Cisco Enhanced Digital Return (EDR) 85 System – Compact Segmentable Nodes

The Cisco® Enhanced Digital Return (EDR) 85 System expands the functionality of Compact Segmentable Nodes by increasing the performance, reach, and efficiency of the reverse path transmissions.

The Cisco EDR 85 System includes EDR Compact Segmentable Node A9020x Transmitter modules that install in the node, and companion Prisma® high-density (HD) EDR PRX85 Receiver modules that install in a Prisma II or Prisma II XD chassis at the headend or hub. The transmitter and receiver use SFP (Small Form Factor Pluggable) style optical pluggable modules (OPMs) for enhanced flexibility. 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 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. The baseband data stream is then converted to an optical signal for transmission to the headend or hub. The 2:1 transmitter modules is available for the Cisco Compact Segmentable Nodes type 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. The EDR Receiver module is available in the half-height High Density (HD) form factor. 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.

A single EDR Receiver module occupies one slot in a 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*, 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.

** 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

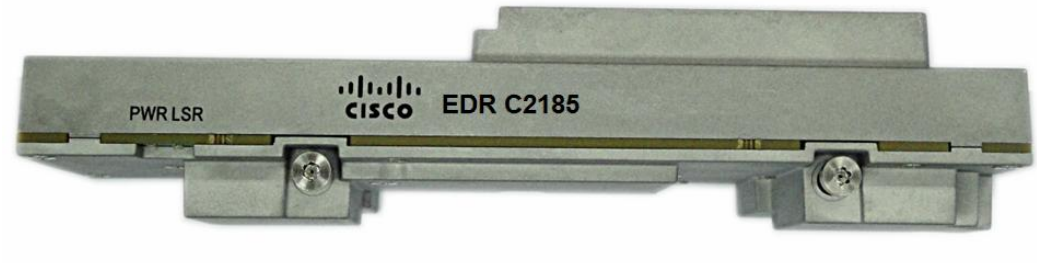


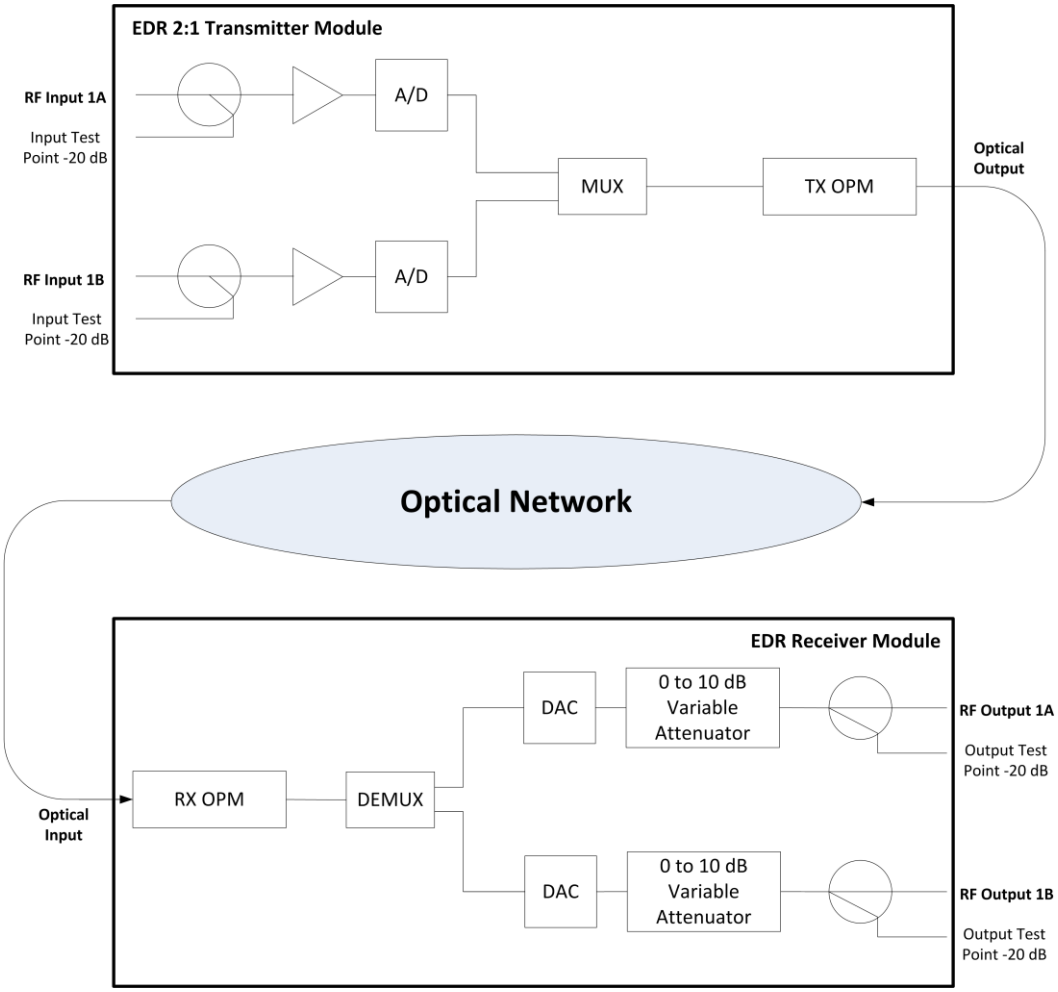
Figure 2. EDR Receiver Module

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 (e.g.,16 QAM, 64 QAM, and 256 QAM)
- Optical Pluggable Modules (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
  - Leverages 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 transmitter parameters available at the receiver

Block Diagrams

Figure 3. Cisco EDR 85 System



Notes:

1. The EDR Transmitter test points are accessible via node mainboard.
2. The EDR Receiver supports one single test point selectable between the two receiver outputs for RF output verification.

Product Specifications

Table 1. EDR C2185 2:1 Transmitter Module

Specification	Value	Notes
RF Input Level	(dBmV/Hz) See ***Link Performance***	
RF Input Test Point	-20 dB (± 0.5 dB)	
Test Point Return Loss (minimum)	18 dB	
Power Consumption (maximum)	< 8 W	
Operating Temperature Range, node ambient	-40 to +55 °C -40 to +131 °F	
Physical Dimensions (D x W x H)	156.0 x 33.9 x 64.0 mm 6.1 x 1.3 x 2.5 In.	

Table 2. EDR PRX85 Receiver Module

Specification	Value	Notes
RF Output Level	(dBmV/Hz) See ***Link Performance***	
RF Output Return Loss (minimum)	18 dB	
Output RF Variable Gain Control Range	0 to -10 dB (0.5 dB increments)	
Power Consumption (maximum)	< 9 W	
RF Output Test Point	-20 dB (± 0.5 dB)	
RF Output Test Point Return Loss (minimum)	18 dB	
Operating Temperature Range	0 to 50 °C 32 to 122 °F	1
Physical Dimensions (D x W x H)	8.8 x 1.0 x 3.5 mm 22.35 x 2.54 x 8.89 in.	
Weight	0.9 lbs 0.4 kg	

Note:

1. Recommended for use only in non-condensing environments.

Table 3. RF Link Performance

General	Value	Notes
Bandpass	5 – 85 MHz	
Full Scale Single CW Carrier Amplitude	20 dBmV	1, 2
Link Gain	For A90200 22 dB (± 1.0 dB) For A90201 25 dB (± 1.0 dB)	3, 4
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% 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.

Table 4. Group Delay (C2185 TX with PRX85 Module, 1 MHz and 1.5 MHz bandwidth)

General	Value	Notes
Group Delay	< 2.0 ns @ 5 –10 MHz (Δf = 1 MHz)	
	< 1.5 ns @ 11 – 85 MHz (Δf = 1 MHz)	

Table 5. 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. Noise Power Ratio (NPR) Performance in A90200 - Input Power per Hz

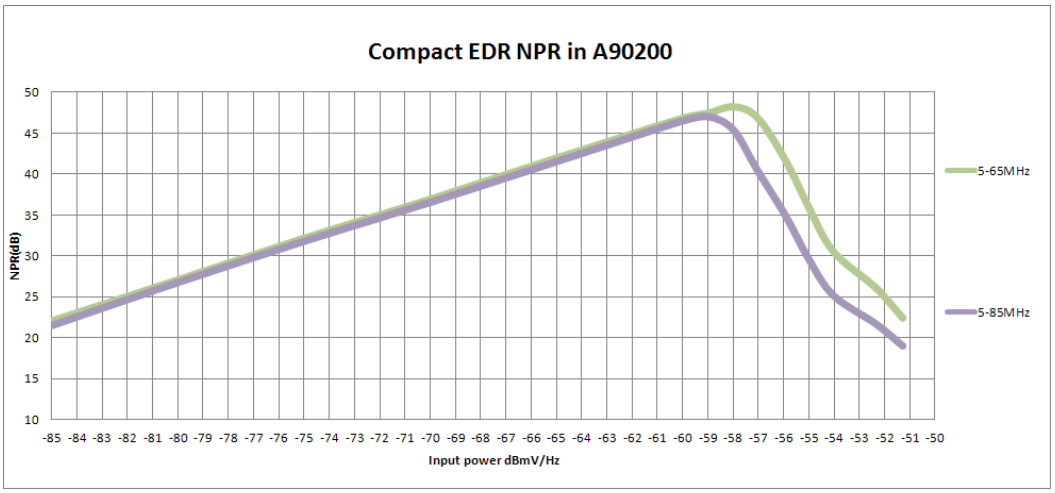
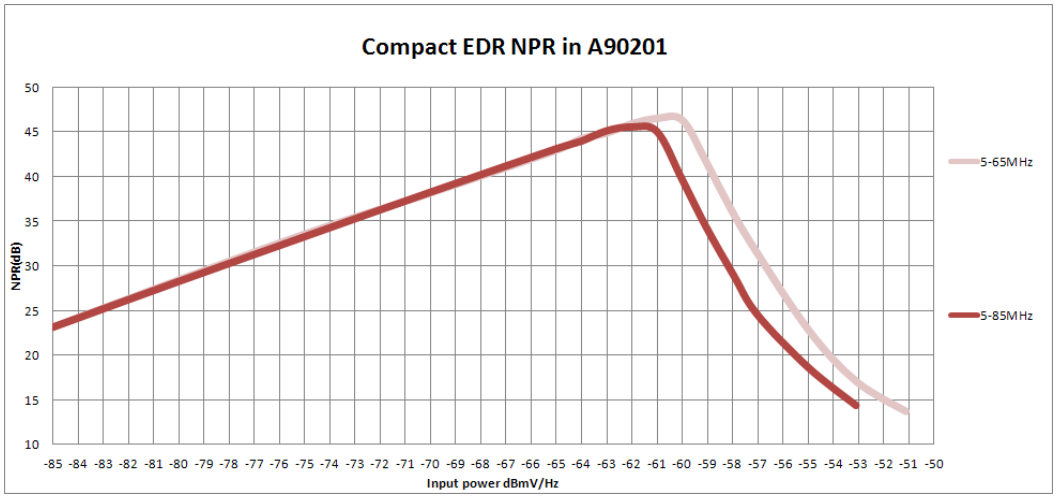


Figure 5. Noise Power Ratio (NPR) Performance in A90201 - Input Power per Hz

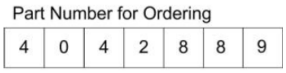


Notes:

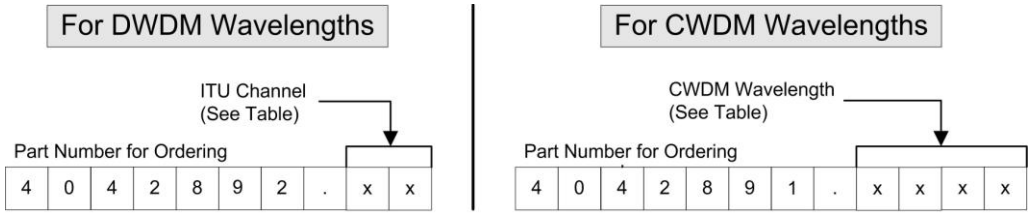
1. The NPR performance figures represent the 5-65 MHz noise loading and the 5-85 MHz noise loading.
2. Input power is specified with respect to the input port of the compact segmentable node A90200 or A90201.
3. Reverse attenuators in the node are set to 0 dB.
4. Variable Gain Control on the EDR Receiver Module set to 0 dB.

Ordering Information

EDR C2185 Compact Segmentable Nodes 2:1 Transmitters without OPM



EDR C2185 Compact Segmentable Nodes 2:1 Transmitters with OPM Order Matrix



Transmitter Optical Pluggable Module (OPM) Order Matrix

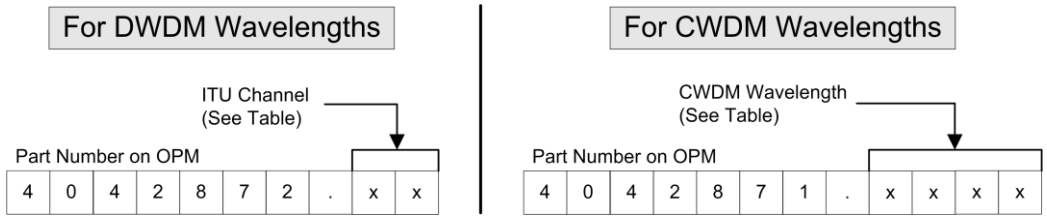


Table 6. DWDM and CWDM Wavelengths

ITU Channel	DWDM Wavelength, nm
17	1563.86
18	1563.05
19	1562.23
20	1561.42
21	1560.61
22	1559.79
23	1558.98
24	1558.17
25	1557.36
26	1556.55
27	1555.75
28	1559.94
29	1554.13
30	1553.33
31	1552.52
32	1551.72
33	1550.92
34	1550.12
35	1549.32
36	1548.51
37	1547.72
38	1546.92
39	1546.12

ITU Channel	DWDM Wavelength, nm
40	1545.32
41	1544.53
42	1543.73
43	1542.94
44	1542.14
45	1541.35
46	1540.56
47	1539.77
48	1538.98
49	1538.19
50	1537.40
51	1536.61
52	1535.82
53	1535.04
54	1534.25
55	1533.47
56	1532.68
57	1531.90
58	1531.12
59	1530.33
60	1529.55
61	1528.77

CWDM Wavelengths, nm
1270
1290
1310
1330
1350
1370
1390
1410
1430
1450
1470
1490
1510
1530
1550
1570
1590
1610

Table 7. EDR PRX85 Required Equipment

Description	Part Number for Ordering	Part Number on Module	Part Number on OPM
EDR C2185 Tx module	4042889	4042712	N/A
EDR PRX85 Prisma HD Rx module	4041277	4041278	N/A
EDR PRX85 Prisma HD Rx w/SR OPM	4042748	4041278	4044008
EDR PRX85 Prisma HD Rx w/XR OPM	4042749	4041278	4044009
EDR Rx OPM SR	4042750	N/A	4044008
EDR Rx OPM XR	4042751	N/A	4044009

Table 8. Additional Equipment

Description	Part Number
Compact EGC Segmentable Node A90200	Refer to A90200 data sheet, part number 7018152.
Compact EGC Segmentable GaN Node A90201	Refer to A90201 data sheet, part number 7023364.

Table 9. Accessories

Description	Part Number for Ordering
EDR C2185 Fiber Jumper	4044314

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.

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Part Number 95-7024051-01 Rev A
October 2012