8 mono channels (with license)
Audio decompression	• MPEG, Dolby Digital (AC-3), HE-AAC, and Dolby Digital Plus • Dolby-E input support (SMPTE302) with SDI passthrough (SMPTE338)
Analog Output level	• Balanced output is adjustable at the front panel by ±6.0 dB (ref. 100 kilo ohms) and is factory calibrated to +18 dBu (at full scale). Recommended 600 ohm operation adjustment range is –6 dB to +4dB. +17 dBu (ref. 600 ohms) at full scale
Frequency response	• ±0.2 dB, 20 Hz to 20 kHz (ref. 100 kiloohms)
Total harmonic distortion	• < 0.02% at 1 kHz (ref. 100 kiloohms)
Dynamic range	• 85 dB (CCIR average response meter [ARM] weighting)
Crosstalk	• –115 dB at 1 kHz (typical)
Digital Video Outputs	**SDI is optional HW**
Number of Video Channels	• 1
SDI Output Ports	• 2 BNC ports • Either mirrored output or simultaneous 1 port SD and 1 port HD output
SDI Output type/format	• 3G-SDI, SMPTE-424M (license option) • HD-SDI, SMPTE-292M (license option) • SDI, SMPTE-259M
Embedded SDI audio	• 2 audio programs (license option for 4), PCM or pass-through

Digital HDMI output	• 2 digital audio outputs (license option for 4) (1 stereo channel each) • BNC, AES-3id (HW limited to 2), SMPTE 276M • HDMI 2.0a (no HDCP) with HLG HDR and 4k/UHD support (licensed)
Aspect Ratio	
Display aspect ratios	• 4:3, 16:9
Aspect ratio conversions for down-conversion	• 4:3: 16:9 letterbox, 14:9 letterbox, center cutout • 16:9: center cutout
Aspect ratio conversions for SD programs	• 4:3: 16:9 letterbox, 14:9 letterbox, center cutout, none • **16:9: Scale to 16:9**
VBI	
NTSC	• Lines 10 to 22, fields 1 and 2 • Line 21 closed captions • NABTS • AMOL I and II (Neilsen) • VITC • WSS • VITS
PAL	• Lines 7 to 22, fields 1 and 2 • WST • WSS • VPS • VITC • VITS

Multi-Stream and Transcoder Specific Product Specifications	
HD Video Tx Output	
Compression format	• MPEG-2 and MPEG-4 (optional)
Vertical resolutions	• Same as input
Horizontal resolutions	• 1080i:1920, 1080i:1440, 720p:1280, 720p:960
Output bitrate	• 10 Mbps to 25 Mbps
SD Video Tx Output	
Compression format	• MPEG-2 and MPEG-4 (optional)
Vertical resolutions	• Same as input
Horizontal resolutions	• 720/704/544/528
Output bitrate	• 2 Mbps to 15 Mbps
SD output aspect ratios	• 4:3, 16:9
Aspect ratio conversions	• Auto, auto AFD, 16:9 letterbox, 4:3 pillarbox, 14:9, 4:3 center cut, 16:9 scale
Decryption and Transcoding	
Transcode density	• Up to 16 AVC or up to 12 HEVC
Decrypt density	• Up to 32 services of PVu
Bit Rates	• Up to 400 Mbps aggregate input and 800 Mbps aggregate output (individual physical input limitations and decrypt limitations apply

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Figure 2 shows the rear view of the Synamedia PowerVu Professional Receiver single stream configuration (D9800-SS-MPEGOIP), multi-stream transcode setup (D9800-MS-MPEGOIP) and multi-stream with decoder card (D9800-MS-MPEGOIP-D)

Figure 2.   Synamedia PowerVu Professional Receiver rear panel

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Ordering Information

To place an order or download software, visit the Synamedia Ordering Portal Home Page.

Synamedia PowerVu Professional Receiver Single Stream Base HW Chassis	Part Number
1RU PowerVu Professional Receiver Base Chassis with ASI Input/Output	D9800-SS-BASIC
1RU PowerVu Professional Receiver Base Chassis with ASI and MPEGOIP Input/Output	D9800-SS-MPEGOIP
Synamedia PowerVu Professional Receiver Single Stream Base Decoder only Options	**Part Number**
PowerVu Professional Receiver Analog Video and Audio Output Decoder	D9800-ANALOG
Synamedia PowerVu Professional Receiver Common Hardware Options	**Part Number**
Four Port Satellite Input Card with optional DVB-S2x support	D9800-SAT-GEN2
DVB Common Interface Module for 2 CAMs	D9800-DVB-CI
PowerVu Professional Receiver Digital Video and Audio Output Decoder	D9800-3G-SDI
Synamedia PowerVu Professional Receiver Multi and Single Stream Software License Options	**Part Number**
AVC Video Decoding License (per chassis)	L-D9800-DEC-AVC
HEVC Video Decoding License (must have L-D9800-DEC-AVC) (per chassis)	L-D9800-DEC-HEVC
Standard HD (up to 720p, 1080i) Output License (must have D9800-3G-SDI HW) (per chassis)	L-D9800-VR-HD
Advanced HD (up to 1080p) Output License (must have D9800-3G-SDI HW and L-D9800-VR-HD) (per chassis)	L-D9800-VR-3G
PowerVu Professional Receiver 4k Video Output Enablement License for HDMI	L-D9800-VR-4K
Enable 3rd and 4th Audio License (must have D9800-3G-SDI HW) (per chassis)	L-D9800-AUD-ADV
Enables adaptive bit rate sources as an input (per chassis)	L-D9800-ABR2TS
Enables Zixi sources as an input (per chassis)	L-D9800-ZIXI
Bundle license for ABR2TS and Zixi (per chassis)	L-D9800-IPBUNDLE
Upgrade to DVB-S2 Demodulation License (must have D9800-SAT-GEN2 HW) (per chassis)	L-D9800-SAT-S2
Upgrade to DVB-S2x Demodulation License (must have D9800-SAT-GEN2 HW and DVB-S2 license) (per chassis)	L-D9800-SAT-S2x
PowerVu Professional Receiver S2-16/32APSK Demodulation Enablement License	L-D9800-SAT-APSK
Synamedia PowerVu Professional Receiver Multi-Stream Base HW Chassis	**Part Number**
1RU PowerVu Professional Receiver Base Chassis with ASI and MPEGOIP Input/Output	D9800-MS-MPEGOIP
1RU PowerVu Professional Receiver Base Chassis with ASI and MPEGOIP Input/Output and Analog/SDI decoder card	D9800-MS-MPEGOIP-D
Synamedia D9800 Multi-Stream only Transcoder HW Options	**Part Number**
AVC to MPEG-2 8 Channel Transcode Card	D9800-TXB
HEVC Decoder Front End Card (for HEVC input transcoding)	D9800-HEVC-DEC
Synamedia PowerVu Professional Receiver Multi-Stream only Software License Options	**Part Number**
Add an extra Tuner/Demodulator License (must have D9800-SAT-GEN1 HW) (per tuner, 1 included)	L-D9800-SAT-DEMOD
Add an SD Output Transcoding Channel to a D9800-TXB	L-D9800-SD-TX
Add an HD Output Transcoding Channel to a D9800-TXB	L-D9800-HD-TX
Upgrade an SD to an HD Transcoding Channel to a D9800-TXB	L-D9800-HD-UPGR-TX

Add AVC output per channel to a D9800-TXB	L-D9800-AVC-TX
D9800 HEVC Transcoding License for Multistream	L-D9800-HEVC-CH
PVu Bulk Decryption License (up to 32 services decrypt exceed transcoding channels) (per chassis)	L-D9800-PVU-DCRYPT
DVB Bulk Decryption License (up to 32 services or limited by CAM) (per chassis)	L-D9800-DVB-DCRYPT
Enables an additional 6 IP input sources (2 standard)	L-D9800-IP-TS-6PK
Enables an additional 30 IP input sources (2 standard)	L-D9800-IP-TS-30PK

Ordering Information: Country-Specific Powercords	
Power Cord Description	**Part Number**
North American Power Cord (US, IEC, 10AMP, 2.5m)	CAB-PWR-DMN-US
Japan Power Cord	CAB-PWR-DMN-JPN
China Power Cord (IEC)	CAB-PWR-DMN-CHN
Australia Power Cord	CAB-PWR-DMN-AUS
Italy Power Cord	CAB-PWR-DMN-IT
European Power Cord (EU)	CAB-PWR-DMN-EU
Brazil Power Cord	CAB-PWR-DMN-BRA
India Power Cord	CAB-PWR-DMN-IND
Argentina Power Cord	CAB-PWR-DMN-ARG
UK Power Cord (IEC, 10AMP, 2.5m)	CAB-PWR-DMN-UK

Warranty Information

Find warranty information on PowerVu Professional Receiver solution page on Synamedia.com.

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