Scientific Atlanta
A CISCO COMPANY

Headend Systems

Digital Content Manager (DCM) Model D9900

Description

Today's digital systems demand powerful, flexible and compact solutions which will allow the service provider to support new network architectures. The Digital Content Manager (DCM) Model D9900 is a compact MPEG processing platform capable of supporting extremely high numbers of video stream processing. The DCM is the next generation of intelligent headend processing equipment where the combination of compactness and flexibility leads to a cost-effective solution. Based on our experience, the DCM should bring operational and economic benefits in MPEG processing applications. The optional built-in DVB scrambler allows easy integration with several Conditional Access (CA) systems.

Physical Configuration

The DCM comes in a compact 2RU chassis with hot swappable and redundant power supplies. The unit can be configured with up to 4 I/O cards, with each card having either 10 ASI ports or 4 GbE ports. Additionally, the DCM can be fitted with up to four Co-Processor cards to support advanced MPEG processing functions.

The ASI cards have been designed to support full ASI rates allowing freedom in system design. All ASI ports can be individually configured as either input or output and all ASI ports support both MPTS and SPTS streams.

The GbE I/O cards support four GbE ports via SFP connectors, with the card having a total throughput of two Gbps in and two Gbps out. The GbE ports support both MPTS and SPTS streams.

The Co-Processor cards' powerful MPEG content processing cores allow the DCM to perform content re-compression to lower bit rates, support open loop statistical multiplexing, digital program insertion and scrambling. Since the cards are designed around general purpose FPGAs, the DCM is prepared to support multiple functions in the future through simple code downloads.

Grooming and Re-Multiplexing

Re-multiplexing and grooming of content is only a first step of the DCM's MPEG processing capability. The DCM supports advanced PSI and descriptor handling capabilities. Furthermore it supports extensive transport stream and program analysis including program level bit rate measurements on both incoming and outgoing streams to allow the operator 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 is designed to meet evolving architectures for certain future applications.

MPEG Processing Applications

Designed as an MPEG processing application platform, DCM accommodates bandwidth management of several encoder pools using IP-based closed loop statistical multiplexing.

DCM can also operate as a Digital Transport Formatter (DTF) in which multiple incoming transport streams are combined into a single transport stream making it suitable for distributing DVB-T and DVB-H signals for broadcast networks that may operate in an SFN environment.

Advanced Processing

The DCM has been designed to provide MPEG processing power for today's as well as anticipated future requirements. The DCM supports up to 8 Gbps of input and output capability. Each of the four Co-Processing cores is capable of transrating, statistically multiplexing, or rate limiting up to 350 SD streams or 85 HD streams using new IntelliRate™ *Plus* advanced transrating technology and algorithms. Each of the cores allow for digital program insertion (ad splicing) on SD streams as well as on HD streams. Splicing on component level allows for seamless insertion of regional content into existing transport streams. In addition to video processing, these cores also enable the DCM to perform DVB Simulcrypt compliant scrambling. Functionality of the Co-Processing cores is enabled via software licenses, allowing the operator to scale the functionality to their needs while at the same time reducing the capital expense necessary to meet the system requirements.

Conditional Access
The built-in scrambler allows easy integration with several CA systems. Integrating multiple CA systems at the same time is possible through the Simulcrypt interface.

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

High-Quality Video Transmission over IP Networks
As IP is becoming more and more the transport network of choice, provisions are required to maximise quality of service. The DCM'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 allows for a seamless integration with these IP networks.

User Interface and Management
The DCM 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 is a pure HTML-based user interface that can be opened using Microsoft Internet Explorer 6.0 or higher. The GUI supports simple program provisioning through drag and drop functionality. The interface provides detailed information to the user showing the DCM configuration, input and output bit rate measurements, transport stream alarms as well as other information. Additionally, 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.

For integrated network monitoring and control, the DCM is integrated with Scientific-Atlanta's 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 40 ASI interfaces ports (10 ASI ports per ASI I/O card)
  - SPTS and MPTS supported
  - User configurable as input or output on a port per port basis
  - Each ASI port supports up to 213 Mbps data rate
  - Connector type: BNC
- Up to 16 GbE ports (4 ports per GbE I/O card in 2+2 configuration)
  - SPTS and MPTS supported
  - Unicast and multicast support
  - Protocols supported: 802.3, Ethernet, VLAN, RTP, UDP, IP, ARP, ICMP, IGMPv2 / v3
  - Connector type: SFP interfaces
  - FEC according to Pro-MPEG COP3 release 2 (CoP3r2)/SMPTE 2022

Re-multiplexing

- PID filtering / re-mapping on each input
- PID tracking
- Re-multiplexing of services and components
- Content routing from any input to any output port

Advanced Processing

- Transrating of single SD and HD programs, (recompression to lower bit rates)
  - VBR to VBR
  - VBR to CBR (clamped VBR)
  - CBR to CBR
- Open Loop Statistical Re-multiplexing of SD and HD programs
  - Group statistical multiplexing of programs and transrating to lower bit rate if required
  - Support of user defined program prioritization
- Digital Program Insertion in both SD and HD domains
  - Ad insertion based on SCTE 35 and SCTE 30 standards
  - Program substitution based on SCTE 35 triggers or manual interaction
- DVB Simulcrypt scrambling of SD and HD programs
- Advanced Processing features enabled through software licenses on a per program basis

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 mirroring
- Input service redundancy

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

Specifications

Environmental Specifications	
Operating temperature	0°C to +50°C / +32°F to +122°F
Storage temperature	-40°C to +70°C / -40°F to +158°F
Humidity	5% – 95% (non condensing)
Altitude	-200 to 10000 feet (-61 to 3048 m)

Power Requirements	
Power Consumption	
Fully loaded	< 350 W
Input Voltage	
AC input voltage Nominal Normal service voltage range Frequency	 100 – 240 V AC 90 – 254 V AC 47 – 63 Hz
DC input voltage	-48 – -60 V DC

Mechanical Specifications	
Height	2 RU 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

ASI Interface Card	
Number of ports per card	10 ports, each port configurable as input or output
Connector	BNC-type
Impedance	75 Ω
Interface type	Asynchronous Serial Interface (ASI)(according to EN 50083-9)
Packet format	Auto detection: 188 / 204 byte packets
Bit rate	0.1 to 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) (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

Digital Transport Formatter (ASI Card Mode)	
Number of ASI input ports per card	7 ASI ports
Number of ASI output ports per card	3 ASI ports (ports are identical)
Scrambling Activation	Per combined incoming transport stream
Conditional Access	BISS Mode 1

IP Statmux (GbE Card Mode)	
Number of supported encoders	Up to 60
Number of supported encoder pools	Up to 20 statmux pools

(1) SFP Module not included

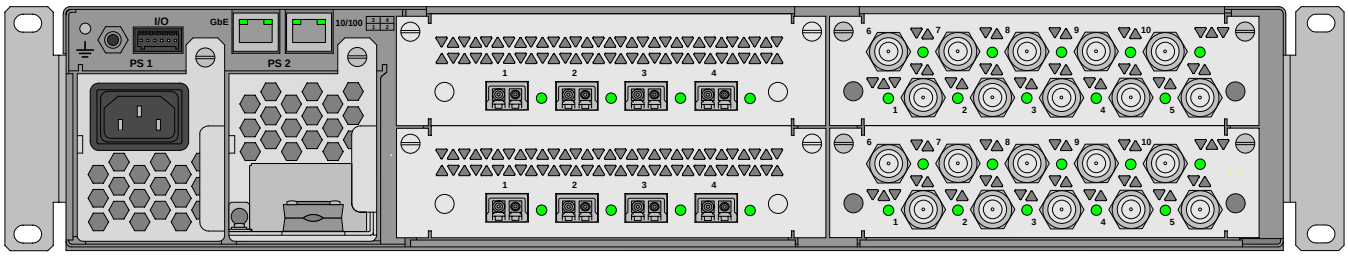
Specifications (continued)

Co-Processing Card	
Video formats	MP@ML (SD) en MP@HL (HD)
Audio formats	MPEG-1 Layer II and Dolby AC-3
Transrating (MPEG 2)	Up to 420 PAL/350 NTSC SD Streams or 85 HD Streams per card
DVB Simulcrypt Scrambling	Up to 500 SD streams per card
Maximum throughput	2 Gbps

Conditional Access	
Scrambling Algorithm	DVB Common Scrambling Algorithm
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

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

Transport Stream Processing
PID filtering / re-mapping capability
Built-in PSI Viewer
Dynamic PSI regeneration with advanced descriptor handling support
Detailed bit rate measurement of incoming services
Error monitoring



Digital Content Manager (DCM) Model D9900 Rear Panel
(AC and DC power supply, 2 GbE cards and 2 ASI cards)

Ordering Information

Digital Content Manager (DCM) Components	Part Number
DCM Pre-configured Unit	
DCM pre-configured unit (fully assembled and pre-enabled licenses)	Dxxxxxxxxxxxxxxxx Call for Part Number
Hardware Upgrades (Boards delivered as separate kits)	
DCM coprocessor board	4010882
DCM ASI I/O board	4010881
DCM GbE board	4023050
DCM GbE I/O + FEC board Kit	4022724
DCM blank plate for I/O slot	4008973
DCM blank plate for power supply	4010913
DCM frontpanel	4012888
Power Supplies	
AC power supply (AC power cord needs to be ordered separately)	4009626
DC power supply	4009627
License Upgrades (Upgrade delivered on a CD-ROM – Note 1)	
DCM license upgrade containing one or more of the following licenses: - Transrating license package (1 license needed for each SD, 4 licenses needed for each HD, coprocessor board needed) - Splicing license package (1 license needed for each SD, 2 licenses needed for each HD, coprocessor board needed) - DVB Simulcrypt Scrambling license package (1 license needed per service) - Digital Transport Formatter (DTF) license package (1 license needed for each ASI board) - Digital Transport Formatter BISS Mode 1 (DTF-BISS) license package (1 license needed for each ASI board) (BISS license can only be used on an ASI board already having a DTF license) - COP3 FEC license package (1 license needed per FEC encode/decode repair stream) Notes: 1. License Upgrade CD-ROMs are delivered as one separate CD-ROM per part number 2. 'xxxx' in the License Upgrade part numbers represent the license quantity for that specific license type	 40113440xxxx (Note 2) 40113460xxxx (Note 2) 40113480xxxx (Note 2) 40223400xxxx (Note 2) 40223420xxxx (Note 2) 40208020xxxx (Note 2)
AC Power Cords	
Argentina	207340
Australia	1000897
China	745415
Europe	3989835
Italy	3993130
Japan	3993133
UK	3989836
US	3989838

Ordering Information (continued)

Digital Content Manager (DCM) Components	Part Number
SFP Plug-ins – WDM types	
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 25 km)	4002021
SFP Plug-ins – CWDM types	
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
SFP Plug-ins – 1000 BT copper	
GbE SFP module 1000 BT copper	4006222

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

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