

The Motorola DOCSIS Cable Module 2000 (DCM 2000) integrates Motorola's expertise in RF technology with an industry-proven high performance Cable Modem Termination System (CMTS). The Motorola DCM 2000 is DOCSIS 1.1 compliant and DOCSIS 1.0 CableLabs qualified. The DCM 2000 interoperates with the SURFboard® family of cable modems, as well as all other vendors' certified DOCSIS cable modems. In addition, the DCM 2000 interoperates with Voice over IP (VoIP) communication gateways such as the Motorola CentriQ™ 1000 and digital set-top boxes including the Motorola DCT5000 to deliver high-speed data, voice and video services over the Hybrid Fiber Coaxial (HFC) network.

Designed as a scalable, modular CMTS, the Motorola DCM 2000 enables cable operators to expand their CMTS network capacity as their subscriber base grows, protecting current investment and revenue streams.

When combined as part of the CAS 2000, the Motorola DCM 2000 delivers a complete high availability CMTS solution. The spare DCM, responsible for ensuring optimal system performance, continuously communicates with each primary DCM for a point of failure, and when detected, will alert the RF Module.



► **Features**

- 1 downstream port, 8 upstream ports
- Dual 100BaseT ports
- Integrated RF upconverter for space efficiency and enhanced system availability
- Onboard processor providing one of the highest throughputs in the industry

► **Benefits**

- DOCSIS 1.0 CableLabs qualified provides interoperability with other vendors' DOCSIS certified cable modems.
- DOCSIS 1.1 compliance provides a seamless migration to DOCSIS 1.1 supporting additional voice and Quality of Service (QoS) features
- N+1 high availability provides 99.999% system availability to meet the growing demands of Voice over IP (VoIP) telephony and data applications
- Multiple Internet Service Provider support



“Targeted to meet the demands of today’s service providers,
the Motorola DCM 2000 provides a robust and flexible

FUNCTIONALITY

► Functionality to Meet Today’s Application Needs

Targeted to meet the demands of today’s service providers (Multiple System Operators, Local Cable Operators, ISPs and other emerging communication providers), the Motorola DCM 2000 provides a robust and flexible architecture. Based on a remote access server (RAS) model, the DCM 2000 offers anti-spoofing functions resulting in greater subscriber privacy and higher system availability. Support for SNMPv3 delivers enhanced authentication and system privacy, as well as standards based remote configuration. Features such as per subscriber filters, per cable modem DHCP assignments and per cable modem maximum number of subscribers are examples of the level of flexibility the DCM 2000 offers. In addition, dynamic frequency agility optimizes system throughput by reducing cable plant disruptions.

As data, voice and video converge, new classes of entertainment and business services will emerge. Motorola offers proven access solutions, above and beyond DOCSIS 1.1, to meet the changing needs of the business market. Motorola’s enhanced revenue generating solutions include:

- Quality of Service (QoS)
- IP Multicast
- Customer Premise Routing

► System Architecture

Designed as a scalable, compact CMTS, a single DCM 2000 provides 1 transmitter, 8 receivers and dual 100BaseT ports. Additionally, the DCM provides an embedded state-of-the-art central processing unit (CPU) that generates superior levels of MAPs per second and wire-speed forwarding of 64 Byte packets, even with BPI and access lists enabled. A flash card, used to optimize system reliability, is housed within each DCM and serves as a storage device for system software, configuration and log files. Designed for space efficiency, an integrated upconverter also enhances system availability and eliminates the need for an external upconverter.

RELIABILITY

► Carrier Class Reliability

With the DCM 2000, operators can deliver carrier class reliability for support of lifeline telephony services. The Motorola DCM 2000 can operate as a stand-alone DOCSIS CMTS or reside within a cluster of up to five active DCMs with a backup DCM that serves as a spare for system redundancy (N+1). The spare DCM, responsible for ensuring optimal system performance, continuously communicates with each primary DCM for a point of failure; and when detected, will alert the RF Module to execute a switch over. With the DCM 2000, data, voice and video connections are instantly backed-up since the transfer of HFC cable signals from the failed DCM to the spare occur in milliseconds.

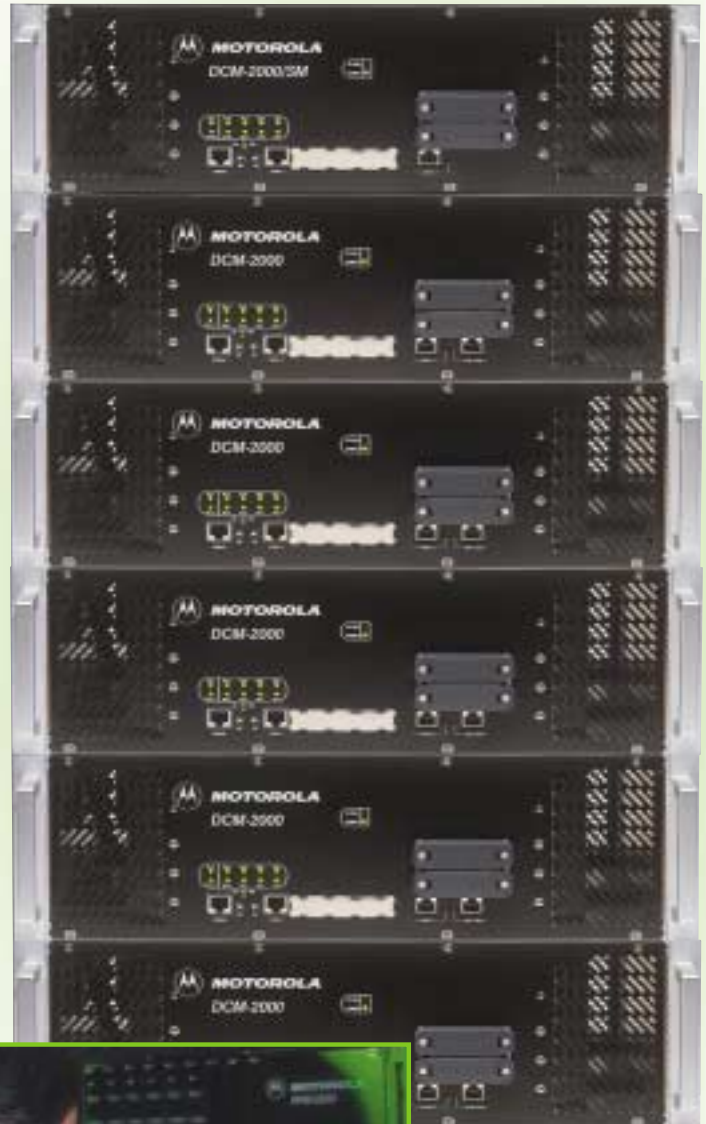
architecture.”

MANAGEMENT

➤ Network Management

The DCM 2000 supports the DOCSIS RF Interfaces MIB, Baseline Privacy MIB, Cable Device MIB and the Motorola Enterprise MIB. Via Simple Network Management Protocol (SNMP) V1, V2 and V3 or Command Line Interface (CLI) the cable operator can configure, manage and control the CMTS.

As part of the CAS 2000 solution, Motorola offers the Control Management Module (CMM 2000), which provides a single management interface to manage the entire CMTS network from a central site or remote location.



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DCM 2000 SPECIFICATIONS

UPSTREAM-RF

Bandwidth 200, 400, 800, 1600,
3200 kHz

Data Rate 320 kbps - 10240 kbps

Symbol Rate 160, 320, 640, 1280,
2560 ksym/s

Modulation. QPSK or 16 QAM

Receive Frequency
Range. 5 MHz - 42 MHz w/dynamic
frequency agility

Spectral Shaping . . .25 SRRC

Input Impedance. . 75 Ω (nominal)

Minimum C/N
(at nominal
level - FEC Off) . . . QPSK: 15 dB,
16 QAM: 21 dB

Dynamic Range. . . 30 dB per given symbol rate

- 160 ksym/s -16 dBmV to +14 dBmV
- 320 ksym/s -13 dBmV to +17 dBmV
- 640 ksym/s -10 dBmV to +20 dBmV
- 1280 ksym/s -7 dBmV to +23 dBmV
- 2560 ksym/s -4 dBmV to +26 dBmV

Adjacent Channel
Interference Adjacent channel (digitally
modulated carrier) = +11 dBc
Adjacent channel (unmodu-
lated carrier) = +25 dBc

DOWNSTREAM-RF

Bandwidth. 6 MHz

Modulation 64 QAM or 256 QAM
(ITU-T Rec. J.83
Annex B - 6/97)

Modulation
(Symbol) Rate. . . . 64 QAM: 5.056941 Msym/s
256 QAM: 5.360537 Msym/s

Transmit
Frequency Range . 88 - 860 MHz

Spectral Shaping
(Excess
Bandwidth) 64 QAM: 0.18 Square Root
Raised Cosine
256 QAM: 0.12 Square Root
Raised Cosine

Information
Bit Rate (MPEG2
Framing) 64 QAM: 26.4 Mbps
256 QAM: 37.98 Mbps

Transmit Level . . . +50 dBmV to +61 dBmV

Spurious Response

- Adjacent Channel = < -62 dBc:
(BW = 5.25 MHz, 3.75 MHz \leq FC \leq 9 MHz)
- Alternate Channel = < -65 dBc:
(BW = 6 MHz, 9 MHz \leq FC \leq 15 MHz)
- Remaining Channels = < -12 dBmV:
(BW = 6 MHz, 15 MHz \leq FC \leq 860 MHz)

Output
Impedance 75 Ω (nominal)

ENVIRONMENTAL

Operating
Temperature. 0° C to +40° C
(+32° F to +104° F)

Power
Consumption 190 W TYP

Power Source. 90 - 264 VAC; 50/60 Hz
-48 VDC

Safety Approvals . . UL 1950;
CSA C22.2 No. 950;
IEC 950; EN60950

Emissions. FCC Part 15, Class A;
ICES-003, Class A;
CISPR 22, Class A;
EN55022, Class A;
AS/NZS 3548, Class A;
EN50083-2

Immunity EN50082-1

PHYSICAL

Dimensions 18.9" W x 5.4" H x 18" D
(rack mounted)

Weight 24 lbs.

HFC Configuration . . (1) Downstream Port
with Integral Upconverter
(8) Upstream Ports

Network
Configuration. (2) 100BaseT Ports (RJ45)

LEDs (Front Panel) . . Status (Power)
DC Output Alarm
Transmitter Port Status
Receiver Port Status
Dual 100BaseT Port Status
Board Status
CPU Status
Disk Status

LEDs (Back Panel) . . Temperature
Fan
Power Supply
4.8 Output

In-Band
Management Remote SNMP via
standard MIB browser
and Telnet via
100BaseT Port

Out-of-Band
Management RS232 serial craft
interface

CONCLUSION

The DCM 2000 is the "basic building block" of Motorola's Cable Access System, and can be deployed as a stand-alone CMTS or reside within the CAS 2000. The Motorola DCM 2000 supports the entire range of system requirements, from basic data capabilities to advanced Voice over Internet Protocol (VoIP) telephony applications. The DCM 2000 is a scalable and flexible solution that employs the latest in high-density technology. Motorola's field-proven distributed processing design provides one of the highest packet throughputs of any CMTS available today.



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Specifications subject to change.