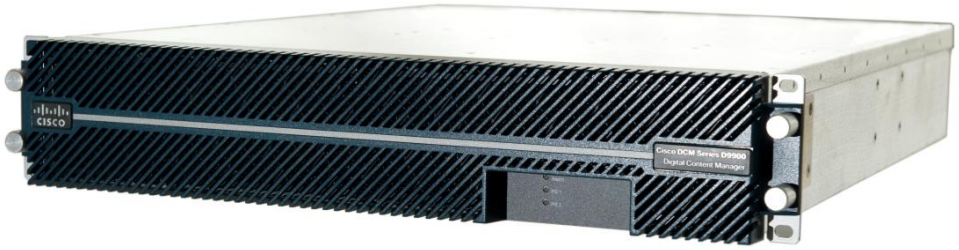
Cisco DCM Series D9900 Digital Content Manager Transcoder

Today's IPTV channel lineup requirements are growing rapidly with the dual drivers of increased standard and high-definition channels and a need for reduced cost of ownership. The Cisco® DCM Series D9900 Digital Content Manager (DCM) Transcoder is a high-density MPEG-2 to H.264 video conversion platform capable of processing a high number of video streams in a compact form factor with low power usage over cost-effective Ethernet links. The DCM Series D9900 Transcoder provides IP-centric headend distributors the ability to convert MPEG-2 compressed MPTS or SPTS to H.264 SPTS or MPTS. With the flexibility of ASI, IP or ATSC off-air inputs and ASI or IP outputs, the DCM Series D9900 Transcoder can be placed at multiple points in the content acquisition subsystem. Converting up to 48 standard definition channels from MPEG-2 to H.264 in a 2RU appliance allows for IP-centric headends processing of a 250 channel line-up in less than one rack.

Based on the industry proven track record of the DCM Series D9900, the transcoder plug-in cards for the DCM provides for the next generation of IP-centric headend deployments large and small with high reliability and excellent video quality. The DCM Series D9900 MPEG Transcoder conforms to the Network Equipment Building Standards (NEBS).

Figure 1. Cisco DCM Series D9900 Transcoder



Key Benefits

- Dense MPEG-2 to H.264 transcoding for IPTV HE and cable video over DOCSIS® applications
- Can be housed in existing DCM chassis and coexists with existing DCM cards (requires Compact Flash upgrade to 16 GB)
- Up to 48 SD / 12 HD channels in 2RU chassis
- Process both SD and HD in the same chassis
- Can be combined with other DCM functionality, e.g., DVB scrambling, BISS-1 (de)scrambling, FEC
- ASI or IP I/O and interface conversion
- ATSC off-air RF input card option

- Satellite reception for digital turnaround applications
- Descrambling via DVB-CI Conditional Access Modules
- PSI/SI/PSIP processor
- Input error monitoring
- Advanced redundancy schemes maximizing up-time
- Low power consumption
- Flexible modular configuration
- Future-proof against changing system requirements
- Seamless IP video networks integration
- Excellent transcoded video quality
- Picture-in-picture (PIP) outputs
- Dolby Digital (AC-3) and MPEG-1 Layer II to HE-AAC audio transcoding
- Audio and metadata pass-through

Physical Configuration

The DCM Series D9900 Transcoder comes in a compact 2RU chassis with hot-swappable and redundant power supplies and can be configured with up to four plug-in cards. The unit can be configured with up to three transcoder modules, which can transcode up to 16 standard definition channels. The DCM Series D9900 Transcoder can use the standard DCM ASI interface card to connect directly to the ASI outputs of satellite receivers, and/or it can be housed with the standard DCM GbE interface card for IP reception and/or streaming. The DVB DRD Satellite Reception and Decryption card adds high density DVB-S and DVB-S2 reception capabilities and Common Interface decryption functionality. For receiving off-air ATSC terrestrial signals, the unit can be fitted with up to 3 high-density 8-VSB input cards.

The ASI cards have 10 ASI ports and support full ASI rates allowing freedom in system design. All ASI ports can be individually configured as input or output, and all ASI ports support MPTS and SPTS streams. The GbE I/O cards support four GbE ports via SFP connectors, with the card having a total throughput of 2 Gbps in and 2 Gbps out. The GbE ports support MPTS and SPTS streams.

The DCM Series D9900 Transcoder can be fitted with co-processor cards to support advanced MPEG processing functions like DVB Simulcrypt compliant scrambling.

Each 8-VSB input card can simultaneously receive up to 8 RF channels and can fully benefit from DCM's MPEG processing functionality.

The 2RU chassis can host up to 3 DRD Satellite Reception and Decryption that provides 12 RF inputs for the reception of DVB-S and DVB-S2 signals and 12 DVB-CI common interface slots for descrambling using CAM modules.

Programs from any input can be descrambled, which allows highly efficient and dense configurations.

Transcoding

Following today's rapidly growing IPTV channel lineup requirements, the DCM Series D9900 performs high density MPEG-2 to H.264 video transcoding and supports optional audio transcoding from AC-3 and MPEG-1 Layer II to HE-AAC. It is capable of processing a high number

of both SD and HD video streams, supporting 1080i and 720p formats at up to full HD resolution. It is designed to support numerous advanced features like closed caption handling, PIP, audio, and metadata pass-through. Functionality of the transcoding modules is enabled via software licenses, allowing operators to scale and grow to meet their needs.

Grooming and Remultiplexing

The DCM Series D9900 Transcoder supports advanced demultiplexing and remultiplexing capabilities including advanced PSI and descriptor handling capabilities. PSI, SI, and PSIP tables can be regenerated and played out, changing dynamically according to input changes and configurations. Integration with Continuum® DVP SI-Server allows customized PSI/SI situations to be addressed.

Furthermore, it supports extensive transport stream and program analysis, including program-level bit rate measurements on both incoming and outgoing streams. This allows operators to easily configure the content into logical outgoing program groups. Every version also includes monitoring of many TR 101 290 errors.

The high processing power of the DCM Series D9900 Transcoder is designed to meet evolving architectures for certain future applications.

Conditional Access

The built-in scrambler allows easy integration with several Conditional Access (CA) systems. Integrating multiple CA systems at the same time is possible through the Simulcrypt interface. The DCM Series D9900 Transcoder also supports BISS-1 scrambling to secure satellite or IP transmission links. It also provides BISS-1 descrambling functionality for remote locations that need to receive BISS-1 encrypted video streams over secured primary distribution links.

ATSC Off-air Reception

The state-of-the art 8-VSB input card allows four or eight RF channels to be received simultaneously depending on the chosen hardware version. Each RF input is licensed and can be configured independently to provide full flexibility. After reception, each received transport stream can use all other DCM processing functionality and allows operators to build a flexible solution.

Satellite Reception and DVB-CI Descrambling

For digital turn-around distribution applications, the Dense Receiver and Decrypter (DRD) card receives DVB-S and DVB-S2 satellite signals on all inputs simultaneously.

Each of the DVB-CI slots on a card can descramble satellite feeds and programs from any input, including ASI and GbE, allowing a more efficient use of the Conditional Access Modules (CAMs).

Redundancy and Reliability

The DCM Series D9900 Transcoder has been designed to help operators configure highly reliable networks. The DCM Series D9900 Transcoder supports hot-swappable and redundant power supplies and hot-swappable cooling fans. The DCM Series D9900 Transcoder can be configured in a hot 1:1 configuration to support maximum up-time with minimum switch-over interruption. To maximize service availability, the DCM Series D9900 Transcoder also offers port, transport stream, and service redundancy.

High-Quality Video Transmission over IP Networks

As IP is becoming more and more the transport network of choice, advanced functionality is required to maximize quality of service. The DCM Series D9900 Transcoder's extensive set of IP over GbE features, including extensive protocol support and Forward Error Correction (Pro-MPEG COP3 release 2 / SMPTE-2022 FEC) functionality, allow for seamless integration with these IP networks.

Security Functions

Today's IP attack profiles cover operating systems, networks, applications, and protocols. These attacks can cause hours or days of downtime, affecting availability of resources and creating serious breaches in data confidentiality and integrity. Depending on the level of the attack and the type of information compromised, the consequences vary in degree from mildly annoying to completely debilitating, and the cost of troubleshooting and recovery can become considerable. To cope with the increased complex and open nature of the IP network environment, the DCM Series D9900 Transcoder is designed with robust and comprehensive security features.

User Interface and Management

The DCM Series D9900 Transcoder is controlled via an easy and intuitive GUI. To keep things simple, there is no software to load on the user's computer. The GUI of the DCM Series D9900 Transcoder is a HTML-based user interface that can be opened using Microsoft® Internet Explorer 7.0 and 8.0 or Firefox 3.5 and 3.6. The GUI supports simple program provisioning through drag-and-drop functionality. The interface provides detailed information to the user, showing the DCM Series D9900 Transcoder configuration, input and output bit rate measurements, transport stream alarms, and other information. For easy access to content details, sorting of program information can be performed on various program criteria, including input and output ports, bit rates, and program names. The general-purpose inputs on the chassis allow for triggering of service backup or digital program insertion.

For integrated network monitoring and control, the DCM Series D9900 Transcoder is integrated with the ROSA® Network Management and Control (NMC) system. All functionality available via the HTML interface is available with the ROSA control system..

Features

Interfaces

- Up to 30 ASI interface ports (10 ASI ports per ASI I/O card)
  - SPTS and MPTS supported
  - User-configurable as input or output on a per-port basis
  - Each ASI port supports up to 213 Mbps data rate
  - Connector type: BNC
- Up to 12 GbE ports (four ports per GbE I/O card)
  - SPTS and MPTS supported
  - Unicast and multicast support
  - Protocols supported: 802.3, Ethernet, VLAN, RTP, UDP, IP, ARP, ICMP, IGMPv2 / v3
  - Port configurations: 2+2 backup or 2 inputs + 2 outputs
  - Quality of Service: Diffserv/TOS 802.1p

    - FEC according to Pro-MPEG COP3 release 2 (COP3R2)/SMPTE-2022
    - Low latency dejitter option
    - Connector type: SFP interfaces
- Up to 24 ATSC 8-VSB RF input ports
    - 4 and 8 RF input version available
    - Each RF input is enabled via software licensing
    - ATSC A/74 tested
    - Supports reception of MPTS and SPTS
- Up to 12 DVB-S and DVB-S2 RF input ports
    - 2 and 4 RF satellite input versions available
    - Each RF input is enabled via software licensing
    - Supports reception of single and multi-stream signals
- Up to 12 Common Interface slots for CAMs
    - 2 and 4 CI slot versions available
    - Supports all major Conditional Access Modules (CAM)
    - Supports descrambling of programs from any input

Transcoding

- Up to 48 SD or 12 HD channels in 2RU chassis
- Up to 96 stereo pairs transcoding of AC-3 or MPEG-1 Layer II to HE-AAC
- Support of audio and metadata pass-through
- Closed caption handling
- Integrated PIP support
- Transcoding features enabled through software licenses on a per program basis

Remultiplexing

- PID filtering / remapping on each input
- PID tracking
- Auxiliary PID synchronization with video
- Remultiplexing of services and components
- Content routing from any input to any output port

Monitoring

- Error monitoring on each input
- Input and output bit rate measurements
- Graphical bit rate viewer showing transrater group bit rates

Redundancy

- 1:1 redundant configuration supported
- 1:1 GbE port backup supported
- ASI, GbE port and GbE port pair mirroring
- Input service and transport stream redundancy

Extended PSI-SI Capabilities

- Dynamic PSI/SI regeneration
- PSI/SI playout carousel
- Import of PSI/SI tables according to DVB Simulcrypt
- PSI descriptor editing capabilities
- Built-in PSI/SI viewer
- Pass-through and regeneration of PSIP tables

System

- 10 Gbps internal processing throughput with 8 Gbps of I/O capability
- User hot-swappable power supplies and fans
- Redundant load-sharing power supplies, supports both AC and DC power supplies
- Configuration settings stored on Compact Flash card (transferable to cold standby unit)

Management

- SNMP traps
- ROSA management
- Easy control using web browser
- Ethernet interface for communication with management system and web browser
- IPsec
- General-purpose inputs

Product Specifications

Table 1. Product Specifications

Specification	Value
Transcoder Card	
Video input coding format	MPEG-2 MP@ML (SD) and MPEG-2 MP@HL (HD)
Video output coding format	H.264 MP@L3, H.264 HP@L3 and H.264 HP@L4
Video resolutions	SD: 525i/29.97 and 625i/50 HD: 720p/59.94, 1080i/29.97, 720p/50 and 1080i/25
Video modes	CBR and VBR
Video transcoding	Up to 16 SD streams per card or up to 4 HD streams per card
Audio input coding format	MPEG-1 Layer II and AC-3
Audio output coding format	Pass-through: MPEG-1 Layer II, AC-3 and others Transcoding: HE-AAC
Audio transcoding	Up to 32 stereo pairs per card
PIP encoding format	H.264 main profile
PIP picture size	96 x 96 or 128 x 96 or 176 x 144 or 192 x 192
Chassis Compact Flash size	16 GB required
ASI Interface Card	
Number of ports per card	10 ports, each port configurable as input or output
Connector	BNC-type
Impedance	75 ohms

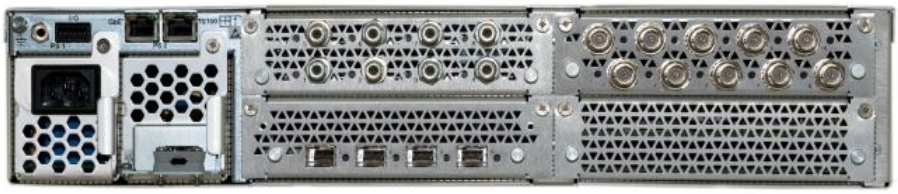
Specification	Value
Interface type	Asynchronous Serial Interface (ASI) (according to EN 50083-9)
Packet format	Auto detection: 188 / 204 byte packets
Bit rate	0.1 – 213 Mbps
Syntax	SPTS or MPTS (according to ISO/IEC 13818)
GbE Interface Card	
Number of ports per card	4 GbE ports, 2+2 (for redundancy)
Connector type	Optical/electrical Small Form Factor Pluggable (SFP) (see Note 1)
Interface type	Gigabit Ethernet (GbE) according to IEEE 802.3ab (Electrical) or IEEE 802.3z (Optical) Support for IEEE 802.Q VLAN Tagging
Protocols	MPEG over IP/UDP and IP/UDP/RTP
Maximum throughput	2 Gbps input and 2 Gbps output per card
Syntax	SPTS or MPTS (according to ISO/IEC 13818)
Forward Error Correction	Pro-MPEG COP3R2/SMPTE-2022
8-VSB Input Card	
Number of ports per card	4 or 8 ports, each port independently configurable
Connector	F-type, female
Impedance	75 ohms
Interface type	ATSC 8-VSB according to ATSC A/53 - Part 2 (A/74 tested)
Frequency range	50 – 860 MHz
Channel range	2 – 69
Input level range	-80 – -20 dBm (Note 2)
Syntax	SPTS or MPTS (according to ISO/IEC 13818)
Satellite Input and CI decryption Card	
Number of RF ports per card	2 or 4 ports, each port independently configurable
Input return loss	> 10dB
Connector	F-type, female (75 Ω)
Interface type	DVB-S (according to ETSI EN 300 421) DVB-S2 (according to ETSI EN 302 307)
Frequency range	950 to 2150 MHz
Input level range	-65 to -25 dBm
Constellation	QPSK, 8PSK, 16APSK
Symbol Rate	1 to 45 MSym/s
FEC code rate	DVB-S QPSK: 1/2, 2/3, 3/4, 5/6, 7/8 DVB-S2 QPSK: 1/4, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10 DVB-S2 8PSK: 3/5, 2/3, 3/4, 5/6, 8/9, 9/10 DVB-S2 16APSK: 2/3, 3/4, 4/5, 5/6, 8/9, 9/10
FEC Frame	Normal and Short
Roll Off factor	0.20, 0.25 and 0.35
Modulation Mode	CCM and VCM
Transport stream mode	Single and Multi-stream
Number of Common Interface slots per card	2 or 4 independent PCMCIA slots
Interface type	DVB-CI (according to EN 50221)
Transport Stream Processing	

Specification	Value
PID filtering / remapping capability	
Built-in PSI Viewer	
Dynamic PSI regeneration with advanced descriptor handling support	
Detailed bit rate measurement of incoming services	
Error monitoring	
Conditional Access	
Scrambling Algorithm	DVB Common Scrambling Algorithm BISS Mode 1
Level and mode of scrambling	Service/Program level scrambling support, component level scrambling support, both MPTS and SPTS scrambling supported
Number of CA system connectors	1
Connector type	RJ-45
Interface Type	Ethernet 10/100/1000 BASE-T
Simulcrypt	Simulcrypt version 3
Management and Monitoring	
Number of ports on chassis	2
Connector type	RJ-45
Interface type	10/100 & 10/100/1000 BT
Protocols	HTTP, SNMP, IIOP
User interface	Embedded HTML user interface
General Purpose Inputs	4 (spring clamp terminal block connector)
Environmental Specifications	
Operating temperature	0°C – +50°C / +32°F – +122°F
Storage temperature	-40°C – +70°C / -40°F – +158°F
Humidity	5% – 95% (non condensing)
Altitude	-200 – 10,000 feet (-61 – 3048 m)
Power Requirements	
Power consumption (fully loaded)	< 350 W
Input voltage • AC input voltage ◦ Nominal ◦ Normal service voltage range ◦ Frequency • DC input voltage ◦ Nominal ◦ Normal service voltage range	 100 – 240 VAC 90 – 254 VAC 47 – 63 Hz -48 – -60 VDC -38 – -58 VDC
Chassis Mechanical Specifications	
Height	2RU 3.48 in. / 88 mm
Width	19 in. / 483 mm
Depth	21.8 in. / 554 mm
Weight (fully loaded)	28.3 lbs / 12.8 kg
Cooling	Front to back, forced air; units are stackable

Notes:

1. SFP Module not included.
2. Input level range for channel 2: -20 to -79 dBm at ambient temperature.

Figure 2. Cisco DCM Series D9900 Transcoder Rear Panel with AC and DC power supply, 1 GbE card, and 3 Transcoder cards



Ordering Information

Table 2. Ordering Information Cisco DCM Series D9900 Components

Description	Part Number
Chassis	
D9901 DCM MKI Chassis, 2RU, No PSU, Main	DCM-MK1-2RU
Hardware Modules (Boards delivered as separate kits)	
DCM Transcoder board	DCM-TC-MK1
DCM ASI I/O board	DCM-ASI-MK1
DCM GbE I/O board	DCM-GBE-MK1
DCM FEC board	DCM-FEC-MK1
DCM Co-Processor board	DCM-COP-MK1
DCM 8-VSB input card with 4 RF inputs	DCM-8VSB-4RF
DCM 8-VSB input card with 8 RF inputs	DCM-8VSB-8RF
DCM DRD Satellite Reception and Decryption board with 2 RF and 2 CI inputs	DCM-DRD-2SAT2CI
DCM DRD Satellite Reception and Decryption board with 4 RF and 4 CI inputs	DCM-DRD-4SAT4CI
DCM blank plate for I/O slot	DCM-BLANK-IO
DCM blank plate for power supply	DCM-BLANK-PSU
DCM 16G Compact Flash upgrade kit (select version in Cisco's Dynamic Configuration Tool)	MEM-DCM-CF16
Power Supplies	
AC power supply (AC power cord needs to be ordered separately)	PWR-AC-DCM-MK1-2U
DC power supply	PWR-DC-DCM-MK1-2U
AC Power Cords	
Argentina	CAB-PWR-DMN-ARG
Australia	CAB-PWR-DMN-AUS
China	CAB-PWR-DMN-CHN
Europe	CAB-PWR-DMN-EU
Italy	CAB-PWR-DMN-IT
Japan	CAB-PWR-DMN-JPN
UK	CAB-PWR-DMN-UK
US	CAB-PWR-DMN-US
Software	

Description	Part Number
Software license CD-ROM (Add licenses in Cisco's Dynamic Configuration Tool)	DCM-LIC-UPGR

Table 3. Ordering Information SFP Plug-ins (see Note)

Description	Part Number
SFP Plug-ins – WDM types	
GbE SFP module 850 nm (LC, up to 500 m)	SFP-WDM-850-0500
GbE SFP module 1310 nm (LC, up to 5 km)	SFP-WDM-1310-5
GbE SFP module 1310 nm (LC, up to 40 km)	SFP-WDM-1310-40
SFP Plug-ins – CWDM types	
GbE SFP module 1470 nm (LC, up to 40 km)	SFP-CWDM-1470-40
GbE SFP module 1490 nm (LC, up to 40 km)	SFP-CWDM-1490-40
GbE SFP module 1510 nm (LC, up to 40 km)	SFP-CWDM-1510-40
GbE SFP module 1530 nm (LC, up to 40 km)	SFP-CWDM-1530-40
GbE SFP module 1550 nm (LC, up to 40 km)	SFP-CWDM-1550-40
GbE SFP module 1570 nm (LC, up to 40 km)	SFP-CWDM-1570-40
GbE SFP module 1590 nm (LC, up to 40 km)	SFP-CWDM-1590-40
GbE SFP module 1610 nm (LC, up to 40 km)	SFP-CWDM-1610-40
GbE SFP module 1470 nm (LC, up to 70 km)	SFP-CWDM-1470-70
GbE SFP module 1490 nm (LC, up to 70 km)	SFP-CWDM-1490-70
GbE SFP module 1510 nm (LC, up to 70 km)	SFP-CWDM-1510-70
GbE SFP module 1530 nm (LC, up to 70 km)	SFP-CWDM-1530-70
GbE SFP module 1550 nm (LC, up to 70 km)	SFP-CWDM-1550-70
GbE SFP module 1570 nm (LC, up to 70 km)	SFP-CWDM-1570-70
GbE SFP module 1590 nm (LC, up to 70 km)	SFP-CWDM-1590-70
GbE SFP module 1610 nm (LC, up to 70 km)	SFP-CWDM-1610-70
SFP Plug-ins – 1000 BT copper	
GbE SFP module 1000 BT copper	SFP-CU-RJ45

Note: All Class 1 SFP plug-ins are according to IEC 60825-1 (1997) Amendment 2 (2001).

Service and Support

Using the Cisco Lifecycle Services approach, Cisco and its partners provide a broad portfolio of end-to-end services and support that can help increase your network's business value and return on investment. This approach defines the minimum set of activities needed by technology and by network complexity to help you successfully deploy and operate Cisco technologies and optimize their performance throughout the lifecycle of your network.

For More Information

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Cisco Systems, Inc.
800 722-2009 or 678 277-1120
www.cisco.com

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