Cisco Prisma II Quad Optical Input Enhanced Digital Return (EDR) Receiver for Compact Segmentable Nodes

The Cisco® Quad Optical Input Enhanced Digital Return (Q-EDR) 85 Receiver expands the Cisco PII EDR Receiver product line. This new Q-EDR receiver offers the superior performance of our dual EDR receiver and enables doubling the PII receiver density in digital return systems.

The Cisco EDR 85 System includes the EDR Compact Segmentable Node A9020x Transmitter modules that install in the node and companion Prisma® high-density (HD) EDR PRX85 Dual or Quad input receiver modules. (See Figure 1.) Both the dual and quad optical input EDR receivers install in a Prisma II or Prisma II XD chassis at the headend or hub. The Q-EDR receiver uses the same Small Form-Factor Pluggable (SFP) optical pluggable modules (OPMs) as the dual EDR receivers. The Cisco EDR 85 System operates over the 5–85 MHz range and supports all standard reverse frequency bandwidths at 40, 42, 55, 65, and 85 MHz.

At the transmit (node) end of the system, the reverse path RF input signals from each node port are routed to an EDR 2:1 transmitter module in the node mainboard. The transmitter module converts each signal to a baseband digital data stream and combines them into a serial data stream using time-division multiplexing (TDM). The baseband data stream is then converted to an optical signal for transmission to the headend or hub. The 2:1 transmitter module is available for the Cisco Compact Segmentable Node types A90200 and A90201. The transmitter OPMs are available in either coarse wavelength-division multiplexing (CWDM) 1270–1610 nm wavelengths or dense wavelength-division multiplexing (DWDM) ITU channels 17–61.

At the receive end, typically in a large hub or headend, the EDR receiver module receives the optical signal and performs conversion back to the baseband data stream. The resulting data streams are converted back to analog reverse path signals for routing to termination equipment. With the Q-EDR receiver, up to 4 optical inputs can be combined and routed to the 2 RF outputs of the module in a variety of ways. For example, all 4 optical inputs can be combined onto a single RF output or reconfigured with a simple software command to be split between the 2 RF outputs. This software-controlled reconfiguration capability of the Q-EDR Rx allows for maximum network flexibility with minimal hardware investment. The receiver OPMs are available in Standard Range (SR) and Extended Range (XR) configurations. Both configurations feature a dual LC/PC optical input connector that feeds two independent reverse optical receivers, each with its own RF output port.

Both the dual and quad input EDR receiver modules (Figure 2) occupy one slot in a Cisco Prisma II XD chassis. Two EDR HD receiver modules can be vertically stacked in an associated Prisma II host module that occupies a single-wide slot in the Prisma II standard chassis. Up to 26 HD modules can operate in a standard 6RU chassis,[1] while up to 16 HD modules can operate in the Prisma II XD chassis. The ability to mix EDR receiver modules with other Prisma II HD modules in the same chassis greatly enhances the flexibility of the platform.

[1] The 56-connector version of the chassis is required to make use of both receivers in one chassis slot.

Figure 1. EDR 2:1 Transmitter Modules for Compact Segmentable Nodes

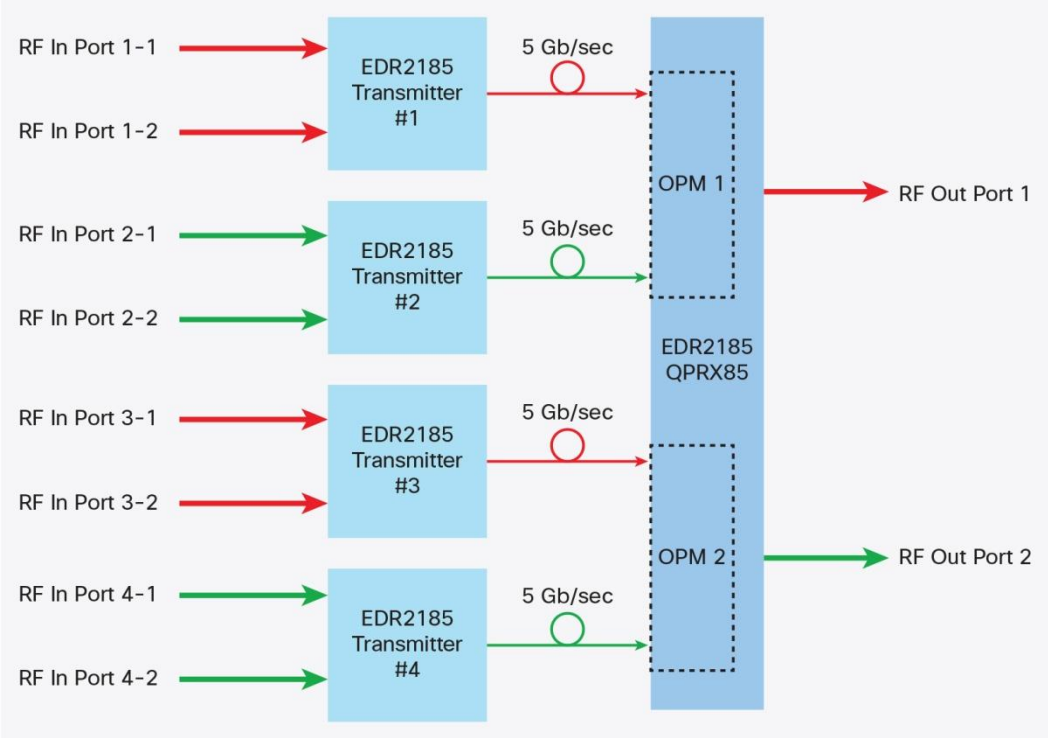
Figure 2. Quad EDR Receiver Module

Features

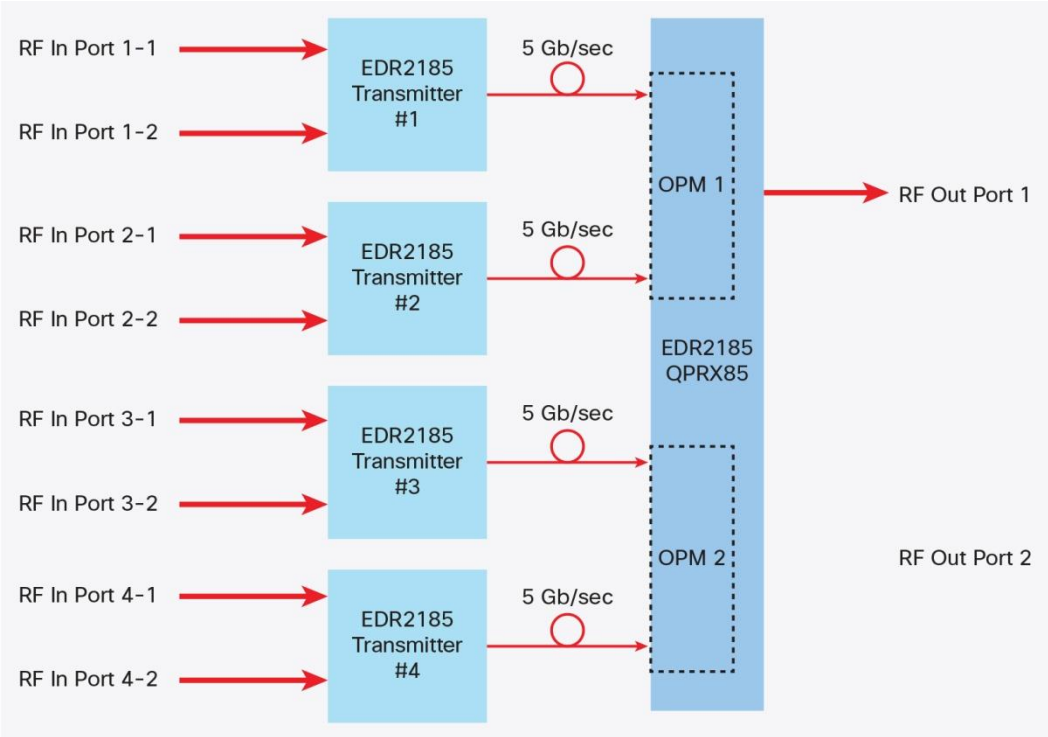
- High-performance digital reverse technology:
  - 12-bit encoding enables transmission of analog video in the reverse band
  - Compatible with high-order digital modulation signals (for example, 16 QAM, 64 QAM, and 256 QAM)
- OPMs enable flexible inventory management
- Long reach transmission capabilities eliminate the need for optical amplifiers, reducing cost and space requirements
- Capable of sending 90 individual 5–85 MHz reverse signals over a single fiber:
  - Uses 2:1 multiplexing to reduce fiber usage
  - Compatible with Cisco's 45-wavelength DWDM system
- Simplified setup reduces installation time and expertise requirements
- Distance- and temperature-independent link performance simplifies engineering and maintenance requirements
- Space-saving, high-density deployment in Prisma II or Prisma II XD chassis increases deployment cost efficiency
- Optional monitoring of Compact node and EDR transmitter parameters available at the EDR receiver

Figure 3 illustrates configuration options.

Figure 3. Cisco Quad EDR 85 System Configuration Options



2:1 Input, Two RF Output Operating Mode



2:1 Input, Single RF Output Operating Mode

Note:

[1] The EDR receiver supports one single test point selectable between the two receiver outputs for RF output verification.

Product Specifications

Table 1 provides receiver module specifications, Table 2 describes link performance, Table 3 describes group delay, and Table 4 describes optical link performance. Figures 4 and 5 give noise power ratio (NPR) information.

Table 1. EDR PRX85 Receiver Module

Specification	Units	Value	Notes
RF output level	dBmV/Hz	See Table 2, note 4	
RF output return loss (minimum)	dB	18 dB	
Output RF variable gain control range	dB	0 to –10 dB (0.5 dB increments)	
Power consumption (maximum)	W	< 9.5 W	
RF output test point	dB	–20 dB (± 1 dB)	
Operating temperature range	^{0}C ^{0}F	0 to 50°C 32 to 122°F	1
Operating humidity	%	5–95, noncondensing	
Physical dimensions (D x W x H)	mm in.	8.8 x 1.0 x 3.5 mm 22.35 x 2.54 x 8.89 in.	
Weight	lbs kg	0.9 0.4	

Note:

[1] Recommended for use only in noncondensing environments.

Table 2. RF Link Performance

General	Value	Notes
Bandpass	5–85 MHz	
Full-scale single continuous wave CW carrier amplitude	20 dBmV	1, 2
Link gain	 26.5 (± 1.0 dB) for dual RF output mode 23.5 (± 1.0 dB) for dual RF output mode	3, 4,5
Response flatness	± 0.75 dB	

Notes:

[1] With respect to the input port on EDR 2:1 transmitter module.

[2] A CW carrier of this amplitude applied to the RF input will exercise the full-scale range of the A/D converter. Full scale is analogous to 100 percent OMI for analog lasers.

[3] Variable gain control on EDR receiver module set to 0 dB.

[4] Add link gain (dB) to the input level of the node to determine EDR receiver module RF output level.

[5] At low and high temperature extremes.

Table 3. Group Delay, 1 MHz Bandwidth

Frequency (MHz)	Units	Value	Notes
5-10	ns	≤ 3.0	
11-85	ns	≤ 1.5	

Table 4. Optical Link Performance

General	Value	Notes
Link budget	21 dB (SR Rx) 28 dB (XR Rx)	
Optical wavelength	1270–1610 nm (CWDM) 1563.86–1528.77 nm (DWDM)/ITU channels 17–61	1
Optical output power (modulated)	3 dBm minimum (CWDM) 3 dBm minimum (DWDM)	1
Optical input power (SR module)	–8 to –18 dBm	2
Optical input power (XR module)	–8 to –25 dBm	2
Optical interface	LC/PC connector	

Notes:

[1] Applies to transmitter module only.

[2] Applies to receiver module only.

Figure 4. NPR Performance in A90200: Input Power per Hz

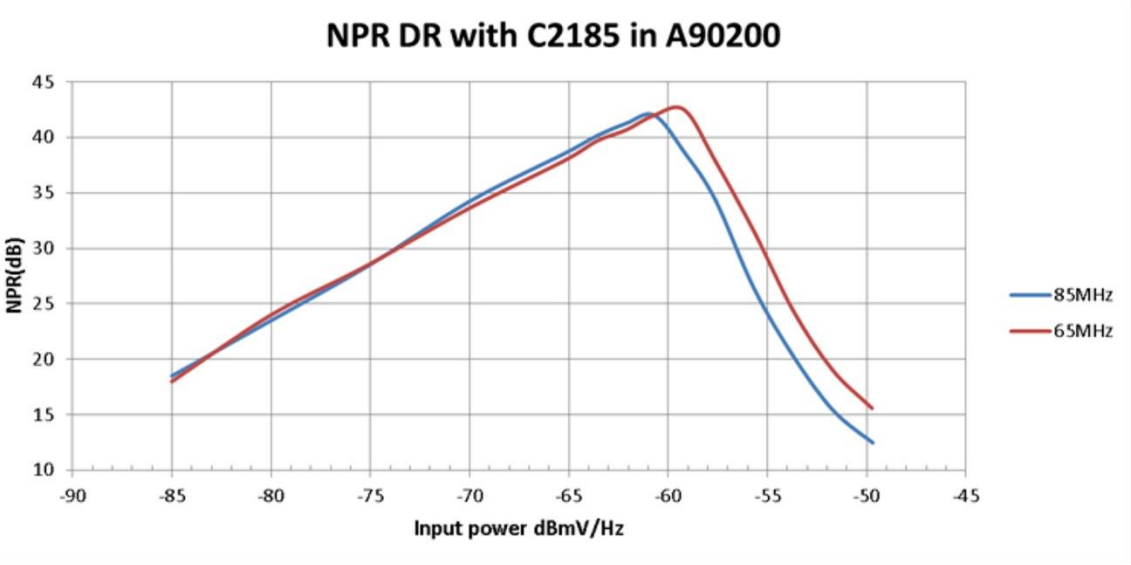
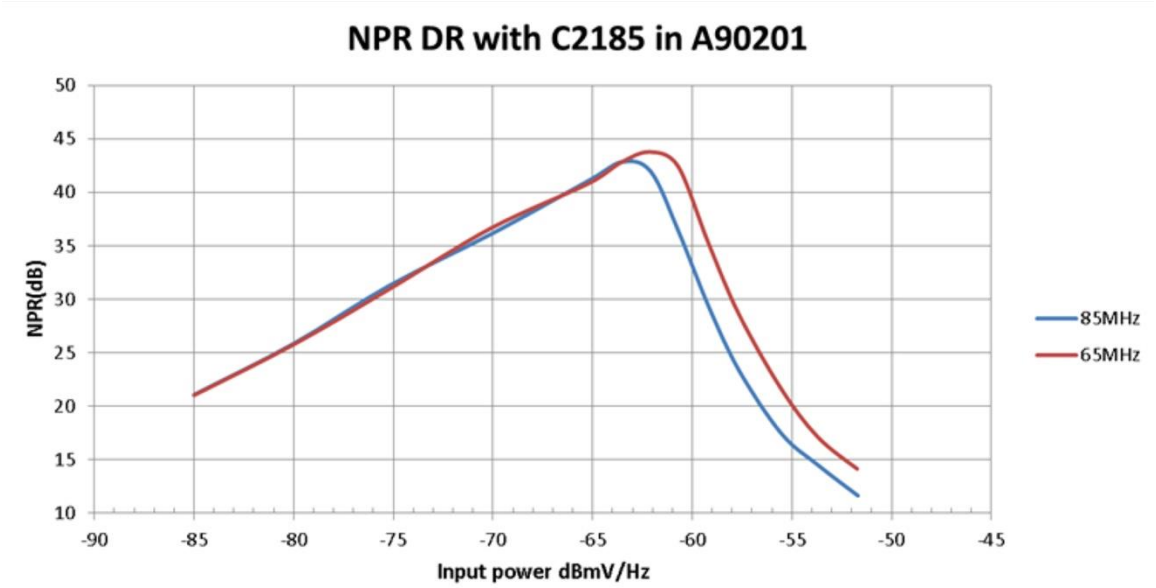


Figure 5. NPR Performance in A90201: Input Power per Hz



Notes:

[1] The NPR performance figures represent the 5–65 MHz noise loading and the 5–85 MHz noise loading.
[2] Input power is specified with respect to the input port of the compact segmentable node A90200 or A90201.
[3] Reverse attenuators in the node are set to 0 dB.
[4] Variable gain control on the EDR receiver module set to 0 dB.

Ordering Information

Table 5 provides ordering information, and Table 6 describes accessories.

Table 5. Cisco Prisma Q-EDR Products

Description	Part Number for Ordering	Part Number on Module
EDR PRX85 Prisma HD quad Rx module	P2-HD-QEDR-RX	800-102707-01
EDR Rx OPM SR	4042750	800-4073801-01
EDR Rx OPM XR	4042751	800-4073802-01

Table 6. Accessories

Description	Part Number for Ordering
Test Port Adapter Cable	CAB-TSTADPT-MCX-F=

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