Cisco DCM Series D9901
Digital Content Manager – IP Video Gateway
Uncompressed and JPEG2000 Transports

Today's video contribution networks are evolving rapidly, driven both by increased demand, including high definition TV, and a need for reduced cost of ownership. The Cisco® DCM Series D9901 Digital Content Manager (DCM) IP Video Gateway, shown in Figure 1, is a compact 1 rack unit (1RU), serial digital interface (SDI) video gateway platform capable of supporting the delivery at full quality of a high number of uncompressed video signals, as well as JPEG2000 compressed video signals over cost-effective Ethernet links.

Figure 1.   Cisco DCM Series D9901 Digital Content Manager – IP Video Gateway

The DCM Series D9901 IP Video Gateway provides simultaneous transport of uncompressed standard-definition (SD), high-definition (HD), and 3G high definition (3G-HD) SDI video, as well as compressed video using JPEG2000. At the transmitter site, the DCM IP Video Gateway enables SDI video to be carried over 1 Gigabit Ethernet or 10 Gigabit Ethernet. At the receiving site, the DCM IP Video Gateway converts the IP-encapsulated stream back to a baseband SDI video signal.

Because of its quality, flexibility, and very compact design, the DCM Series D9901 IP Video Gateway is adaptable for a wide range of applications, including professional broadcast contribution, studio-to-studio media exchange, in-house signal distribution and routing, post-production, and live event coverage, including transport of full resolution 3D signals.

As IP is becoming more and more the transport network of choice, it's important to maximize quality of service. The DCM IP Video Gateway's extensive set of IP over Gigabit Ethernet features including extensive protocol support allows for a seamless integration with these IP networks. For highest quality of service transport the DCM IP Video Gateway provides a Hitless Merge feature that allows for uninterrupted video transport in case of severe network failures.

Physical Configuration

The DCM IP Video Gateway comes in a compact 1RU chassis. The unit can be configured with up to two gateway cards, with each card having dual Gigabit Ethernet ports and up to six SDI video ports.

The gateway cards can be individually configured with either electrical video interfaces or optical video interfaces, or a combination of both.

With electrical interfaces, the gateway can be equipped with either six electrical SDI inputs, or six electrical SDI outputs, or the combination of three SDI inputs and three SDI outputs. With optical interfaces, the gateway can be equipped with either six optical ports, or a combination of three optical SDI ports and three electrical SDI ports (either three inputs or three outputs). The optical ports are based on unidirectional video small form-factor pluggables (SFPs). The user defines the port direction by plugging in either a receiver SDI SFP or a transmitter SDI SFP.

Each gateway card is equipped with a main and a backup Ethernet port. The ports are software switchable to function as either 1 Gigabit Ethernet or 10 Gigabit Ethernet. With 1 Gigabit Ethernet, the ports can be equipped with SFP connectors, giving each card a total throughput of 1 Gbps bidirectional. With 10 Gigabit Ethernet, the ports can be equipped with SFP+ connectors, giving each card a total throughput of 10 Gbps.

Each gateway card can optionally be equipped with a JPEG2000 plug-in that enables encoding or decoding of the video while still allowing video to be transported uncompressed. For example, this enables uncompressed transport of SD video while compressing HD signals in order to fit onto a 1 Gigabit Ethernet. With 10 Gigabit Ethernet connectivity, you can have uncompressed transport of up to six SD/HD video signals, or any combinations of uncompressed transport of HD and SD while simultaneously compressing other input signals using JPEG2000.

Scalable Platform

The Cisco DCM IP Video Gateway has been designed to provide processing of up to 12 video signals. However, the platform is scalable in hardware as well as in software. The chassis can be equipped with one card only, and a basic card always comes with one SD video stream enabled. If the physical configuration is for three inputs and three outputs, the network operator can freely select either to transmit or receive a video stream over IP. The operator can choose over time to enable additional video signals to be processed, as well as to add HD video, Forward Error Correction (FEC) and Hitless Merge (redundancy features described in the next section), and 10 Gigabit Ethernet through software licenses. The capital expenses can therefore be adapted to the existing situation and subsequently to future growth needs.

Redundancy and Reliability

The DCM IP Video Gateway has been designed to allow operators to configure highly reliable networks. The DCM IP Video Gateway supports hot-swappable and redundant power supplies and hot-swappable cooling fans. In addition, each DCM IP Video Gateway Card is also hot-swappable. When the chassis is equipped with two cards, one of the cards can be hot-swapped while the other card continues to operate uninterrupted.

The DCM IP Video Gateway can be configured in a hot 1:1 configuration to support a maximum uptime with minimum switchover interruption.

Each DCM IP Video Gateway card optionally supports a very powerful redundancy mechanism to protect against network failures. The feature is called Hitless Merge, and it relies on dual transmission of the stream in a diverse-path mode. The transmitting DCM IP Video Gateway card provides a copy of the stream on the two Ethernet ports, and the receiving DCM IP Video Gateway card receives the two streams on the two individual Ethernet ports as well. The receiving Gateway card performs a Hitless Merge of the two streams and ensures there is no impact on the outgoing SDI video signal in case of network failures impacting one of the two streams. Hitless Merge is supported with unicast as well as multicast transport.

In applications and networks where dual streaming is not viable, the DCM IP Video Gateway provides forward error correction (FEC) to protect against packet loss.

User Interface and Management

You control the DCM IP Video Gateway through an easy and intuitive GUI. To keep things simple, there is no software to load: the GUI of the DCM IP Video Gateway is a pure HTML-based user interface that can be opened

using Microsoft Internet Explorer 6.0 and later or Firefox 3.0 or later. The GUI supports simple program provisioning through drag and drop functionality. The interface provides detailed information, including the DCM IP Video Gateway configuration, input and output video integrity monitoring, and video stream alarms as well as other information.

For integrated network monitoring and control, the DCM IP Video Gateway is integrated with ROSA® Network Management and Control (NMC) system.

Features

This section describes the features of the Cisco DCM Series D9901 IP Video Gateway.

Note: The software and hardware features and releases described in this data sheet are in varying stages of development and are subject to change at the sole discretion of Cisco without liability to Cisco. Contact Cisco for estimated commercial availability.

Interfaces

- Up to 12 video interface ports (6 video ports per gateway card)
  - Each card can be equipped with electrical video interfaces or optical video interfaces or a combination of electrical and optical interfaces.
  - With electrical (BNC) interfaces, each card can have three inputs and three outputs or six inputs or six outputs.
  - With optical interfaces, each card can house up to six video SFPs and each SFP can be either a Tx or an Rx SFP.
  - In a mix of electrical and optical, the electrical section can be either three inputs or three outputs.
- Flexible video signal monitoring
  - Each card has a dedicated electrical monitor output, which can mirror any of the six video ports selected by the user.
  - Any video output port can also be configured as a duplicate of another active video output port or input port.
- Each gateway card is equipped with dual Ethernet ports capable of either 1 Gigabit Ethernet (connectors: SFP) or 10 Gigabit Ethernet (connectors: SFP+).
  - Unicast and multicast support
  - Protocols supported: 802.3, Ethernet, Real-Time Transport Protocol (RTP), User Datagram Protocol (UDP), Internet Protocol (IP), Address Resolution Protocol (ARP), Internet Control Message Protocol (ICMP), Internet Group Management Protocol Version 2 and 3 (IGMPv2 / v3), and VLAN
  - Quality of service (QoS): Diffserv/ToS 802.1p

Video Signals and Formats

- Standard Definition 625i25 and 525i29.97
- High Definition 720p50, 720p59.94, 720p60, 1080i25, 1080i29.97, 1080i30, 1080p25, 1080p29.97, 1080p30
- 3G High Definition 1080p50, 1080p60, 1080p59.94 (for uncompressed transport)
- Adaptive clock recovery
- Genlocking with user-tunable phase adjustment to the external reference signal
- Built-in SDI signal generators assist in easy setup of the gateway during installation without the need for a dedicated signal generator

Uncompressed Video Transport — Per Gateway Card

- 1 Gigabit Ethernet interface: Up to three SD transmit and 3 SD receive
- 10 Gigabit Ethernet interface:
  - Up to six SD/HD transmit or receive, or any combination depending on the interface configuration.
  - Up to three 3G-HD transmit or receive or any combination of transmit and receive.
    One 3G-HD can be combined with 4 SD/HDs.
    Two 3G-HD can be combined with 2 SD/HDs.

Flexible JPEG2000 Compression Engine Plug-on —Per Gateway Card

- Encodes up to three SD/HD signals or decodes up to three SD/HD signals
- Each encode or decode engine has a compressed video bit rate bandwidth of 900 Mbps that can be shared across three channels.

Audio and VBI/Ancillary Data Support— With JPEG2000

- User selection of embedded audio channels— from one stereo pair to eight stereo pairs
- HD: Transparent transport of Vertical Interval Timecode (VITC), closed captions, OP47, Active Format Description (AFD) acc SMPTE-2016
- SD: VITC, World System Ticket (WST), Video Index Information. In addition, you can select transparent transport of luminance samples of vertical blanking interval (VBI) lines (select from 1 to all VBI lines).

IP Transport Protection Schemes— For Uncompressed Transport and JPEG2000

- Dual-Streaming mode (IP port mirroring)
- Hitless Merge in a Live-Live streaming configuration using multicast
- Forward Error Correction (FEC) according to CoP4

3D Contribution – Transport of full resolution Left and Right signals

- Synchronization of left and right channel signals
- Receiver outputs are aligned to either the external reference or adaptive clock recovery
- Supported with Uncompressed Video Transport as well as JPEG2000 Transport

Redundancy

- 1:1 Redundant device configuration
- 1:1 Gigabit Ethernet port backup
- Video input ports can act as backup inputs for each other.

ASI Trunk Interface

- With the interface combination of three inputs and three outputs, the gateway is capable of transporting JPEG2K compressed video over asynchronous serial interface (ASI).
- Three ports are used for video interfaces and three ports are used as ASI interfaces.
- The same gateway card hardware can therefore be used as either an encoder or a decoder simply switched by a configuration in the user interface.
- The same gateway card can also be switched between being an ASI trunk-based JPEG2K adapter or an IP trunk-based JPEG2K/uncompressed adapter.

System

- User hot-swappable gateway cards, 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)
- Configurations can also be copied through the user interface from either one chassis to another or from one gateway card to another.
- Software licenses stored in the chassis and not on the gateway cards, which means the number of spare parts is set to a minimum.
- Software licenses can be moved from chassis to chassis.

Management

- Simple Network Management Protocol (SNMP) traps
- ROSA management
- Easy control using a web browser
- Ethernet interface for communication with management system and web browser
- IP Security (IPsec)

Product Specifications

Table 1 lists product specifications for the Cisco DCM Series D9901 IP Video Gateway.

**Table 1.**   Product Specifications

Specification	Value
Video Interfaces	
Number of video ports per card	Up to 6 ports In addition: • Loop-through output: can monitor any active input or output video stream • Reference Input: common to all the video outputs on one gateway card Note: Output ports can also be configured as a monitor of another active video output port or input port.
Hardware configuration of ports	Electrical: One of the following per gateway card: • Three inputs and three outputs • Six inputs • Six outputs Optical: One of the following per gateway card: • Six optical video SFP cages • Three optical video SFP cages and three electrical inputs • Three optical video SFP cages and three electrical outputs
Connector type Video ports (Note 2)	Electrical • Electrical: BNC (in groups of 3) Optical: • Video SFP (for use with Video SFP compliant to SMPTE-297)
Reference input	BNC (internally terminated)
Loop-through output	BNC
Impedance	75 ohms

Specification	Value
Video formats Video ports and loop-through output,	Standard: SD-SDI: • 625i25, 525i29.97 (SMPTE-259-C, Type B) • Transparency of SDTI @ 270 Mbps (SMPTE-305) – for uncompressed transport Option: HD-SDI: • 720p50, 720p59.94, 720p60 (SMPTE-292 – SMPTE-296 System 1, 2 & 3, Type B) • 1080i25, 1080i29.97, 1080i30 (SMPTE-292 – SMPTE-274 System 4, 5 & 6, Type B) • 1080p25, 1080p29.97, 1080p30 (SMPTE-292 – SMPTE-274 System 7, 8 & 9, Type B) 3G HD-SDI: • 1080p50, 1080p60, 1080p59.94 (SMPTE-424 – SMPTE-274 System 1, 2 & 3, Type B)
Reference input	The reference signal input supports corresponding video formats of either black and burst for SD or tri-level sync for 3G-HD/HD or combined SD/HD/3G-HD. Tri-level signals must fulfil SMPTE-274M and SMPTE-296M for 1080 lines system and for 720 lines systems respectively.
Return loss Video ports and loop-through output	SD: >15 dB, 5 MHz – 270 MHz HD: >15dB, 5 MHz – 1.485 GHz 3G-HD: >15 dB, 5 MHz – 1.485 GHz, >10 dB 1.485 GHz – 2.97 GHz
Cable length Video input ports	SD: >350 m (using Belden 1694A) HD: >200 m (using Belden 1694A) 3G-HD: >120 m (using Belden 1694A)
Video resolution	10 bit
ASI Interfaces	
Number of ASI Input ports per card	Three ports The other three output ports on a three-input and three-input electrical port configuration are SDI video ports.
Number of ASI Output ports per card	Three ports (packet mode only) The other three input ports on a three-input and three-input electrical port configuration are SDI video ports.
Connector	BNC-type
Impedance	75 ohms
Interface type	Asynchronous Serial Interface (ASI) (according to EN 50083-9)
Packet format	188 byte packets
Bit rate	10 – 213 Mbps
Syntax	SPTS (according to ISO/IEC 13818)
IP Interfaces	
Number of ports per card	Two Ethernet ports, 1+1 (for redundancy)
Connector type (see Note 1)	Standard: • 1 Gigabit Ethernet: Optical or electrical Small Form Factor Pluggable (SFP) Optional: • 10 Gigabit Ethernet: Optical or electrical Small Form Factor Pluggable+ (SFP+)
Interface type	Standard – 1 Gigabit Ethernet: • Gigabit Ethernet (GbE) according to IEEE 802.3ab (Electrical) or IEEE 802.3z (optical) Optional – 10GbE: • 10 Gigabit Ethernet (GbE) according to IEEE 802.3ae
Protocols	IP/UDP/RTP, ARP, IGMPv2/v3, Diffserv/TOS 802.1p Support for IEEE 802.Q VLAN Tagging
Maximum throughput per gateway card	With 1 GbE interface: 1 Gbps input and 1 Gbps output per gateway card With 10 GbE interface: 10 Gbps input and output per gateway card

Specification	Value
Processing	
Video encapsulation	Uncompressed transport: According to RFC3497 with CoP4 extensions
	JPEG2000: MXF over RTP according to SMPTE-2022-6 draft
Forward Error Correction (FEC)	Based on ProMPEG CoP4
Hitless Merge	User controllable merge-buffer that compensates for network delay differences
JPEG2000 compression	
Video encoding bitrates	SD: 0 – 200 Mbps
	HD: 0 – 450 Mbps
Embedded Audio	1 – 8 stereo pairs, user selectable, 20/24-bit resolution, uncompressed
VBI (SD)	VITC, WST, Video Index Information.
	Transparent transport of luminance samples of entire VBI lines – user can select from 0 to all VBI lines in both fields.
	Closed captions (line 21) and WSS (line 23) are transported as active video.
Ancillary Data (HD)	Transparent transport of VITC, Closed captions, OP47, AFD acc SMPTE-2016
Lip-sync (Audio/Video)	±1 video line
Video output synchronization	Advanced Adaptive clock recovery.
	Genlocked to the external reference. User-tunable phase adjustment.
Programmable output control	Transition to a user selectable monochrome color or 0 VDC in case of loss of RTP stream
Management and Monitoring	
Number of ports on chassis	Two
Connector type	RJ-45
Interface type	10/100 and 10/100/1000BASE-T
Protocols	HTTP, SNMP, IIOP
User interface	Embedded HTML user interface
Environmental Specifications	
Operating temperature	0℃ – + 50℃ / +32℉ – +122℉
Storage temperature	–40℃ – +70℃ / –40℉ – +158℉
Humidity	5% – 95% (non condensing)
Altitude	–200 to 10000 feet (–61 to 3048 m)
Power Consumption	
Chassis fully loaded	< 185 W
One card (chassis included)	< 120 W
Input Voltage	
AC input voltage	
Nominal	100 – 240 VAC
Normal service voltage range	90 – 254 VAC
Frequency	47 – 63 Hz
DC input voltage	
Nominal	–48 VDC
Normal service voltage range	–38 – –58 VDC
Chassis Mechanical Specifications	
Height	1RU 1.74 in. / 44 mm
Width	19 in. / 483 mm
Depth	22.13 in. / 562 mm
Weight (fully loaded)	27.6 lbs / 12.5 kg
Cooling	Front to back, forced air, Units are stackable

1. SFP, SFP+ or video SFP module not included.

Figure 2 shows the Cisco DCM Series D9901 IP Video Gateway Rear Panel with two AC power supplies, two gateway cards with SFP modules applied, and electrical video interfaces.

Figure 2. Cisco DCM Series D9901 IP Video Gateway Rear Panel
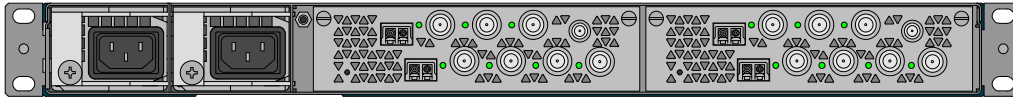
Ordering Information

Table 2 shows ordering information for the Cisco DCM Series D9901 IP Video Gateway components.

Table 2. Ordering Information Cisco DCM Series D9901 IP Video Gateway Components

Description	Part Number
Chassis	
D9901 DCM MKI Chassis, 1RU, No PSU, Main	DCM-MK1-1RU
Hardware Upgrades (Boards delivered as separate kits)	
D9901 DCM Gateway card – Electrical: 3 Inputs/3 Outputs	DCM-GW-E-3I3O
D9901 DCM Gateway card – Electrical: 6 Inputs	DCM-GW-E-6I
D9901 DCM Gateway card – Electrical: 6 Outputs	DCM-GW-E-6O
D9901 DCM Gateway card – Optical: 6 Ports	DCM-GW-O-6P
D9901 DCM Gateway card – Electrical/Optical: 3 Inp/3 Ports	DCM-GW-EO-3I3P
D9901 DCM Gateway card – Electrical/Optical: 3 Out/3 Ports	DCM-GW-EO-3O3P
D9901 DCM Gateway card – EI: 3 Inputs/3 Outputs, JPEG2K	DCM-GW-E-3I3O-J2K
D9901 DCM Gateway card – Electrical: 6 Inputs, JPEG2K 3ch	DCM-GW-E-6I-J2K
D9901 DCM Gateway card – Electrical: 6 Outputs, JPEG2K 3ch	DCM-GW-E-6O-J2K
D9901 DCM Gateway card – Optical: 6 ports, JPEG2K 3ch	DCM-GW-O-6P-J2K
D9901 DCM Gateway card – EI/Opt: 3 Inp & 3 Ports, JPEG2K 3ch	DCM-GW-EO-3I3P-J2
D9901 DCM Gateway card – EI/Opt: 3 Out & 3 Ports, JPEG2K 3ch	DCM-GW-EO-3O3P-J2
DCM blank plate for I/O slot	DCM-BLANK-IO
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-350-AC-1RU
DC power supply	PWR-350-DC-1RU
Software	
Software license CD-ROM (Add licenses in Cisco's Dynamic Configuration Tool) Here you can add: • Enabling of additional video streams • Enabling of HD-SDI • Enabling of 3G HD-SDI • Enabling of FEC and Hitless Merge • Enabling of the 10 GbE	DCM-LIC-UPGR
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
United Kingdom	CAB-PWR-DMN-UK
United States	CAB-PWR-DMN-US

Table 3 shows ordering information for SFP plug-ins. See Notes 2 and 3 for additional information about SFP plug-ins.

Table 3.   Ordering Information for SFP Plug-ins

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
SFP+ Optical Plug-ins (Note 3)	
10GBASE-SR 850 nm MMF	SFP-10G-SR
10GBASE-LR 1310 nm SMF	SFP-10G-LR
10GBASE-ER 1550 nm SMF	SFP-10G-ER
SFP+ Electrical Plug-ins (Note 3)	
Twinax cable, passive, 1 meter	SFP-H10GB-CU1M
Twinax cable, passive, 3 meter	SFP-H10GB-CU3M
Twinax cable, passive, 5 meter	SFP-H10GB-CU5M
Twinax cable, passive, 7 meter	SFP-H10GB-ACU7M
Twinax cable, passive, 10 meter	SFP-H10GB-ACU10M
Video SFP Plug-ins	
Video SFP 1310nm – Tx	VSFP-TX-1310-10
Video SFP 1310nm – Rx	VSFP-RX-1310-10

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

3. Please find further details on the Cisco data sheet for 10 Gigabit BASE SFP+ modules.

Service and Support

Cisco offers a wide range of services programs to accelerate customer success. These innovative services programs are delivered through a unique combination of people, processes, tools, and partners, resulting in high levels of customer satisfaction. Cisco services help you protect your network investment, optimize network operations, and prepare your network for new applications to extend network intelligence and the power of your business. For more information about Cisco services, refer to Cisco Technical Support Services or Cisco Advanced Services.

Manage your network with ROSA service and element management. Get faster mean-time-to-repair, increased uptime, and management that evolves as you provision your networks. US toll-free 1-800-722-2009. EMEA +32 56 445 445. www.cisco.com/go/rosa.

ıllıllı CISCO™

Americas Headquarters	Asia Pacific Headquarters	Europe Headquarters
Cisco Systems, Inc.	Cisco Systems (USA) Pte. Ltd.	Cisco Systems International BV Amsterdam,
San Jose, CA	Singapore	The Netherlands

Cisco has more than 200 offices worldwide. Addresses, phone numbers, and fax numbers are listed on the Cisco Website at **www.cisco.com/go/offices.**

Printed in USA

C78-629533-00   02/11