Cisco XFP QAM Transmitters

The standardization and availability of pluggable optical interfaces for headend equipment offer cable operators significant power and operational cost advantages. They offer a reduction in power consumption of 50 percent, based on Cisco testing, compared to what is typically used in many legacy forward QAM transmitters. The tunable transmitters also reduce customer's inventory expense costs associated with spare components. The Cisco® Small Form-Factor Pluggable (XFP) Radio Frequency QAM Transmitter is one of the industry's first pluggable optical interfaces and is based on the Society of Telecommunications Engineers (SCTE) multi-source agreement for pluggable interfaces. It offers:

- Small form-factor pluggable modules
- Tunable and fixed wavelengths
- SCTE 195 2013 compliance
- A design for Prisma® family

Product Overview

The heart of an optical transmitter is its laser. The Cisco XFP QAM transmitter's laser is frequency-locked and amplitude modulated by the information-bearing QAM RF signals. Full C-band tunable devices complement fixed wavelength transmitters and are available at the interoperable Wavelength Division Multiplexing (iWDM) wavelengths Cisco co-developed for exceptional system performance or on the International Telecommunications Union (ITU) grid. The Cisco XFP QAM transmitter eliminates the need for discrete legacy forward transmitters, saving space in headends and anticipating converged network integration. The Cisco XFP QAM transmitter (Figure 1) changes the paradigm for pluggable optics in a Hybrid-Fiber Coaxial (HFC) network by allowing cable operators to offer the next generation of services over an all IP-based infrastructure.

The Cisco XFP QAM transmitter offers industry-leading density in Cisco HFC optical access platforms. In addition to the increased density, the Cisco XFP QAM transmitter provides cable operators with improved energy management within their access infrastructure. It was developed to comply with the SCTE's Smart Energy Management Initiative (SEMI), resulting in greatly reduced power consumption.

Figure 1. Cisco XFP QAM Transmitter

Figure 2. Cisco XDP 1 RU XFP Chassis

The Cisco XFP QAM transmitter offers operators greater architectural flexibility with tunable or fixed wavelength optics. Both types support a broad, 40 wavelength overlay network or a multi-wavelength system using the industry-accepted iWDM plan. The tunable Cisco XFP QAM transmitter allows for improved sparing and product deployment efficiencies as the module can be tuned to any C-band ITU-compatible wavelength in the field. The fixed wavelength Cisco XFP QAM transmitter offers a more cost-effective alternative while benefiting from the reduced footprint and power requirements of the XFP form factor. The Cisco XFP QAM transmitter helps future-proof cable operators' investment in forward-path QAM optics. Both the tunable and fixed versions are forward compatible into the Cisco Converged Cable Access Platform (CCAP), the Cisco cBR-8 Converged Broadband Router, through the use of the optical physical interface card.

The Cisco XFP QAM transmitter module is easily inserted into the dedicated XPD 1 RU chassis (Figure 2). Up to 10 Cisco XFP QAM transmitters fit into this 1RU chassis. Wavelength setting is software controlled to promote security and ease of use.

Table 1. Product Specifications

Optical	
Wavelength	DWDM ITU compatible between ITU 20 thru 62
Output Power	+5 dBm
Modulation Type	Externally Modulated CW Laser
RF	
Operating Bandwidth	54 MHz to 1218 MHz
Channel Loading[1]	Up to 154 QAM Channels
Nominal RF Input Level with 153 QAM channels **1 RU chassis** **Prisma II Host Module**	 12 dBmV/ch 36 dBmV/ch
Total Composite RF Input (XFP module alone without chassis)	+1.5 ± 5.0 dBm to differential 50 Ohm inputs
RF Input Return Loss	16 dB
Link Performance[1]	Loading: 154 Channels MER: ≥ 38 dB BER: < 1.0×10^{-9} Pre-FEC < 1.0×10^{-12} Post-FEC XFP launched into 50 km of SM fiber; -5 dBm input to optical receiver
Electrical/Mechanical/Environmental	
Power Consumption	3.5 W per XFP Tx
Connector Type	LC/APC
Management & Control	Web Interface SNMP

Dimensions	Height : 0.33 in, 8.4 mm Width : 0.72 in, 18.3 mm Depth : 3.10 in, 78.7 mm
Weight	< 0.1 lbs., < 45 g
Operational Temperature	0 to 50 degrees Celsius
Humidity	5 to 95% Non-Condensing
1 RU chassis	
Power consumption	94 W max
Power supplies	AC or DC available
Weight	10 lbs. (4.5 kg)
Dimensions	17.7 in (W) X 14.875 in (D) X 1.75 in (H) 449 mm (W) X 378 mm (D) X 44.5 mm (H)
Operational Temperature	0 to 50 degrees Celsius
Humidity	5 to 95% Non-Condensing

Note: 1. Transmitter loading of 154 QAM channels from 54 - 1002 MHz plus one channel at 1218 MHz. RF passband is guaranteed to 1218 MHz. MER and BER specs apply to the 154 QAM channels.

2. SBS threshold is 12.5 dBm typical.

Ordering Information

Part numbers for the Cisco XFP QAM transmitters are shown in Table 2. Please consult with your Cisco account representative, customer service representative, or system engineer to determine the best configuration for your particular application.

Table 2. Cisco XFP QAM Transmitter Part Numbers

Description	Cisco Part Number
Cisco XFP QAM Transmitter Tunable ITU 20 - ITU 62	XFP-RF-T=
Cisco XFP QAM Transmitter Fixed Wavelength ITUXX[1]	XFP-RF-ITUXX=
Cisco XFP QAM Transmitter Fixed Wavelength iWDM ITUXX[2]	XFP-RF-IWDM-ITUXX=
Cisco XFP QAM 1 RU Chassis	P2-XDP-1RU-XFP10=
Cisco XFP QAM 1RU AC Power Supply	P2-XDP-1RU-ACPS=
Cisco XFP QAM 1RU DC Power Supply	P2-XDP-1RU-DCPS=

[1] XX is 20, 23, 25, 27, 29, 30, 31, 32, 34, 35, 37, 38, 40, 41, 42, 43, 45, 46, 47, 49, 50, 51, 53, 55, 56, 58, 59

[2] XX is 21, 22, 24, 26, 28, 33, 36, 39, 44, 48, 52, 54, 57, 60, 61, 62

Note: For 40 contiguous ITU channel deployments, non-iWDM and iWDM transmitters are interspersed

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