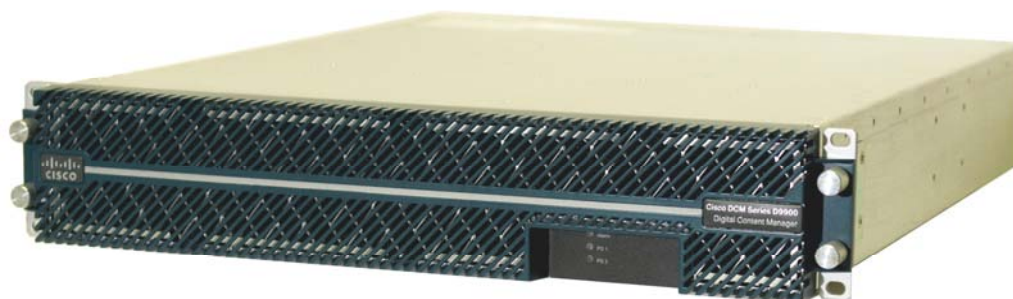


## Cisco DCM Series D9900 Digital Content Manager Transcoder

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<sup>®</sup> 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.

**Figure 1.** Cisco DCM Series D9900 Transcoder



### Key Benefits

- Dense MPEG-2 to H.264 transcoding for IPTV HE and cable video over DOCSIS<sup>®</sup> 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
- Process both SD and HD in 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
- 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
- AC-3 (Dolby Digital) 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. 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.

### 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<sup>®</sup> 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.

### **ATSC Off-air Reception**

The state-of-the art 8-VSB input card allows 4 or 8 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.

### **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.

### **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 D9901 MPEG Processor is designed with robust and comprehensive security features.

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## 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 6.0 and higher or Firefox 3.0. 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<sup>®</sup> 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 (4 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 8 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

### Transcoding

- Up to 48 SD or 12 HD channels in 2RU
- 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 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

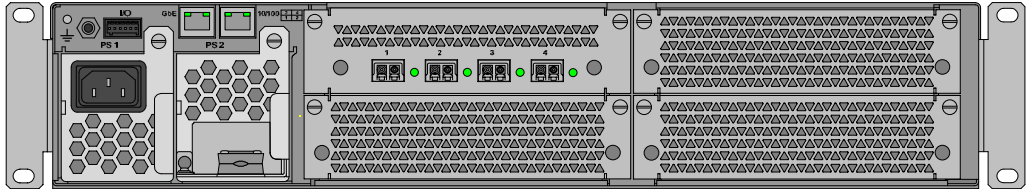
Specification	Value
<b>Transcoder Card</b>	
Video input coding format	MPEG-2 MP@ML (SD) and MPEG-2 MP@HL (HD)
Video output coding format	H.264 MP@L3, H.264 HP@L3 and H.264 HP@L4
Video resolutions	SD: 525i/29.97 and 625i/50 HD: 720p/59.94, 1080i/29.97, 720p/50 and 1080i/25
Video modes	CBR and VBR
Video 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
<b>ASI Interface Card</b>	
Number of ports per card	10 ports, each port configurable as input or output
Connector	BNC-type
Impedance	75 $\Omega$
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)
<b>GbE Interface Card</b>	
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
<b>8-VSB Input Card</b>	
Number of ports per card	4 or 8 ports, each port independently configurable
Connector	F-type, female
Impedance	75 $\Omega$
Interface type	ATSC 8-VSB according to ATSC A/53 - Part 2 (A/74 tested)
Frequency range	50 – 860 MHz
Input level range	-80 – -20 dBm
Syntax	SPTS or MPTS (according to ISO/IEC 13818)
<b>Transport Stream Processing</b>	
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	
<b>Conditional Access</b>	
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 BT
Simulcrypt	Simulcrypt version 3

<b>Management and Monitoring</b>	
Number of ports on chassis	2
Connector type	RJ-45
Interface type	10/100 & 10/100/1000 BT
Protocols	HTTP, SNMP, IIOIP
User interface	Embedded HTML user interface
General Purpose Inputs	4 (spring clamp terminal block connector)
<b>Environmental Specifications</b>	
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)
<b>Power Requirements</b>	
Power consumption (fully loaded)	< 350 W
Input voltage	
AC input voltage	
Nominal	100 – 240 V AC
Normal service voltage range	90 – 254 V AC
Frequency	47 – 63 Hz
DC input voltage	
Nominal	-48 – -60 V DC
Normal service voltage range	-38 – -72 V DC
<b>Chassis Mechanical Specifications</b>	
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

Note: 1. SFP Module not included.

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





**Table 2.** Ordering Information Cisco DCM D9900 Components

Cisco DCM Series D9900 Components	Part Number
<b>DCM Series D9900 Preconfigured Unit</b>	
DCM Series D9900 preconfigured unit (fully assembled and pre-enabled licenses)	DSxxxxxxxxxxxxxxxx Call for Part Number
<b>Hardware Upgrades (Boards delivered as separate kits)</b>	
DCM Transcoder board	4028140
DCM ASI I/O board	4010881
DCM GbE board	4023050
DCM GbE I/O + FEC board kit	4022724
DCM 8-VSB input card: 4 RF inputs (Note 2)	4035123
DCM 8-VSB input card: 8 RF inputs (Note 2)	4033441
DCM FEC board	4019399
DCM co-processor board	4010913
DCM blank plate for I/O slot	4008973
DCM blank plate for power supply	4010913
Dust filter	4035393
<b>Power Supplies</b>	
AC power supply (AC power cord needs to be ordered separately)	4009626
DC power supply	4009627
<b>AC Power Cords</b>	
Argentina	207340
Australia	1000897
China	745415
Europe	3989835
Italy	3993130
Japan	3993133
UK	3989836
US	3989838

License Upgrades (Upgrade delivered on a CD-ROM – see Note 3)	
DCM license upgrade containing one or more of the following licenses:	
- MPEG-2 → AVC SD Transcoding license package (1 license needed for each SD service, transcoder board needed)	40302320xxxx (Note 4)
- MPEG-2 → AVC HD Transcoding license package (1 license needed for each HD service, transcoder board needed)	40302340xxxx (Note 4)
- MPEG-1 Layer II → HE-AAC Transcoding license package (1 license needed for each stereo pair, transcoder board needed)	40302360xxxx (Note 4)
- AC-3 → HE-AAC Transcoding license package (1 license needed for each stereo pair, transcoder board needed)	40302380xxxx (Note 4)
- COP3 FEC license package (1 license needed per FEC encode/decode repair stream)	40208020xxxx (Note 4)
- DVB Simulcrypt / BISS Mode 1 Scrambling license package (1 license needed per service, co-processor board needed)	40113480xxxx (Note 4)
- BISS Mode 1 Descrambling license package (1 license needed per service, co-processor board needed)	40336660xxxx (Note 4)
- PIP license package (1 license needed for each service, transcoder board needed)	40302400xxxx (Note 4)
- 8-VSB Reception license package (1 license needed for each RF input, 8-VSB input card needed)	40369840xxxx (Note 5)

Note: 2. NEBS Level 3 qualification pending

Note: 3. License Upgrade CD-ROMs are delivered as one separate CD-ROM per part number.

Note: 4. 'xxxx' in the License Upgrade part numbers represent the license quantity for that specific license type.

Note: 5. 'xxxx' in the License Upgrade part numbers represent the license quantity for that specific license type. Available quantities are 0004, 0008, 0012, 0016, 0020 and 0024.

**Table 3.** Ordering Information SFP Plug-ins (see Note 6)

Cisco DCM Series D9900 Components	Part Number
<b>SFP Plug-ins – WDM types</b>	
GbE SFP module 850 nm (LC, up to 500 m)	4002019
GbE SFP module 1310 nm (LC, up to 5 km)	4002020
GbE SFP module 1310 nm (LC, up to 40 km)	4003466
<b>SFP Plug-ins – CWDM types</b>	
GbE SFP module 1470 nm (LC, up to 40 km)	4002003
GbE SFP module 1490 nm (LC, up to 40 km)	4002004
GbE SFP module 1510 nm (LC, up to 40 km)	4002005
GbE SFP module 1530 nm (LC, up to 40 km)	4002006
GbE SFP module 1550 nm (LC, up to 40 km)	4002007
GbE SFP module 1570 nm (LC, up to 40 km)	4002008
GbE SFP module 1590 nm (LC, up to 40 km)	4002009
GbE SFP module 1610 nm (LC, up to 40 km)	4002010
GbE SFP module 1470 nm (LC, up to 70 km)	4002011
GbE SFP module 1490 nm (LC, up to 70 km)	4002012
GbE SFP module 1510 nm (LC, up to 70 km)	4002013
GbE SFP module 1530 nm (LC, up to 70 km)	4002014
GbE SFP module 1550 nm (LC, up to 70 km)	4002015
GbE SFP module 1570 nm (LC, up to 70 km)	4002016
GbE SFP module 1590 nm (LC, up to 70 km)	4002017
GbE SFP module 1610 nm (LC, up to 70 km)	4002018
<b>SFP Plug-ins – 1000 BT copper</b>	
GbE SFP module 1000 BT copper	4006222

Note: 6. All Class 1 SFP plug-ins according to IEC 60825-1 (1997) Amendment 2 (2001).



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