

Cisco D9036 Modular Encoding Platform

Product Overview

The Cisco® D9036 Modular Encoding Platform provides multi-resolution, multi-format encoding for applications requiring high levels of video quality. The modular platform is scalable to support as many as eight Standard Definition (SD), four High Definition (HD), or other combinations of video encoders within a single rack unit, while providing excellent broadcast quality video and consuming as little as 40 Watts per service.

Figure 1. Cisco D9036 Modular Encoder



Chassis Overview

The D9036 chassis features dual redundant, hot-swappable power supplies and capacity for up to six modules. The chassis supports advanced common synchronization mechanisms, such as black burst, that can be used to synchronize the various services being hosted. The D9036 includes general purpose inputs and outputs (GPIOs), which can be used to signal alarms and trigger digital program insertion (DPI) signals. Dedicated management and auxiliary input ports are also provided for remote Web GUI control and statistical multiplexing traffic. All modules are field-replaceable and hot-swappable to allow for fast service with minimum down time.

Modular Video Input (MVI)

The MVI module provides an SDI input to the chassis. SDI inputs are both SDI and HD-SDI compatible. The module supports VBI and HANC extraction, and processing for ancillary services and audio de-embedding. Video and audio data are routed from the SDI inputs of the MVI module through the D9036 encoder to MVC video and MMA audio modules. The module is available in two variants, providing either four or eight inputs.

Modular Video Codec (MVC)

The MVC module provides video encoding in the D9036 platform. Each module is capable of encoding up to two HD services or four SD services in either AVC or MPEG-2 format. These functions are provided on common hardware with license control, making resolution or encoding format changes in the field as easy as loading a license file. Video encoding capabilities include support for 50 Hz and 60 Hz content with a variety of horizontal resolutions. In addition to 576-line and 480-line SD resolutions, the module is capable of HD 1080i and 720p. Future support is planned for 1080p.

Modular Multichannel Audio (MMA)

The MMA module provides audio encoding services. The module is capable of decoding up to eight Dolby® E signals, and will encode stereo channels or Dolby 5.1 surround channels. Licenses are used to enable various numbers and formats of audio encoding, allowing for easy field upgrade to new formats in the future. The module supports MPEG-1 LII, Dolby Digital, Dolby Digital Plus, and HE-AAC formats. HE-AAC includes support for AAC-LC, ADTS, and LOAS/LATM variants. The audio encoding capabilities can be shared across services in the D9036 encoder, providing flexible use of resources across SD and HD channels with different audio encoding requirements, all within the same chassis.

Modular Input/Output (MIO)

The MIO module provides advanced ASI and Ethernet input and output capabilities. It features two ASI ports, which can each be defined as an input or output, as well as four 100/1000 BASE-T electrical connections. Encoded services can be transmitted on one or more physical interfaces in a variety of different transport streams. The Ethernet connection supports multicast with IGMP and provides support for advanced redundant IP configurations.

Features

- 1080i and 720p support
- Deblocking and Motion Compensated Temporal Filtering (MCTF) support
- Closed Captioning support via SMPTE-334M
- HD-SDI embedded audio support
- Dual redundant, hot-swappable power supplies
- Dolby Digital, Dolby Digital Plus, and AAC audio pass-through support
- Dolby E pass-through support
- Dual ASI and Quad IP outputs (100/1000 BASE-T) in a 2+2 redundant configuration
- Multi-service streaming IP outputs
- Web-based GUI for device management
- DVB VBI, OP47 HD Teletext support
- AFD Signaling, manual or automatic

Options

- Closed-loop statistical multiplexing
- SCTE-35 support, triggered via GPI
- ROSA[®] and ROSA Video Services Manager (VSM) driver
- Dolby Digital, Dolby Digital Plus and AAC audio encoding, stereo or 5.1
- MPEG-1 LII stereo encoding
- Dolby E decoding

Specifications

Table 1. Product Specifications

Feature	Description
Video Input	
SDI input	SMPTE-292M, SMPTE-259M, SMPTE-296M, SMPTE-424M
Systems	1080i @ 29.97 Hz, 1080i @ 25 Hz, 720p @ 59.94 Hz, 720p @ 50 Hz, 625 @ 50 Hz, 525 @ 60 Hz
Impedance	75 ohms unbalanced
Input level	800 mVpp nominal
Return loss	≥ 15 dB, 5 to 1.485 GHz, ≥ 10 dB, 1.485 to 2.97 GHz
Connector	BNC
Bit rate	1.485 Gb/s ±10 ppm
Jitter acceptance	According to SMPTE RP-184
Aspect ratio	4:3, 16:9
AFD signaling	Manual setting or automated with SMPTE-2016
Audio	
Inputs	16 Digital AES3 per MMA module, 64 embedded channels (any group or pair), Dolby metadata input
Outputs	4 AES3 reference outputs per MMA module
Connector	Mini sub-D for AES3 and adapter for AES3id input/output, Dolby metadata
Number of channels	32 stereo or 8 5.1 multichannel + 8 stereo audios MPEG-1 LII, AAC, HE-AAC, Dolby Digital per MMA module Or up to 22 stereo or six 5.1 multichannel + six stereo audios Dolby Digital Plus per MMA module
Embedded Audio	
Format	SMPTE-299M, SMPTE-272M
Sample frequency	48 kHz (locked to video)
Resolution	20 bits
Video and Audio Processing	
Video	
Encoding	MPEG-4 Part 10 Main Profile @ L4 (3 to 20 Mb/s) MPEG-4 Part 10 High Profile @ L4 (3 to 25 Mb/s) MPEG-4 Part 10 Main Profile @ L3 (0.5 to 10 Mb/s) MPEG-4 Part 10 High Profile @ L3 (0.5 to 12.5 Mb/s) MPEG-2 Main Profile @ Main Level (1 to 15 Mb/s) MPEG-2 Main Profile @ High Level (5 to 60 Mb/s)
Chroma format	4:2:0
Modes	Capped VBR
Inverse telecine	3:2 pulldown inversion

Feature	Description
H resolutions	1080i: 1920, 1440, 1280, 960 @ 50/60 Hz 720p: 1280, 960, 640 @ 50/60 Hz 576i: 720, 704, 640, 528, 480, 352 @ 25 Hz 480i: 720, 704, 640, 544, 528, 480 @ 29.97 Hz
V resolutions	1080i, 720p, 576i, 480i
Video and Audio Processing	
Video Pre-processing	
Video prefiltering	Deblocking, Motion Compensated Temporal Filtering (MCTF)
Audio	
Encoding	MPEG-1 Layer II Dolby Digital (AC-3) Dolby Digital Plus AAC/HE-AACv2 (ADTS and LOAS/LATM)
Pass-through	Dolby Digital (AC-3) Dolby Digital Plus AAC/HE-AAC Dolby E
Encoding rates, Layer II	32, 48, 56, 64, 80, 112, 128, 160, 192, 224, 256, 320, 384 kb/s
Encoding rates, Dolby Digital	56, 64, 80, 96, 112, 128, 160, 192, 224, 256, 320, 384, 448, 512, 576, 640 kb/s
Encoding rates, Dolby Digital Plus	56, 64, 80, 96, 112, 128, 160, 192, 224, 256, 320, 384, 448, 512, 576, 640 kb/s
Pass-through rates, Dolby Digital, Dolby Digital Plus	56, 64, 80, 112, 128, 160, 192, 224, 256, 320, 384, 448, 512, 576, 640 kb/s
Pass-through rates, AAC	14 to 320 kb/s
Pass-through rates and word lengths, Dolby E	1920 (@ 16-bit samples, 48 kHz sample rate) 2304 (@ 20-bit samples, 48 kHz sample rate)
Encoding rates, HE-AAC	Variable, 14 to 320 kb/s
Sample rates	32, 44.1, 48, 96 kHz (AAC only)
Layer II encoding modes	Dual Mono 1+1, Single Mono Left and/or Single Mono Right, Stereo 2/0, Joint Stereo
Dolby Digital encoding modes	Mono, Stereo 2/0, Dual Mono 1+1, 5.1 Multichannel
Dolby Digital Plus encoding modes	Mono, Stereo 2/0, Dual Mono 1+1, 5.1 Multichannel
AAC and AACv1 encoding modes	Dual Mono 1+1, Single Mono 1/0, Stereo 2/0, Joint Stereo 2/0, Mono 1/0 LR, 5.1 Multichannel
DPI	
Input	8 contact closure (GPI) triggers
Signaling	SCTE-35
VBI	
Closed captions	CEA-608/708 SMPTE-334M carriage (HD-SDI) Line 21 (SDI)
VBI formats	WST, DVB-WST, Inverted WST, WSS, VPS, Transparent lines, VII, OP47
Transport	
ASI	Dual DVB-ASI connections, mirrored or independent operation
ASI connector	BNC
ASI impedance	75 ohms
ASI return loss	≥ 17 dB, 27 to 270 MHz
ASI TS rate	1 to 120 Mb/s ±100 ppm
ASI TS packet length	188 bytes, 204 bytes, no RS
ASI bit rate	270 Mb/s

Feature	Description
ASI output level	800 mVpp nominal
IP TS	
Number of outputs	4 in a 2+2 redundant configuration
Type	Eight-pin RJ-45, MDI
Ethernet type	100/1000 Base-T
Format	UDP/IP, RTP/UDP/IP
IP address format	Multicast, unicast
TS streaming	Multiple SPTS/MPTS streams
ToS	Quality of service in streaming IP output
Closed Loop Statistical Multiplexing	
Statistical multiplex interface	IP-based statistical multiplexing via management, auxiliary interfaces
Environment/Physical	
Dimensions	1.25 in. H x 17.65 in. W x 21 in. D (3.2 cm H x 44.8 cm W x 53.3 cm D) 1U high, 19 in. rack mountable, stackable
Operating temperature	0 - 50°C (32 - 122°F)
Storage temperature range	-10 - 70°C (14 -158°F)
Weight	9.5 kg / 21 lbs.
Relative humidity	0 to 95%, non-condensing
Cooling	Forced cooling with air inlets on front panel, air exit at rear
Power Requirements	
Voltage range	90 to 264 VAC input
Line frequency	47 to 63 Hz
Consumption	≤ 400 W maximum, < 50 W per SD channel, < 75 W per HD channel

Figure 2. D9036 Encoder Rear Panel



With respect to each AVC/H.264 product, we are obligated to provide the following notice:

AVC VIDEO LICENSE

THIS PRODUCT IS LICENSED UNDER THE AVC PATENT PORTFOLIO LICENSE FOR THE PERSONAL AND NON-COMMERCIAL USE OF A CONSUMER TO (i) ENCODE VIDEO IN COMPLIANCE WITH THE AVC STANDARD ("AVC VIDEO") AND/OR (ii) DECODE AVC VIDEO THAT WAS ENCODED BY A CONSUMER ENGAGED IN A PERSONAL AND NON-COMMERCIAL ACTIVITY AND/OR WAS OBTAINED FROM A VIDEO PROVIDER LICENSED TO PROVIDE AVC VIDEO. NO LICENSE IS GRANTED OR SHALL BE IMPLIED FOR ANY OTHER USE. ADDITIONAL INFORMATION MAY BE OBTAINED FROM MPEG LA, L.L.C. SEE <http://www.mpegla.com>.

Accordingly, please be advised that service providers, content providers, and broadcasters are required to obtain a separate use license from MPEG LA prior to any use of AVC/H.264 encoders and/or decoders.



Cisco, Cisco Systems, the Cisco logo, the Cisco Systems logo, and ROSA are registered trademarks or trademarks of Cisco Systems, Inc. and/or its affiliates in the U.S. and certain other countries. Manufactured under license from Dolby laboratories. Dolby and the double-D symbol are trademarks of Dolby Laboratories. The DVB logo is a registered trademark of the DVB Digital Video Broadcasting Project. *All other trademarks mentioned in this document are the property of their respective owners.* Specifications and product availability are subject to change without notice. © 2010 Cisco Systems, Inc. All rights reserved.

1-800-722-2009 or 678-277-1000
www.cisco.com

Part Number 7018589 Rev A
June 2010