

CWDM

Managed Coarse Wave Division Multiplexing

- Supports up to 16 discrete wavelengths
- Passive "Drop and Pass" or "Drop and Add" capabilities
- Managed 45Mbps - 2.7Gbps optical links



R4000 with 8-Channel Multiplexer Module and 4-Channel Multiplexer Module with Expansion Port



R4000 with Drop and Add OADM Module

Metrobility's Coarse Wave Division Multiplexing (CWDM) solution combines passive optical CWDM technology with Radiance Access Line Cards and Gigabit Ethernet line cards and superior network element management through NetBeacon® Element Manager to achieve maximum flexibility, scalability, and manageability. This combination creates a robust and flexible *managed* point-to-point or ring network solution. Metrobility's CWDM solution is ideal for applications where dedicated bandwidth, enhanced diagnostics, and a secure PON connection are required on a single fiber pair.

The CWDM network provides a cost-effective "no new fiber upgrade" solution for adding a new services and customers to an existing fiber infrastructure.

Multiplexing and optical add/drop capabilities

Metrobility's *CWDM solutions* allow users to increase the capacity of existing fiber by utilizing widely spaced, separate wavelengths - between 1350nm and 1610nm - within the same fiber pair. These CWDM solutions can support up to 16 different channels utilizing a combination of 8-channel and 4-channel multiplexers. An expansion port on the 4-channel multiplexer allows additional unique wavelengths to be combined on a single fiber pair by 'chaining' multiplexers prior to the final network connection.

Optical add/drop multiplexers (OADM) provide the ability to 'drop and add' or 'drop and pass' one or more of the wavelengths from the fiber locally. "Drop and pass" extracts the assigned wavelengths and relays the remaining channels to the next destination creating a point-to-point optical link from the

subscriber site to the central locations. "Drop and Add" inserts a wavelength onto the link to create a point-to-point link from one site to another

Provider-facing interface

Metrobility *line cards* installed in a managed Metrobility R5000 chassis which support the ITU CWDM wavelength grid provides the interface to the service provider's switch. Each line card connects to a *multiplexer module* in the *R4000 chassis*. Each connection in the R5000 can be managed at a central management station through Metrobility's management card and NetBeacon Element Management software.

Subscriber-facing interface

The *R4000* chassis can support up to two (2) *multiplexer modules*. Each module provides either four (4) or eight (8) discrete wavelengths for subscriber connections. These wavelengths are combined, or multiplexed, onto a single fiber pair to the external network. Multiple modules may be linked through the expansion port to increase wavelength capacity to a total of 16 on a single fiber pair.

Subscriber site

An *R4000* with an Optical Add/Drop Multiplexer (OADM) module or *4-channel multiplexer* at the subscriber site provides the "drop and pass" or "drop and add" capabilities. The R4000 connects to the subscriber's network through a complementary line card mounted in any Radiance chassis. The line card provides either a copper or fiber connection to local switch.

The Metrobility® Difference

Management capabilities when configured with a managed R5000:

Advanced diagnostics:

- Optical Power Measurement
- Remote Loopback
- Quality of Line
- Quality of Equipment
- Link Loss Return
- Link Loss Carry Forward
- Far End Fault

Expansion port allows for up to 16 wavelengths

Broad range of OEO connectivity options from 45Mbps to 2.7Gbps

Extended temperature modules for outdoor installations

NEBS certified



Product Highlights

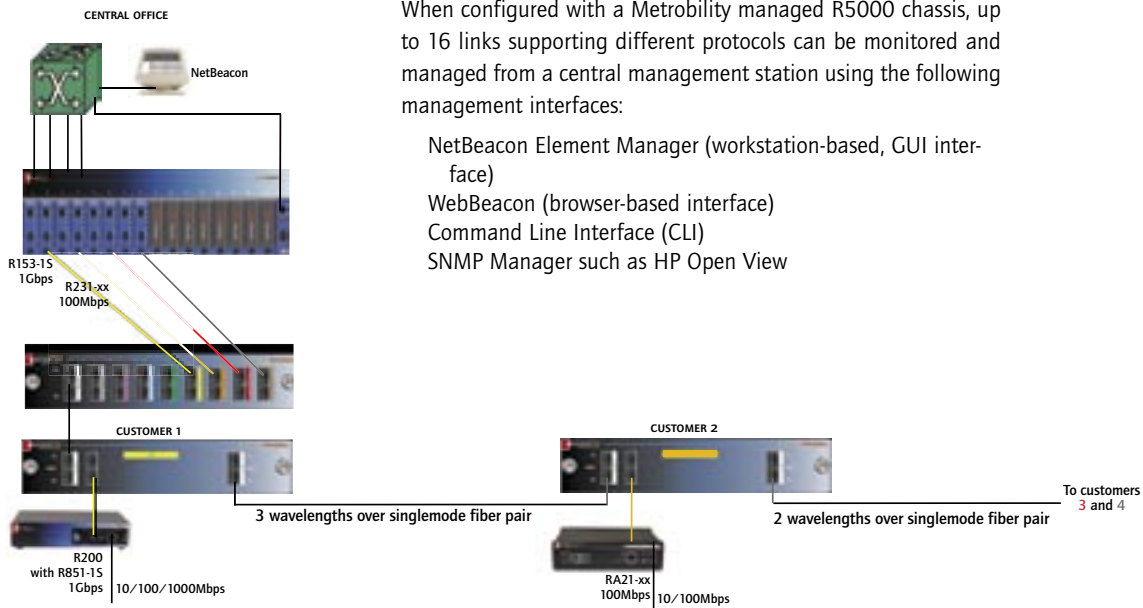
Supports ITU G.694.2 CWDM wavelength grid with a spacing of 20nm

Passive modules require no power

May be used with Metrobility's Multi-rate and Gig-E Interface Line Cards, Ethernet Access Line Cards, and Service Line Cards and the RA21 Optical Network Unit

CWDM Configurations

Drop and Pass



When configured with a Metrobility managed R5000 chassis, up to 16 links supporting different protocols can be monitored and managed from a central management station using the following management interfaces:

- NetBeacon Element Manager (workstation-based, GUI interface)
- WebBeacon (browser-based interface)
- Command Line Interface (CLI)
- SNMP Manager such as HP Open View

Customer 1

Gig-E from CO to 10/100/1000Mbps at CP

- 802.3ah Compliant
- Field upgradable
- Remote site management:
 - Remote loopback
 - RMON statistics
 - Voltage and temperature
 - Optical power
- SFP pluggable optic for flexible inventory options

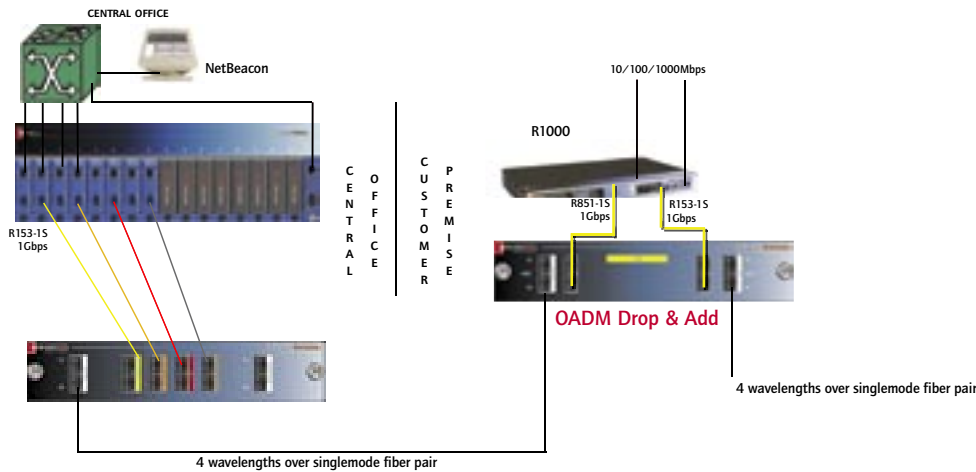
Management capabilities are dependent on individual line card features

Customer 2

100Mbps from CO to 10/100 at CP

- Remote site management
- Remote loopback
- Temperature
- Voltage and Power
- RMON 1 Statistics
- Historical Database
- Fixed optics

Drop and Add



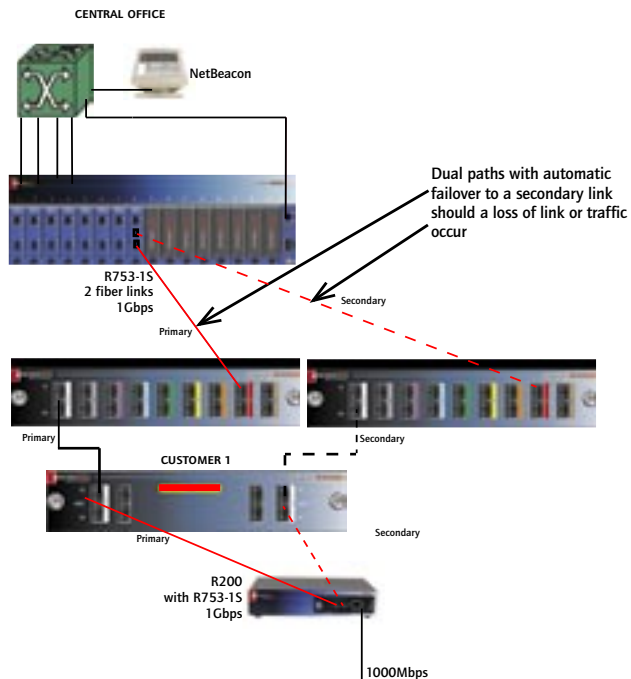
Line Protection and Restoration

Ensuring High Availability

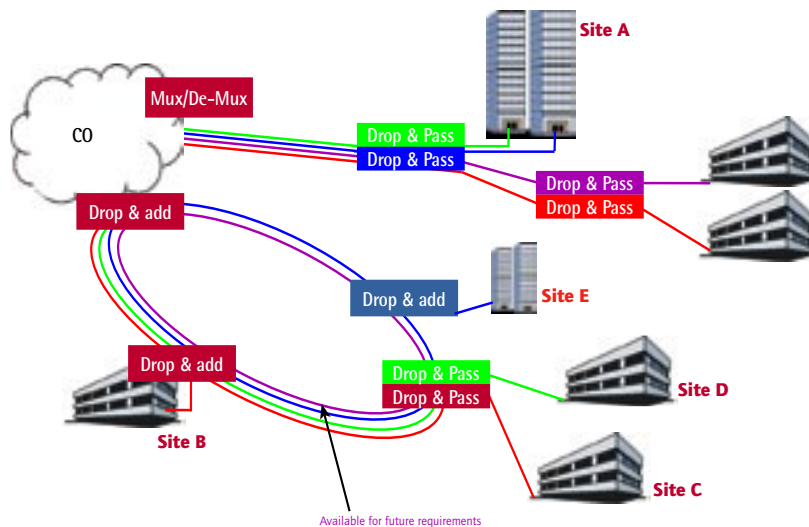
With multiple customers on a single link, the need to safeguard data becomes more critical and makes redundancy a key component of any CWDM system. In a CWDM network, this involves the use of dual links for fast failover and backup.

Metrobility's patented line protection and restoration (LPR) interface line cards offer redundant data paths to prevent data loss due to cable failure, port failure, or catastrophic switch failures.

This physical layer solution is able to isolate failures with a faster recovery time and is simpler to implement when compared to using Spanning Tree protocols.



Remote Terminals



- **Site A** has 4 point to point connections from the Central Office to a high rise office building. In this case two wavelengths are dropped at the office building and the remaining two continue to two other locations.
- **Site B** is on a fiber ring with the red wavelengths that connects to the Central Office and a second red wavelength creating a point to point connection between Site B and Site C.
- **Site D** is connected to the Central Office on the green wavelength.
- **Site E** is connected to the Central Office on both the East and West side of the ring on the blue wavelength.
- In the ring configuration, the **violet** wavelength is not used. If a new point to point or ring application is being added in the local area, new local equipment is installed and an available CWDM wavelength, in this case violet, is then used to provide the service.

Model Description

R4000-02	19", 1U Rack Mount Chassis for CWDM multiplexer and OADM modules
RM-1000	Extension for 23" Rack
4000-CA	Fiber Cable kit - (4) SM LC to SC (1m)

R4000 Options

Multiplexer Modules (SC connectors)

R416-B4	8-Channel CWDM mux/de-mux module	(1470, 1490, 1510, 1530, 1550, 1570, 1590, 1610 nm)
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Multiplexer Modules (SC connectors with expansion port)

R416-A4-A	4-Channel CWDM mux/de-mux module	(1550, 1570, 1590, 1610 nm)
R416-A4-B	4-Channel CWDM mux/de-mux module	(1470, 1490, 1510, 1530 nm)
R416-A4-C	4-Channel CWDM mux/de-mux module	(1390, 1410, 1430, 1450 nm)
R416-A4-D	4-Channel CWDM mux/de-mux module	(1310, 1330, 1350, 1370 nm)

Multiplexer Modules (SC connectors with expansion port and extended temperature range)

R416-A4-AE	4-Channel CWDM mux/de-mux module	(1550, 1570, 1590, 1610 nm)
R416-A4-BE	4-Channel CWDM mux/de-mux module	(1470, 1490, 1510, 1530 nm)

Single Channel OADM Modules

R426-D4-31	1310nm drop & pass module	R436-J4-31	1310nm drop & add module
R426-D4-33	1330nm drop & pass module	R436-J4-33	1330nm drop & add module
R426-D4-35	1350nm drop & pass module	R436-J4-35	1350nm drop & add module
R426-D4-37	1370nm drop & pass module	R436-J4-37	1370nm drop & add module
R426-D4-39	1390nm drop & pass module	R436-J4-39	1390nm drop & add module
R426-D4-41	1410nm drop & pass module	R436-J4-41	1410nm drop & add module
R426-D4-43	1430nm drop & pass module	R436-J4-43	1430nm drop & add module
R426-D4-45	1450nm drop & pass module	R436-J4-45	1450nm drop & add module
R426-D4-47	1470nm drop & pass module	R436-J4-47	1470nm drop & add module
R426-D4-49	1490nm drop & pass module	R436-J4-49	1490nm drop & add module
R426-D4-51	1510nm drop & pass module	R436-J4-51	1510nm drop & add module
R426-D4-53	1530nm drop & pass module	R436-J4-53	1530nm drop & add module
R426-D4-55	1550nm drop & pass module	R436-J4-55	1550nm drop & add module
R426-D4-57	1570nm drop & pass module	R436-J4-57	1570nm drop & add module
R426-D4-59	1590nm drop & pass module	R436-J4-59	1590nm drop & add module
R426-D4-61	1610nm drop & pass module	R436-J4-61	1610nm drop & add module

Single Channel OADM Modules (SC connectors with extended temperature range)

R426-D4-47E	1470nm drop & pass module	R436-J4-47E	1470nm drop & add module
R426-D4-49E	1490nm drop & pass module	R436-J4-49E	1490nm drop & add module
R426-D4-51E	1510nm drop & pass module	R436-J4-51E	1510nm drop & add module
R426-D4-53E	1530nm drop & pass module	R436-J4-53E	1530nm drop & add module
R426-D4-55E	1550nm drop & pass module	R436-J4-55E	1550nm drop & add module
R426-D4-57E	1570nm drop & pass module	R436-J4-57E	1570nm drop & add module
R426-D4-59E	1590nm drop & pass module	R436-J4-59E	1590nm drop & add module
R426-D4-61E	1610nm drop & pass module	R436-J4-61E	1610nm drop & add module

Specifications

Environmental

Operating Temperature	0°C to 50°C
Operating Humidity	5% - 95%
Storage Temperature	-30°C to 70°C

Environmental (Extended Temperature)

Operating Temperature	-40°C to 80°C
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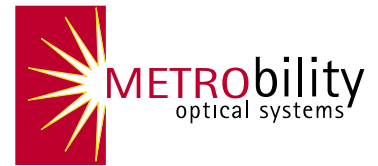
Regulatory

Compliance	ITU G.694.2; NEBS
Safety and EMC	FCC, UL, CE, C-UL

Physical Specification

Dimensions	1.7"H x 17.0"W x 10.0"L 4.4cmH x 43.2cmW x 25.4cmL
Weight	2.85lb / 1.29kg

R4000 chassis and all modules are NEBS certified



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Metrobility Optical Systems is an innovative next generation optical networking company whose focus is on delivering optical access platforms and to harness the power of Ethernet and fiber optics to deliver superior network edge access, connectivity and wavelength multiplexing solutions.

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