Cisco Coaxial Media Converter for Remote-PHY

Deploy DOCSIS over digital fiber while maintaining feature parity with existing cable modem termination systems (CMTS). That's the advantage of Remote-PHY. As an important part of Remote-PHY, the Cisco® Coaxial Media Converter (CMC) is a CableLabs® DOCSIS® 3.0 and C-DOCSIS/Remote-PHY standard-compliant Remote PHY device that supports RF functions at the physical layer. Additionally, the system control, classification and forwarding, and MAC functionality are still retained in the CMTS core (the Cisco uBR10012 Universal Broadband Router configured with Cisco uBR-MC3GX60V-RPHY Broadband Processing Engine).

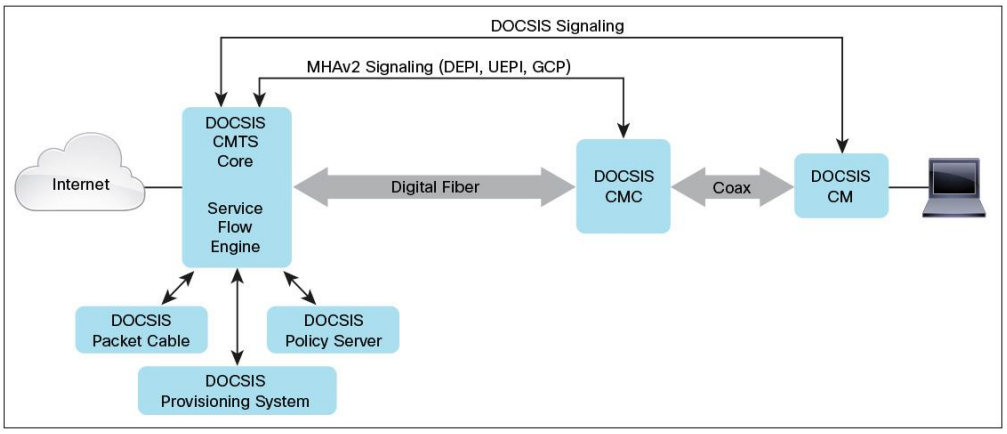
Figure 1. Cisco Coaxial Media Converter For Remote-PHY

The Cisco CMC (Figure 1) converts data between the coaxial cable network and the passive optical network (PON) or the Metro Ethernet network. The Cisco CMC connects to the cable modem through the CATV coaxial cable network and to an aggregation network through the PON or the Metro Ethernet network in the upstream direction.

Remote-PHY System Architecture

The Cisco Remote-PHY system consists of the DOCSIS CMTS core, the Cisco CMC, cable modem, and supporting system. It handles broadband data and digital video access and forwarding, service configuration, and management and maintenance of CATV coaxial cable networks. The Modular Headend Architecture version 2 (MHAv2) is a set of open protocol standard recommendations specifically designed for Remote-PHY.

Figure 2. Remote-PHY Standard Architecture



The Modular Headend Architecture (MHA) is a CableLabs specification for a M-CMTS architecture that differs from the integrated CMTS (I-CMTS) architecture, which has PHYs internal to CMTS. The MHA includes DOCSIS External Downstream Interface (DEPI), DOCSIS Timing Interface (DTI), Operations Support System Interface (OSSI), and video-related specifications. MHAv2 is the extension of MHA, a new Layer 2 Tunneling Protocol Version 3 (L2TPv3)-based protocol Upstream External PHY Interface (UEPI) is defined for upstream DOCSIS MAC management and data packets encapsulation. It supports the combination of DEPI and UEPI in the remote side, hence is also called DOCSIS Remote PHY. General Control Plane (GCP) protocol is also introduced as the general control plane protocol used to start, run, and configure the CMC.

In the MHAv2 architecture, both downstream PHY and upstream PHY are deployed on the remote side, which is called CMC. Please note that the CMC has to work with the Cisco uBR-MC3GX60V-RPHY BPE line card that has the same functionality as the existing Cisco uBR-MC3GX60V except for the RF and PHY-related features. The CMC has both radio frequency interference (RFI) and Gigabit Ethernet (GigE) interfaces while the line card only has GigE interfaces for both upstream and downstream.

DEPI is based on L2TPv3 and is the downstream link between the downstream MAC and remote downstream PHY, which is inherited from MHA and contains the forwarding plane protocol. UEPI is also based on the L2TPv3 and is the upstream link between upstream MAC and upstream PHY.

In the MHAv2 architecture, the CMC and the digital fiber network are transparent to cable modems. The CMC is managed in the CMTS core with GCP. The cable modem and provisioning system do not change. With this approach, Cisco CMC for Remote-PHY has some of the least complicated electronics in the cable field, providing better reliability and lower cost.

The MHAv2 with DEPI and UEPI has been adopted by CableLabs and the China State Administration of Radio, Film, and Television (SARFT) for inclusion in the China DOCSIS (C-DOCSIS) specification.

Remote-PHY System Key Features and Benefits

- Preserves the centralized software structure of the CMTS and rich feature sets. Allows for future software upgrades without requiring upgrades of the numerous remote nodes in the field.
- Requires a small amount of hardware and software in the remote node to keep the device relatively simple and stable. This provides many operational advantages. There is less troubleshooting required. The simpler the hardware, the less chance of failure, simplifying normal operations. Additionally, most of the intelligent software resides in the CMTS in the headend, making it easier for customers to deploy upgrades as new features and capabilities evolve. Instead of upgrading thousands of nodes in the field, upgrades are deployed centrally in the headend.
- Supports Ethernet-based network such as Ethernet Passive Optical Network (EPON), Gigabit Passive Optical Network (GPON) and Layer 2 Metro Ethernet. This gives customers the flexibility to cost-effectively select which transmission network is most appropriate to their needs.
- Preserves the sophisticated DOCSIS quality of service (QoS) assurance mechanism to help ensure end-to-end QoS. The granularity of scheduling is per service flow-based. In addition, there is no mapping needed from the DOCSIS service flow to the Ethernet packet virtual LAN (VLAN).
- The CMC and transmission network are transparent to the CMTS and cable modem so the Remote-PHY has no effect on the existing CMTS and cable modem. Instead, the architecture allows the use of digital Fiber.

Figure 3. Cisco Coaxial Media Converter Silkscreen Base Cover

Features List

- DOCSIS3.0 and Euro-DOCSIS3.0 compliant
- C-DOCSIS and Remote-PHY Standard compliant
- Support up to 16 Downstream channels and up to 4 Upstream channels
- Support 60VAC Line power or 220VAC Main Power
- Support Forward Optical Receiver (one way fiber node) that is customer selectable
- Support EPON/GPON SFP ONU
- Input: 1x RF input, 1 Fiber input for CATV video, 1+1 redundant GE RJ45 for external PON ONU connection or 1+1 redundant SFP GE fiber input or 1 Fiber input for internal PON SFP ONU connection.
- Max Output:
  - 4x RF out, QAM RF output =45dBmV (16 channels)/60dBmV(1 channel), CATV output = 50dBmV
  - 2x RF out, QAM RF output =49dBmV (16 channels)/64dBmV(1 channel), CATV output = 54dBmV (by using jumpers to replace splitters, 4 RF ports CMC can be converted to 2 RF ports CMC)
- 42/54 or 65/87MHZ split
- Operating temperature: -40°C ~55°C
- Waterproof: IP67
- Max AC through current (continuous): 15A
- Surge-resistant circuitry ensures resistance to high voltage transients (6kV for 60V CMC, 4kV for 220V CMC)
- Standard DOCSIS service flow based end to end QoS
- No need for mapping of service flow to PON VLANS that reduces the end to end system to DOCSIS 1.0 Class of Service operation
- Standard Dynamic QoS, Standard packet cable and packet cable multimedia
- From 4-channel to 16-channel downstream bonding capable; 4-channel upstream bonding capable
- 2 Small Form-Factor Pluggable (SFP) ports which can be configured as 1+1 redundancy
- Full DOCSIS 3.0 CMTS and downstream external PHY interface (DEPI) capability
- Full DOCSIS 3.0 CMTS and upstream external PHY interface (UEPI) capability
- Full DOCSIS 3.0 CMTS and General control plane protocol (GCP) capability
- Superior RF performance with enhanced full-feature tap (FFT), ingress cancellation, and impulse noise detection capability
- Time Division Multiple Access (TDMA), Advanced Time Division Multiple Access (A-TDMA)
- One CMC controller (Cisco uBR-MC3GX60V-RPHY) provides a single point of management for many CMCs
- Support DOCSIS 2.0, 3.0 modems
- CLI based commands to manage both the CMTS and CMC

Product Specifications

Table 1. CMC Product Specifications

Descriptions	Specifications
Physical Dimensions	• Dimensions (H x W x D): 170 x 318 x 403 mm
Power Consumption	60VAC • Max power: 100W (w/ FRX, w/ 1G EPON ONU) • Min power: 63.5W (w/o FRX, w/o ONU, w/ one SFP) 220VAC • Max power: 90W (w/ FRX, w/ 1G EPON ONU) • Min power: 65.5W (w/o FRX, w/o ONU, w/ one SFP)
Weight	• Max Weight: 26 lb (11.8 kg with FRX and SFP) • Min Weight: 25.3 lb (11.5 kg without FRX and SFP)
Waterproof	IP67
Product Type	Outdoor
Voltage	• Main Power: 85~264VAC • Line power: 25~90VAC
Interface	• 1 × RF input, 5/8" [1] • 2 or 4 ×RF output, 5/8" [1] • 2 × RJ45 Ports (GE) • 2 × GE SFP or 1 x PON SFP • 1 × FRX (Customer selectable)
Environmental	• Operating altitude: -197 to 13,123 ft (-60 to 4000 m) • Storage temperature: -40 to 149°F (-40 to 85°C) • Operating temperature, nominal: -40 to 131°F (-40 to 55°C) • Storage relative humidity: 5 to 95% • Operating relative humidity: 10 to 90% • Maximum heat dissipation: 114W, or 389 BTU/hr
Software release	• Cisco IOS® Software Release 12.2(33) CX or later
Supported Cisco SFP	They are orderable part numbers, hence no need to insert Cisco at the beginning of the name. • GLC-SX-MM-RGD (1000BASE-SX) 850nm • GLC-LX-SM-RGD (1000BASE-LX) 1310nm • GLC-ZX-SM-RGD (1000BASE-ZX) 1550nm
DOCSIS Parameters	
Standard	Euro-DOCSIS3.0/DOCSIS 3.0/DOCSIS 2.0/C-DOCSIS/Remote-PHY
Terminals	DOCSIS 3.0/2.0CM
Max Number of CM per Cisco CMC	8000
US Communication Protocol	ATDMA
Frequency Band	Downstream: 87~1002MHz /54~1002MHz Upstream: 5~65MHz/5~42MHz
Channel Width	Downstream: 6MHz/8MHz Upstream: 1.6MHz/3.2MHz/6.4MHz
Channel Number	Downstream Channels: 16 Upstream Channels: 4
Modulation	Downstream: 64/256 QAM Upstream: QPSK/16/32/64 QAM
Max QAM Output level	Max 45dBmV @ 16 channel/60dBmV(1 channel) 4 output ports Max 49dBmV @ 16 channel/64dBmV(1 channel) 2 output ports[2]
Max CATV Output level	Max 50dBmV @ 4 output ports Max 54dBmV @ 2 output ports[2]

Descriptions	Specifications
US Receiving Sensitivity	-5 dBmV
Output Impedance	75 ohm
Performance Parameters	
FLASH	128MB
DDR3 Memory	256MB
MTU	1522 Byte
DHCP	Support Option43, Option60, Option82 Support DHCP Relay Support DCHP Snooping
VLAN	Support 802.ad Support 802.1q
VoIP	Support RTPS, UGS
Security (System)	Support Illegal CM detection Support MAC address skimming
Network Management	Support CLI, SSH, Telnet and R232 Serial port Support SNMP V1/V2/V3 Support Syslog
Remote SW upgrading	Support remote SW/FW upgrading
Regulatory Compliance	
Safety	• EN/IEC 60950-1 (Safety of Information Technology Equipment) • AS/NZS 60950.1 (Safety of Information Technology Equipment)
Electromagnetic emissions	• EN55022, Class A • CISPR 22, Class A • VCCI, Class A • AS/NZS CISPR 22, Class A • KN 22, Class A • IEC/EN61000-3-2 Power Line Harmonics • IEC/EN61000-3-3 Voltage Fluctuations and Flicker • EN50083-2
Electromagnetic immunity	• IEC/EN61000-4-2 Electrostatic Discharge Immunity • IEC/EN61000-4-3 Radiated Immunity • IEC/EN61000-4-4 Electrical Fast Transient Immunity • IEC/EN61000-4-5 Surge • IEC/EN61000-4-6 Immunity to Conducted Disturbances • IEC/EN61000-4-11 Voltage Dips, Short Interruptions, and Voltage Variations • KN24
ETSI/EN	• EN55022 Information Technology Equipment (Emissions) • EN55024 Information Technology Equipment (Immunity)
Network Equipment Building Systems (NEBS): Level 3	Designed to meet requirements of: • GR-63-CORE, Issue 3, March 2006 • GR-1089-CORE, Issue 4, June 2006
Mechanical	• IEC 68-2-1, IEC 68-2-2, IEC 68-2-56: Operational temperature and humidity • IEC 68-2-27: Operating shock • IEC 68-2-64, IEC 68-2-6, IEC 68-2-47: Operating and non-operating vibration • IEC 68-2-32: Nonoperating freefall drop • IEC 68-2-40: Nonoperating altitude • IEC 68-2-27, IEC 68-2-32: Nonoperating mechanical shock • IEC 68-2-3: Nonoperating humidity • IEC 68-2-14, IEC 68-2-33: Nonoperating temperature shock

Descriptions	Specifications
LEDs	• Power ◦ Green — Power on ◦ Off — Not power on • Uplink status (SFP or ONU or Ethernet) ◦ Green — Active ◦ Flashing Green — Data transmission ◦ Off — Port link down • Downstream RF port status ◦ Green — Active ◦ Off — Down • System Status ◦ Green — Cisco CMC system is ok ◦ Flashing Green — System is booting ◦ Off — Fail to boot or self check not pass • Alarm ◦ Off — Cisco CMC works normally ◦ Yellow — Temperature, current, power monitor alarm ◦ Red — CPU, FPGA, Switch failure
Network Management Information	
DOCSIS MIBs	• Compliant with DOCSIS Standard MIBs • CMC management MIBs
Standard MIBs	• IF-MIB (RFC-2233) • IP-FORWARD-MIB (RFC-4292) • ENTITY-MIB (RFC-2737) • MIBII (RFC1213) • EtherLike-MIB (RFC-2665) • IGMP-MIB (RFC-2993) • RMON-MIB (RFC-1757) • IP-MIB • ENTITY-SENSOR-MIB
Expression MIBs	• Simple Network Management Protocol Version 2 Structure of Managed Information (SNMPv2 SMI) • SNMPv2-TC • SNMPv2-MIB • IANAifType-MIB
Simple Network Management Protocol Version 3 (SNMPv3) MIBs	• SNMP-FRAMEWORK-MIB (RFC-2571) • SNMP-MPD-MIB (RFC-2572) • SNMP-NOTIFICATION-MIB (RFC-2573) • SNMP-TARGET-MIB (RFC-2573) • SNMP-USM-MIB (RFC-2574) • SNMP-VACM-MIB (RFC-2575)
DOCSIS and EuroDOCSIS MIB	• DOCS-IF-MIB (RFC 4546) • DOCS-CABLE-DEVICE-MIB (RFC-2669) • DOCS-BPI-PLUS-MIB (Rev 5) • DOCS-QOS-MIB (Rev 4) • DOCS-CABLE-DEVICE-TRAP-MIB • DOCS-SUBMGT-MIB (Rev 2) • DOCS-IF3-MIB • DOCS-QOS3-MIB • DOCS-DRF-MIB • DOCS-LOADBAL3-MIB • DOCS-DIAG-MIB • DOCS-SUBMGT3-MIB • CLAB-TOPO-MIB • DOCS-MCAST-AUTH-MIB

Descriptions	Specifications
	• DOCS-MCAST-MIB • DOCS-SEC-MIB • DOCS-IETF-BPI2-MIB • DOCS-IETF-QOS-MIB
Cisco DOCSIS MIBs	• CISCO-DOCS-EXT-MIB • CISCO-DOCS-REMOTE-QUERY-MIB • CISCO-DOCS-QOS-EXT-MIB • CISCO-CABLE-SPECTRUM-MIB • CISCO-CABLE-AVAILABILITY-MIB • CISCO-DOCS-EXT-CAPABILITY-MIB • CISCO-CABLE-WIDEBAND-MIB
Cisco C-DOCSIS MIBs	• CISCO-CDOC-CHGRP-MIB • CISCO-CMC-MGR-MIB
Cisco generic MIBs	• CISCO-SYSLOG-MIB • CISCO-SMI-MIB • CISCO-TC-MIB • CISCO-PRODUCTS-MIB • CISCO-FLASH-MIB • CISCO-CONFIG-MAN-MIB • CISCO-CONFIG-COPY-MIB • CISCO-MEMORY-POOL-MIB • CISCO-BULK-FILE-MIB • CISCO-SONET-MIB • CISCO-TCP-MIB • CISCO-RTTMON-MIB • CISCO-FTP-CLENT-MIB • CISCO-IPMROUTE-MIB • CISCO-QUEUE-MIB • CISCO-IMAGE-MIB • CISCO-ENVMON-MIB • CISCO-ENTITY-VENDORTYPE-OID-MIB • CISCO-PRODUCTS-MIB

Notes:

1. Cisco CMC is by default equipped with 5/8” interface. Operator can change it to PG11 interface by manually removing the PG11 to 5/8” adapters.
2. The default Cisco CMC configuration is 4 RF ports, operator can change it to 2 RF ports by using jumpers to replace splitters and use port plugs to terminate the unused RF ports.

Table 2. Forward Optical Receiver Module Section Specifications

Item	Value
Optical Section Specifications	
Wavelength	1200 to 1610 nm
Optical Input Range	-8 to +2 dBm
Optical AGC Range	-6 to 0 dBm
Optical AGC Control Stability	±1.5 dB
Optical Connector	SC/APC
Equivalent Input Noise	≤ 6 pA/$\sqrt{\text{Hz}}$
RF Output Level @ -6 dBm Optical Input	Refer to chart below (dBmV) (AGC Off)
Frequency Range	52-1002 MHz

Item	Value
RF Reference output levels[1]	
1002MHZ	50.0 dBmV
870MHz	48.4 dBmV
750MHz	47.5 dBmV
650MHz	46.7 dBmV
550MHz	45.8 dBmV
87MHz	41.6 dBmV
52MHz	41.0 dBmV
Default tilt (±1.0 dB)	9 dB
Frequency Response	±0.75 dB
Output Return Loss	≥ 16 dB
Forward tilt range	3 to 15 dB, 1 dB step
Forward Attenuator	0 to -6dB, 1 dB step
Distortion @ 78 NTSC + Digitial[2] **CTB** **CSO** **XMOD**	Typical 68 dB 65 dB 60 dB
Distortion @ 59 PAL B/G + Digital[2] **CTB** **CSO**	Typical 70 dB 67 dB
Distortion @ 59 PAL D/K + Digital[2] **CTB** **CSO**	Typical 70 dB 67 dB
Distortion @ 42 CENELEC[2] **CTB** **CSO**	Typical 65 dB 62 dB

Notes:

1. RF Output Levels are referenced to an Optical Input Level at 1310 nm at 3.25% OMI
2. Distortion performance reference output level is 50 dBmV with default 9dB tilt. QAM carrier is -6 dB relative to analog CW carrier level

Figure 4. Cisco CMC Optical Forward Receiver RF Output Level Curve

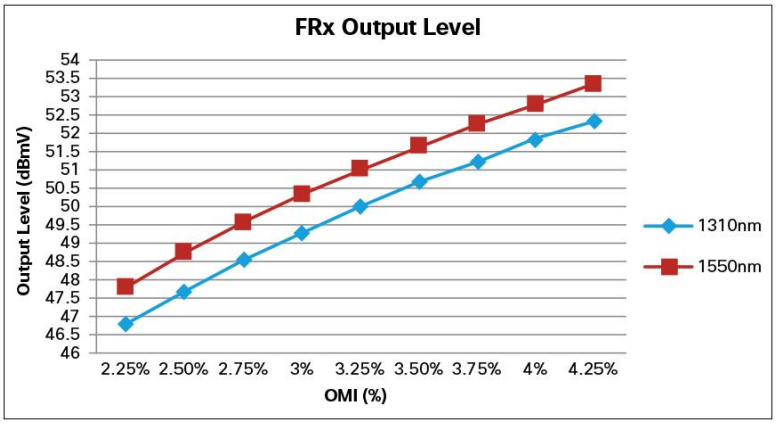


Table 3. Cisco CMC Forward RF Section Specifications (Cisco CMC with Forward Optical Receiver Integrated)

Item	Value
Optical Section Specifications	
Wavelength	1200 to 1610 nm
Optical Input Range	-8 to +2 dBm
Optical AGC Range	-6 to 0 dBm
Optical AGC Control Stability	±1.5 dB
Optical Connector	SC/APC
Equivalent Input Noise	≤ 6 pA/$\sqrt{\text{Hz}}$
Forward RF Section Specifications	
Frequency Range	54-1002MHz 87-1002 MHz
RF Reference output levels	
1002MHZ	50.0 dBmV
870MHz	48.4 dBmV
750MHz	47.5 dBmV
650MHz	46.7 dBmV
550MHz	45.8 dBmV
87MHz	41.6 dBmV
54MHz	41.02 dBmV
Forward tilt range in FRX	3~15 dB, 1dB step
Tilt Range in Cisco CMC RF Section	0~12 dB, 1.5dB step
Cisco CMC Flatness with Tilt	±1.0 dB (87MHz~1GHz) @ 65/87 Diplexer ±1.5 dB (54MHz~1GHz) @ 42/54 Diplexer
Output Return Loss	≥ 16 dB (54/87-550 MHz) ≥ 14 dB (550-1002 MHz)
Distortion @ 78 NTSC + Digitial[1,2] **CTB** **CSO**	Typical 67dB 64 dB
Distortion @ 59 PAL B/G + Digital[1,2] **CTB** **CSO**	Typical 68 dB 66 dB
Distortion @ 59 PAL D/K + Digital[1,2] **CTB** **CSO**	Typical 68 dB 66 dB
Distortion @ 42 CENELEC[1,2] **CTB** **CSO**	Typical 63 dB 60 dB

Notes:

1. Forward performance is from optical receiver to RF output port with default setting (0 dB pad, 0 dB linear EQ and Splitter).
2. Distortion performance reference output level is 50 dBmV with default 9dB tilt. QAM carrier is -6 dB relative to analog CW carrier level.
3. RF Output Levels are referenced to an Optical Input Level at 1310 nm at 3.25% OMI.

Table 4. Cisco CMC Forward RF Section Specifications (Cisco CMC without Forward Optical Receiver Integrated)

Item	Value
Forward RF Section Specifications	
Frequency Range	54/87-1002 MHz
Cisco CMC Flatness with Tilt	±1.0 dB (87MHz~1GHz) @ 65/87 Diplexer ±1.25 dB (54MHz~1GHz) @ 42/54 Diplexer
Gain @1002MHz	-2.5dB (w/Splitter) 1.5dB (w/Jumper)
Output Return Loss	≥ 16 dB (54/87-550 MHz) ≥ 14 dB (550-1002 MHz)
Default CATV output tilt	0dB
Distortion @ 78 NTSC + Digital[1,2] **CTB** **CSO**	Typical 68 dB 65 dB
Distortion @ 59 PAL B/GK + Digital[1,2] **CTB** **CSO**	Typical 70 dB 67 dB
Distortion @ 59 PAL D/K + Digital[1,2] **CTB** **CSO**	Typical 70 dB 67 dB
Distortion @ 42 CENELEC[1,2] **CTB** **CSO**	Typical 66 dB 64 dB
HUM Modulation **8A AC current feeding into RF/AC port** **15A AC current feeding into RF/AC port**	 -65.0 dBc (Typical) between 87 - -60.0 dBc (Typical) between 87 - 862MHZ -55.0 dBc (Typical) between 862 - 1002 MHZ
Notes: 1. Forward performance is from CATV IN to RF output port with default setting (0 dB pad, 0 dB linear EQ and Splitter). 2. Distortion performance reference output level is 50 dBmV with default 9dB tilt. QAM carrier is -6 dB relative to analog CW carrier level.	

Table 5. Powering Data (220VAC CMC with FRX)

Powering Data (220VAC)									
AC input Voltage (V)	85	90	100	110	120	130	140	150	160
AC input Current (A)	1.06	1.00	0.89	0.81	0.74	0.68	0.63	0.59	0.55
AC input Power (W)	90.1	89.6	88.9	88.5	88.2	87.9	87.8	87.5	87.5

170	180	190	200	210	220	230	240	250	260	264
0.53	0.50	0.47	0.45	0.43	0.41	0.40	0.38	0.37	0.36	0.35
87.34	87.34	87.34	87.34	87.34	87.34	87.24	87.24	87.14	86.83	86.01

Table 6. Powering Data (60VAC CMC with FRX)

Powering Data (60VAC)								
AC input Voltage (V)	25	30	40	50	60	70	80	90
AC input Current (A)	3.99	3.25	2.41	1.90	1.57	1.35	1.19	1.07
AC input Power (W)	99.75	97.50	94.97	93.83	92.91	92.49	92.08	91.77

Warranty Information

Warranty information is available on Cisco.com at the Product Warranties page.

Ordering Information

Table 7 provides ordering information. To place an order, visit the Cisco Ordering Home Page. To download software, visit the Cisco Software Center.

The Cisco Coaxial Media Converter for Remote-PHY is available in a wide variety of configurations. This page also contains ordering information for required and optional accessories. Consult your Customer Service Representative or Applications Engineer to determine the best configuration for your particular application.

Table 7. Ordering Information

Product Description	Part Number
Cisco Coaxial Media Converter (CMC)	
RPHY CMC, 60V, 6DS 4US Ch, 42/54MHZ	CMC-L-L-16X4
RPHY CMC, 60V, 16DS 4US Ch, 65/87MHZ	CMC-L-M-16x4
RPHY CMC, 60V, 16DS 4US Ch, 42/54MHZ, w/Node	CMC-L-L-16X4-N
RPHY CMC, 60V, 16DS 4US Ch, 65/87MHZ, w/Node	CMC-L-M-16x4-N
RPHY CMC, 110/220V, 16DS 4US Ch, 42/54MHZ, US PowCord	CMC-M-L-16X4-US
RPHY CMC, 110/220V, 16DS 4US Ch, 42/54MHZ, JP PowCord	CMC-M-L-16X4-JP
RPHY CMC, 110/220V, 16DS 4US Ch, 42/54MHZ, EU PowCord	CMC-M-L-16X4-EU
RPHY CMC, 110/220V, 16DS 4US Ch, 42/54MHZ, UK PowCord	CMC-M-L-16X4-UK
RPHY CMC, 110/220V, 16DS 4US Ch, 42/54MHZ, India PowCord	CMC-M-L-16X4-ID
RPHY CMC, 110/220V, 16DS 4US Ch, 65/87MHZ, CH PowCord	CMC-M-M-16x4-CH
RPHY CMC, 110/220V, 16DS 4US Ch, 65/87MHZ, JP PowCord	CMC-M-M-16x4-JP
RPHY CMC, 110/220V, 16DS 4US Ch, 65/87MHZ, US PowCord	CMC-M-M-16x4-US
RPHY CMC, 110/220V, 16DS 4US Ch, 65/87MHZ, EU PowCord	CMC-M-M-16x4-EU
RPHY CMC, 110/220V, 16DS 4US Ch, 65/87MHZ, UK PowCord	CMC-M-M-16x4-UK
RPHY CMC, 110/220V, 16DS 4US Ch, 65/87MHZ, AU PowCord	CMC-M-M-16x4-AU
RPHY CMC, 110/220V, 16DS 4US Ch, 42/54, US PowCord, w/Node	CMC-M-L-16X4-USN
RPHY CMC, 110/220V, 16DS 4US Ch, 42/54, EU PowCord, w/Node	CMC-M-L-16X4-EUN
RPHY CMC, 110/220V, 16DS 4US Ch, 42/54, JP PowCord, w/Node	CMC-M-L-16X4-JPN
RPHY CMC, 110/220V, 16DS 4US Ch, 42/54, UK PowCord, w/Node	CMC-M-L-16X4-UKN
RPHY CMC, 110/220V, 16DS 4US Ch, 42/54, ID PowCord, w/Node	CMC-M-L-16X4-IDN
RPHY CMC, 110/220V, 16DS 4US Ch, 65/87, CH PowCord, w/Node	CMC-M-M-16x4-CHN
RPHY CMC, 110/220V, 16DS 4US Ch, 65/87, JP PowCord, w/Node	CMC-M-M-16x4-JPN
RPHY CMC, 110/220V, 16DS 4US Ch, 65/87, US PowCord, w/Node	CMC-M-M-16x4-USN
RPHY CMC, 110/220V, 16DS 4US Ch, 65/87, EU PowCord, w/Node	CMC-M-M-16x4-EUN
RPHY CMC, 110/220V, 16DS 4US Ch, 65/87, UK PowCord, w/Node	CMC-M-M-16x4-UKN
RPHY CMC, 110/220V, 16DS 4US Ch, 65/87, AU PowCord, w/Node	CMC-M-M-16x4-AUN
RPHY CMC, 110/220V, 16DS 4US Ch, 65/87, ID PowCord, w/Node	CMC-M-M-16x4-IDN

Product Description	Part Number
Accessory For CMC	
CABLE GLAND FOR RJ45, PG16, 1 HOLE	GLND-PG16-RJ-1H=
CABLE GLAND FOR RJ45, PG16, 2 HOLES	GLND-PG16-RJ-2H=
PLUG W/ O-RING 5/8" BRASS NICKEL PLATE	PLUG-CMC-RF=
ASSY, F-CONN, 5/8", METRIC	FCONNTOR-CMC-M=
ASSY, F-CONN, 5/8, STND	FCONNTOR-CMC-S=
GS7000 Node Signal Director Spltr (Kit/10)	4011908
GS7000 Node Signal Director Jmpr (Kit/10)	4011907
Cisco CMC Console cable, converter between DB9 and PCB	CAB-CONSOLE-DB9=
Optical Adapter For SC/APC to SC/APC	OPT-ADP-SC-SC=
Optical Adapter For SC/APC to FC/APC	OPT-ADP-SC-FC=
SFP Optics For Cisco CMC	
1000Mbps Multi-Mode Rugged SFP	GLC-SX-MM-RGD
1000Mbps Single Mode Rugged SFP	GLC-LX-SM-RGD
Cisco 1000BASE-ZX Single Mode Rugged SFP	GLC-ZX-SM-RGD
1000BASE-BX SFP, 1310NM[2]	GLC-BX-U
1000BASE-EX SFP transceiver module, SMF, 1310nm, DOM[2]	GLC-EX-SMD
Note: 1. The type of SFP need to be selected based on application and environmental conditions. Check SFP datasheets for more detailed information. 2. SFP has a less wide temperature range as CMC. SFP will define the lowest temperature the CMC can operate in.	

Table 8. Required Accessories

Required Accessories	Part Number
Plug-in Pads (attenuators) - Available in 0.5 dB steps from 0 to 20 dB • 2 required for Forward • 3 required for Reverse (2 input, 1 output) Above five 0 dB value pads are pre-installed in the CMC, customer can purchase different value pads separately if those default values do not fit the system design requirements.	589693 (0 dB) sequentially thru 589734 (20.5 dB)
Plug-in Forward Linear Equalizer - Available in 1.5 dB steps from 0 to 30 dB at 1002 MHz • 2 required for Forward Above two 0 dB value EQs are pre-installed in the CMC, A customer can purchase different value EQs separately if these default values do not fit the system design requirements.	Please refer to GainMaker Forward Linear Equalizer list

Table 9. Optional Accessories

Optional Accessories	Part Number
Signal Director- two way splitter • 2 required for CMC with 4 RF output ports Two splitters are pre-installed in the CMC to enable 4 output ports. Signal Director- Jumper • 2 required for CMC with 2 RF output ports A customer can purchase jumpers separately to replace splitters to make the CMC a 2 port CMC. If jumpers are used, port plugs also need to be ordered to terminate the unused RF ports.	4011908 4011907
Console cable The customer should purchase the console cable separately	CAB-CONSOLE-DB9=

Optional Accessories	Part Number
Port Plug with O-Ring, 5/8” • 3 required for 60V CMC to terminate unused ports (Power port and two fiber ports) • 2 required for 220V CMC to terminate unused ports (Two fiber ports) Above port plugs are pre-installed on CMC and they can be easily removed in the field by using a wrench. Customer can purchase more to terminate unused ports.	PLUG-CMC-RF=
Cable Gland for RJ45 port Customer needs to order cable gland separately for external ONU connection.	GLND-PG16-RJ-1H= GLND-PG16-RJ-2H=
SC/APC - SC/APC Adaptor Two adaptors are pre-installed in the CMC for fiber connectivity. Customer can purchase more if needed.	OPT-ADP-SC-SC=
SC/APC - FC/APC Adaptor Customer can purchase this adaptor separately	OPT-ADP-SC-FC=
F-connector	FCONNTOR-CMC-M= FCONNTOR-CMC-S=

Notes on configuration:

1. With regard to Pads, Forward Cable Equalizer, Forward Linear Equalizer and Inverse Equalizer, Cisco CMC will use the same parts of Cisco Gainmaker products.
2. FRX field installation is not recommended given the operation complexity and lack of calibration in the field, hence the performance is not guaranteed. If have to be done, must be performed by experienced engineer and follow the instruction.
3. Shunt will be used for CMC with line power (60V CMC). By installing AC shunts for the ports that you want to pass AC power, you can configure power direction based on field requirement. CMC re-uses the same shunt from GainMaker/GS7000 ndes. There are 5 pcs shunts (1 pcs shunt in red color for RF input port and 4 pcs shunts in black color for RF output ports) assembled in a bag that by default shipped with 60V CMC.
4. When using F-Connector together with remote powering option please make sure that the chosen F-Connector is capable of safely passing the desired remote power current.

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