Cisco D9094SE HD/SD AVC Low Delay Contribution Encoder

Product Overview

The Cisco® D9094SE HD/SD Low Delay Contribution Encoder utilizes advanced MPEG-4 AVC encoding to perform real-time transmission of TV at low bit rates over DVB and broadband IP networks. With an optional built-in DVB-S/S2 modulator the Cisco D9094SE provides a very dense solution for DVB satellite applications.
The Cisco D9094SE supports transmission of HDTV as well as SDTV. Powerful error-correction functions help ensure high-quality of service over IP networks seeking to prevent the distortion of decoded images, even when network packet losses occur. With its compact size and rugged construction, the D9094SE helps reduce the cost of transmission from remote locations that demand HDTV image quality.

Figure 1. Cisco D9094SE HD/SD AVC Low Delay Contribution Encoder

Applications

Applying the H.264 High Profile at Level 4 image processing algorithms, the Cisco D9094SE provides high video quality for use in Electronic News Gathering (ENG) as well as broadcast contribution networks. By utilizing sophisticated H.264 compression algorithms, the streaming bit rate may be reduced by more than half compared to MPEG-2 encoding, while still achieving the same video quality. Encoder delay is selectable between standard and low-delay modes, allowing the Cisco D9094SE to be used in delay-sensitive ENG applications.

As a result, HDTV content can now be transmitted at lower bandwidths over existing DVB satellite or low-cost broadband IP networks.

The Cisco D9094SE utilizes auto-sensing 10BT/100BT/1G Ethernet for IP connectivity as well as optional DVB-S/S2 modulation or ASI I/O ports for connecting to DVB networks. The encoder also provides industry standard HD/SD-SDI and HDMI I/Os for connecting to HDTV camcorders and displays. Bidirectional voice intercom capability is provided across broadband networks for interactive communication between remote and studio locations.

Features – Software Version 4.3

- 4:2:0 High Definition MPEG-4 AVC encoding
  - HP @ L4 and MP @ L4, 1080i, 720p (59.94/50 Hz) and 60 Hz[1]

    Regular GOP based low-delay mode

    Low-delay mode: 300 ms @ ASI, 450 ms @ IP
- 4:2:0 Standard MPEG-4 AVC encoding
  - HP @ L3 and MP @ L3, 720 x 480i, 720 x 576i (59.94/50 Hz)

    Regular GOP based low-delay mode

    Low-delay mode: 300 ms @ ASI, 450 ms @ IP
- Secondary channel video encoder with up to SD resolution
- Can down-convert HD to Full or less than D1
- Two AES pairs embedded in SDI, 1 HDMI stereo pair, 1 analog pair
  - MPEG-1 Layer II audio
  - MPEG-2 AAC audio
  - SMPTE-302M uncompressed audio and Dolby E pass-through
- Advanced error correction functions help to ensure a high quality of service
  - Pro-MPEG FEC
  - FEC and ARQ

    For video transmission using IP network, Forward Error Correction (FEC) and Automatic Repeat Request (ARQ) are provided for network error correction. The combined use of FEC and ARQ provides high quality of service.

    ARQ enables retransmission of packets lost in the network, and the user may adjust the retransmission buffer size to optimize the end-to-end delay.
- ToS bit control enables usage of Diffserv IP QoS mechanisms in the network
- Encryption - BISS 1/E
- Bidirectional Voice Intercom over IP
- SNMPv2 control and traps, ROSA® Driver

Optional Features

- Dual output DVB-ASI module
- DVB-S/S2 Modulator for IF or L-band

[1] By converting the signal to 59.94 Hz before encoding to H.264

Product Specifications

Table 1. Product Specifications – Software Version 4.3

Parameter		Value			
Video					
Input		1 x HD-SDI or SD-SDI 1 x HDMI			
Output		1 x HD-SDI or SD-SDI – loop-through 1 x NTSC/PAL monitor – down-converted from HD			
Video Format					
Input		HD: 1920/1440/960 x 1080i (59.94 / 50 Hz) and 60 Hz[1] HD: 1280/960/640 x 720p (59.94 / 50 Hz) and 60 Hz[1] SD: 720 x 480i (59.94 Hz), 720 x 576i (50 Hz)			
Video Coding					
HD		4:2:0 - H.264 MP & HP @ L4, 3 to 12 Mbps			
SD		4:2:0 - H.264 MP & HP @ L3, 1.3 to 6 Mbps			
Delay (nominal) Encode & Decode – D9094SE @ HD – decoded with a D9894, at 12 Mbit/s					
GOP mode		1080i		720p	
Field/Frame frequency		59.94 Hz	50 Hz	59.94 Hz	50 Hz
Ultra Low	IP @ 4:2:0	0.43s	0.45s	0.41s	0.44s
	DVB-ASI @ 4:2:0	0.28s	0.30s	0.26s	0.29s
Low	IP @ 4:2:0	0.69s	0.70s	0.65s	0.67s
	DVB-ASI @ 4:2:0	0.54s	0.55s	0.50s	0.52s
Standard	IP @ 4:2:0	1.19s	1.28s	1.03s	1.10s
	DVB-ASI @ 4:2:0	1.04s	1.13s	0.88s	0.95s
Delay (nominal) Encode & Decode – D9094SE @ SD – decoded with a D9894, at 6 Mbit/s					
GOP mode	Field frequency	59.94 Hz		50 Hz	
Ultra Low	IP @ 4:2:0	0.41s		0.44s	
	DVB-ASI @ 4:2:0	0.26s		0.29s	
Low	IP @ 4:2:0	0.55s		0.58s	
	DVB-ASI @ 4:2:0	0.40s		0.43s	
Standard	IP @ 4:2:0	1.05s		1.12s	
	DVB-ASI @ 4:2:0	0.90s		0.97s	
VBI					
Input/Output		NTSC Closed Caption Line 21 and Line 261 (decodable with a D9894 Decoder)			
Audio					
Input/Output		2 x AES pairs embedded in SDI (48 kHz) - out of 4 pairs embedded. 1 x HDMI 1 x Analog stereo pair (balanced)			
Audio Coding					
Program		MPEG-1 Layer II MPEG-2 AAC SMPTE-302M uncompressed audio (Dolby E pass-through) Dolby Digital (AC-3) pass-through (ATSC/DVB)			
Audio Encoding Bit Rates		MPEG-1 Layer II: 128, 256, 384 kb/s MPEG-2 AAC: 64, 128, 256, 384 kb/s Uncompressed audio or Dolby E pass-through: 2304 kb/s Dolby Digital (AC-3) pass-through (ATSC/DVB): 56-640 kb/s			
Voice Intercom		G.711			

Parameter	Value
Transport Interface	
Interface Type	10BASE-T/100BASE-TX/1000BASE-T DVB-ASI (optional) – 2 outputs DVB-S/S2 (optional)
Error Correction	Pro-MPEG FEC and ARQ
Encryption on ASI & DVB-S/S2	BISS 1/E
DVB-S/S2 – Option	
Modulator Type, Frequency	Option: L-Band Modulator, 950.000 to 1,750.000 MHz Option: IF-Band Modulator, 50.000 to 90.000 MHz, 100.000 to 180.000 MHz
Transmission System	CCM
Modulation & FEC	DVB-S (DSNG): QPSK: 1/2, 2/3, 3/4, 5/6, 7/8 8PSK: 2/3, 5/6, 8/9 DVB-S2: QPSK: 1/2, 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10 8PSK: 3/5, 2/3, 3/4, 5/6, 8/9, 9/10 16APSK: 2/3, 3/4, 4/5, 5/6, 8/9, 9/10
Environmental Specifications	
Operating Temperature	-10 to 55°C (14 to 131°F)
Chassis Mechanical Specifications	
Height	4.2 cm (1.65 in.)
Width	42.5 cm (16.73 in.)
Depth	35.0 cm (13.8 in.)
Weight	6 kg (13.2 lb)
Power	
Voltage Range	100 to 240 VAC
Line Frequency	50/60 Hz
Power Consumption	60 W maximum at 100 VAC With option: 90 W maximum at 100 VAC

Figure 2. D9094SE HD/SD AVC Low Delay Contribution Encoder Rear Panel (Base unit – No Option Card installed)

Ordering Information

Table 2. Ordering Information

Cisco D9094SE HD/SD AVC Encoder	Part Number
D9094SE AVC HD/SD Encoder, IP In/Out	40354260
D9094SE AVC HD/SD Encoder, IP and Dual ASI Out	40354261
D9094SE AVC HD/SD Encoder, IP and DVB-S/S2, IF	40354262
D9094SE AVC HD/SD Encoder, IP and DVB-S/S2, L-Band	40354263
Power Cords	
Power Cord (Argentina)	207340
Power Cord (China)	745415
Power Cord (Australia)	1000897
Power Cord (Europe)	3989835
Power Cord (UK)	3989836
Power Cord (US)	3989838
Power Cord (Italy)	3993130
Power Cord (Japan)	3993133
ROSA Drivers	
ROSA Driver for Cisco D9094SE	70200320

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