Cisco RF Gateway Downstream 48-1G Universal Edge QAM Line Card

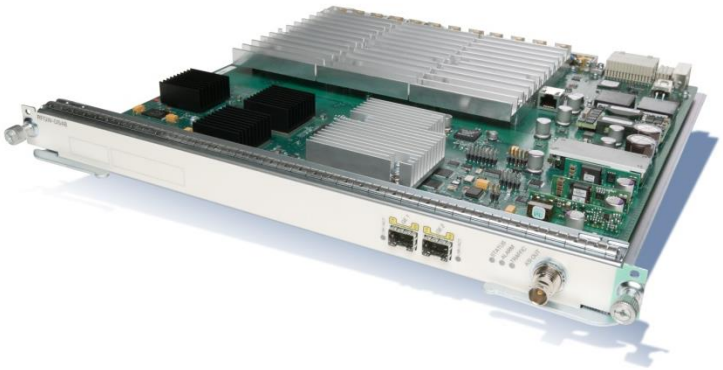
Product Overview

The Cisco® RF Gateway Downstream 48-1G Universal Edge QAM Line Card is a 12-port, 48-channel universal edge quadrature amplitude modulation (UEQAM) modulator designed for operation in the Cisco RF Gateway 10 platform. This line card is very similar in function to the standalone Cisco RF Gateway 1 Universal Edge QAM product, but the Cisco RF Gateway 10 can accommodate up 10x the density of the Cisco RF Gateway 1.

The Cisco RF Gateway Downstream 48-1G UEQAM line card offers concurrent support for standard and high-definition digital broadcast television, switched digital video (SDV), video-on-demand (VoD), and DOCSIS® modular cable modem termination system (M-CMTS™) services. Cable operators can choose to configure the line card as a DOCSIS only, video only, or DOCSIS and video shared universal edge QAM.

In the 10-slot Cisco RF Gateway 10 platform, RF Gateway Downstream 48-1G UEQAM line cards (Figure 1) can be configured with 1:N redundancy (up to 1:9), resulting in a fully protected, high-capacity, and highly dense edge QAM solution. For video services, the line cards can accept multiple formats of video content and provide a wide range of video processing features. Leading-edge RF technology is used to perform QAM modulation and RF upconversion, at significant space and power savings compared to existing upconverter architectures.

Figure 1. RF Gateway Downstream 48-1G Universal Edge QAM Line Card



Applications

- Broadcast video
- SDV
- VoD
- Standard and high-definition digital video
- DOCSIS 3.0 and M-CMTS

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Features and Benefits

Table 1 lists the features and benefits of the RF Gateway Downstream 48-1G UEQAM line card.

Table 1. Features and Benefits

Feature	Benefit
Video	
• Concurrent support for Digital Video Broadcast, SDV, and VoD	• Supports a very wide variety of video solution architectures
• Concurrent support for standard and high-definition services	• Achieves greater investment protection through the flexibility to evolve as service and capacity requirements change
• Concurrent support for multiple video encoding formats, including MPEG-2 and MPEG-4/H.264	• Can maximize QAM channel utilization
• Table-based and session-based edge QAM operation	• Helps ensure a smooth transition from current video system architectures to future video system architectures
DOCSIS	
• Designed to meet CableLabs DOCSIS 3.0 and M-CMTS specifications	• Industry-recognized common specifications with tested multivendor interoperability
• Fully tested with the Cisco uBR10012 M-CMTS solution	• Full-featured and tested end-to-end M-CMTS solution offering stability, scalability, and availability
Universal Edge QAM	
• Concurrent support for video and DOCSIS on the same line card	• Supports amortization of expenditure for video and DOCSIS edge QAM resources by sharing a common platform and universal edge QAM line card
• Standards-based universal edge QAM resource management	• Designed to support CableLabs defined universal edge QAM specification for multiple vendor interoperability
• Concurrent support for Annex A, B, and C operations on the same line card	• Can support mixed annex environments on the same line card with granularity per port (for example, Annex B for DOCSIS, Annex A for video)
• 48 QAM channels per line card, up to 10 line cards per RF Gateway 10 chassis (up to 480 QAMs per chassis)	• High-capacity edge QAM solution reduces the total number of devices to manage and provides more scalable management than multiple standalone edge QAMs
High Availability	
• Supports high availability for universal edge QAM applications	• Industry's first carrier-class edge QAM platform provides continuous service availability and reduces the duration of planned service outages
Operations and Management	
• Software based on QNX microkernel-based real-time, high-performance operating system	• As in the Cisco Carrier Routing System 1 (CRS-1) series of products, QNX is the basis of the Cisco RF Gateway Downstream 48-1G EUQAM software architecture, providing a very stable, scalable, and efficient operating system

Product Specifications

Table 2 gives product specifications for the Cisco RF Gateway Downstream 48-1G EQAM line card. Table 3 lists system requirements.

Table 2. Product Specifications

Specification	Value
Hardware Specifications	
Physical	Occupies a single RF slot in the Cisco RF Gateway 10 chassis
RF ports	12 RF ports with up to four contiguous QAM channels per port for a total of 48 QAMs
Dimensions	1.28 x 15.35 x 15 in. (33 x 390 x 381 mm) (H x W x D)
Weight	9.5 lb (4.32 kg)
Power consumption	180W maximum (3.75W per QAM); 165W typical (3.44W per QAM)

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Specification	Value
Environmental	• Operating altitude: -60 to 3000m • Storage temperature: -40 to 158°F (-40 to 70°C) • Operating temperature, nominal: 32 to 104°F (0 to 40°C) • Operating relative humidity: 10 to 85%, noncondensing
LEDs	Status, alarm, traffic, Gigabit Ethernet (GE) port link, and activity
Ethernet Uplink Interfaces	
Uplinks	2 GE
Uplink optic types	Small Form Factor Pluggable (SFP) GE
Small Form Factor Pluggables Supported	
Gigabit Ethernet interfaces	• SFP-GE-T • SFP-GE-S • SFP-GE-L
Video Specifications	
Video format	• MPEG-2 SPTS and MPTS encapsulated in UDP/IP (RFC-768) • Up to seven 188-byte MPEG-2 packets per UDP datagram • MPEG-2 and MPEG-4/H.264 content • Standard and high definition • CBR and VBR
Video processing	• PID remapping • PCR restamping • PSI extraction, generation, and insertion • Dejitter (up to 200 ms) • MPTS passthrough • Stream replication • Session statistics
Video redundancy	• Redundant source failover • Link redundancy
Video monitoring	• ASI video monitor port • BNC-type connector • Monitor any output MPTS
Multicast	• IP multicast routing protocols: Protocol Independent Multicast (PIM), including sparse mode and dense mode • Source Specific Multicast (SSM) and Any-Source Multicast (ASM) • Internet Group Management Protocol (IGMP)
Dejitter buffering	200 ms, configurable
TS bit rate	VBR and CBR
ASI monitor port	BNC type connector
Signaling mode	• Table-based or session-based functionality • Support for up to 1440 streams
Maximum unique video multicast sessions	2048 load balanced
DOCSIS Specifications	
CableLabs specifications supported	• Downstream RF Interface (DRFI) CM-SP-DRFI • Downstream External PHY Interface (DEPI) • DOCSIS Timing Interface (DTI) • M-CMTS Operations Support System Interface (OSSI)

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Specification	Value
RF Specifications	
Channel encoding	Randomization, Reed-Solomon, trellis encoding, and interleaving configurable to ITU-T J.83 Annex A, B, or C
QAM constellations	64 and 256 QAM
QAM stacking	Contiguous, quad-stacked QAM channel block
Symbol rate	3.5 Msym per second to 7 Msym per second
Bits per symbol	6 bits per symbol and 8 bits per symbol
Frequency plan	HRC, IRC, and STD
Center frequency range	57 to 999 MHz
Step size	1 kHz
Channel spacing	6 MHz and 8 MHz
MER (unequalized and equalized)	≥35 dB and ≥43 dB (at RF)
Output impedance	75 ohms
Return loss	• >14 dB: 45-750 MHz • >13 dB: 750-870 MHz • >12 dB: 870-1000 MHz
Channel power - 1-channel mode (single QAM stacking)	+61 dBmV RMS maximum per QAM channel in 0.2 dB steps
Channel power - 2-channel mode (dual QAM stacking)	+57 dBmV RMS maximum per QAM channel in 0.2 dB steps
Channel power - 4-channel mode (quad QAM stacking)	+53 dBmV RMS maximum per QAM channel in 0.2 dB steps
Power accuracy	± 2 dB
Channel power delta in 4-QAM block	<1 dB
RF channel muting	≥73 dB
Phase noise	• 1 KHz-10 KHz: 33 dBc double sideband • 10 KHz-50 KHz: 51 dBc double sideband • 50 KHz-3MHz: 51 dBc double sideband
Out-of-band noise and spurious emissions	• -60 dBc or better
Stability	± 3 ppm

Table 3. System Requirements

Specification	Value
Chassis compatibility	Cisco RFGW-10
Software	Cisco IOS® Software version 12.2(50)SQ1

Regulatory Compliance

Table 4 provides information about regulatory compliance.

Table 4. Regulatory Compliance

Specification	Value
Network Equipment Building Standards (NEBS) and European Telecommunications Standards Institute (ETSI)	UL 60950CAN/CSA-C22.2 No. 60950, EN 60950, IEC 60950, TS 001, AS/NZS 3260
Electromagnetic compatibility (EMC)	FCC Part 15 (CFR 47) Class A, ICES-003 Class A, EN55022 Class A, AS/NZS CISPR22 Class A, AS/NZS 3548 Class A, VCCI Class A, ETS 300 386, EN 55022, KN22, EN 61000-3-2, EN 61000-3-3

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Specification	Value
Electromagnetic interference (EMI)	EN550082-1, EN55024, EN61000-4-2, EN61000-4-3, EN61000-4-5, EN61000-4-6, EN61000-4-8, EN61000-4-11, EN61000-6-1
Safety	GR-1089-Core Level 3, ETS 300 019 Storage Class 1.1, ETS 300 019 Transportation Class 2.3 (pending), ETS 300 019 Stationary Use Class 3.1, ETS 300 386
Industry EMC, safety, and environmental standards	Designed to meet NEBS standard GR-63-CORE and GR-1089-CORE
Other industry standards	Cisco corporate compliance standards

Ordering Information

Table 5 lists ordering information. To place an order, visit the Cisco Ordering Homepage. To download software, visit the Cisco Software Center.

Table 5. Ordering Information for the Cisco RF Gateway Downstream 48-1G UEQAM Line Card

Product Name and ID	Product Description
Cisco RF Gateway Series Line Cards	
RFGW-DS48-1G	RFGW Universal Downstream Universal Edge QAM Card, 12 RF ports, 48 QAMs
RFGW-DS48-1G=	RFGW Universal Downstream Universal Edge QAM Card, 12 RF ports, 48 QAMs spare
Cisco RF Gateway Series Transceiver Modules	
SFP-GE-T	1000BASE-T SFP (NEBS 3 ESD) (100 m on Cat5 UTP)
SFP-GE-S	1000BASE-SX short wavelength, with DOM (550m on MMF)
SFP-GE-L	1000BASE-LX/LH short wavelength, with DOM (10 km on SMF)
Cisco RF Gateway Series Accessories	
RFGW-LC-COVER	RFGW line card cover
RFGW-LC-COVER=	RFGW line card cover spare

Service and Support

Using the Cisco lifecycle services approach, Cisco and its partners provide a broad portfolio of end-to-end services and support that can help increase your network's business value and return on investment. This approach defines the minimum set of activities needed, by technology and by network complexity, to help you successfully deploy and operate Cisco technologies and optimize their performance throughout the lifecycle of your network.

For More Information

For more information about the Cisco RF Gateway series, visit http://www.cisco.com/en/US/products/ps8360/index.html or contact your local account representative.

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