METRObility
optical systems
Simply Brilliant Optical Ethernet

Radiance Fast Ethernet Services Line Cards

Managed Network Interface Device (NID) for Ethernet in the First Mile (EFM)

E·F·M COMPLIANT O·A·M

The R821Services Line Card is supported in Metrobility's R5000, R1000, R400 and R200 platforms.

- *Transparent Ethernet access*
- *Advanced VLAN Aware Bridging*
- *Minimal Touch Provisioning*
- *Q-in-Q VLAN Tagging*
- *Traffic Prioritization*
- *Bandwidth Provisioning and Rate Limiting*
- *Optional ITU-Grid CWDM SFP Optics*

Metrobility's Radiance Services Line Card for Fat Ethernet provides an intelligent optical Ethernet demarcation point for service providers who are deploying Ethernet in the First Mile. The Services Line Card extends baseline VLAN technologies to enable delivery of multiple, converged end-user services across the first-mile, optical access network. These services include transport (link-specific) OAM, interconnectivity (network-specific) OAM, and services (application-specific) OAM.

The Radiance Ethernet Services Line Card offers multiple management schemes designed to meet the needs of the services provider who may need to manage a remote device via SNMP using an IP address today but may want to migrate to a more robust, secure, scalable and flexible proxy-based management framework.

As a carrier-class device, the Services Line Card is specifically designed to maintain the maximum isolation between the public and private network while supporting the OAM requirements defined by both the IEEE and the Metro Ethernet Forum (MEF).

Direct Internet-Standard Management using SNMP and IEEE802.3ah

As an intelligent CPE demarcation point, the Services Line Card offers the Operations, Administration and Maintenance (OAM) aspects of the most recent IEEE 802.3ah draft, and will conform to the full standard (OAM aspects) once ratified. OAM management features provide loopbacks, MIB statistics, errored frame events, and "Dying Gasp" capabilities. These features allow in-service loopbacks for transparent service monitoring.

Additional features include sophisticated management access control which protects the system and network connections from a denial of service attack from the user's network. Management access control automatically discards unauthorized traffic received over the user port making the device impervious to all traffic conditions and all traffic patterns.

The embedded software is field-upgradable to ensure support of new features as the EFM standards and implementation agreements evolve. Remote downloads may be accomplished via TFTP and CLI over Telnet allows remote provisioning.

At the most basic level, the Services Line Card can check for health and status of the device and network connection.

Proxy-based Management via NetBeacon Element Manager

Metrobility's NetBeacon Element Manager is a carrier-class element mangement framework that consists of a GUI-based element management system and an element management proxy to achieve the highest level of managability. NetBeacon provides intuitive, graphical management of up to 109 remote sites using a single IP address creating a robust and secure management scheme which improves performance through IP and managed object aggregation. Because an IP address is not required at every access point, this solution scales extremely well for a large metro access service deployment which otherwise would require the management of countless IP addresses.

With NetBeacon, Metrobility goes beyond direct internet-standard management to include monitoring of optical amplitude, line card voltage and power, and equipment temperature. Using NetBeacon, network managers can access each device remotely, adjust operating parameters quickly and even switch hardware settings across the network. All configuration updates, maintenance, and diagnostics can be performed remotely. Data may be collected for up to 28 days to provide a histogram of RMON statistics, optical transmit and receive levels, power supply levels, voltage levels, and temperature.

The Metrobility Difference

Flexible management options accommodates future requirements as network evolves

Intelligent management access control makes the device impervious to denial of service

Small form-factor (SFP) optics support ITU CWDM wavelength specific optics to enable managed CWDM links

Extensions to 802.3ah OAM
   Real-time statistics to enable Quality of Line monitoring
   Remote real-time monitoring of optical power budgets

Remote loopback testing

History database of power, temperature, optical budgets

NEBS Level 3 certified

Product Highlights

Supported distances up to 80km

Line rate forwarding

Copper port supports 10/100Mbps autonegotiation

Console port provides local access for configuration and upgrades

Configurations

Standards-based Multi-service Delivery

The Services Line Card supports delivery of Metro Ethernet Forum (MEF) -defined point-to-point E-Line and multi-point E-LAN services. Traffic belonging to each service is classified by, and tunneled over, pre-determined VLANs for segregation and transport across carrier networks. Controlled at the Services Line Card, VLANs identify and segregate the specific ISP-access or corporate-access E-Line service, and determine corresponding prioritization and traffic management parameters for the associated traffic. Service provider management traffic is given higher priority than user data traffic.
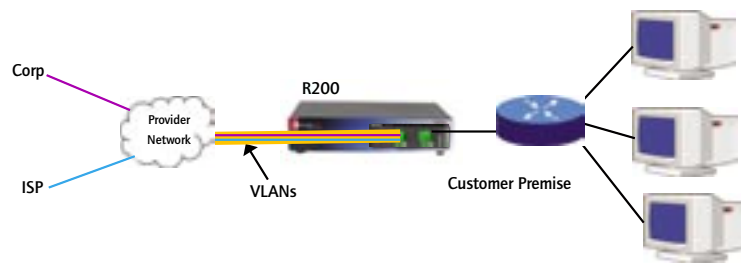
Direct Internet-Standard Management using IP address of NID at customer site

As a NID at the customer premises the R821 Services Line Card is used in one of Metrobility Premises Service Platforms which include the Radiance R1000, R400 or R200. DHCP client functions are enabled on the R821 for obtaining its management (endstation) IP address, network mask, and default gateway for the service provider's network. If a DHCP server is not found, the R821 will use a unique *zeroconf* IP address for initial provisioning. As the CPE demarcation point, the Services Line Card responds to PING requests addressed to unicast and subnet broadcast addresses by delivering information on the health and status of the device and its network connection. SNMP provides Internet-standard management and can be used for surveillance and fault management. Carrier-class management access control protects against denial of service on the management channel.
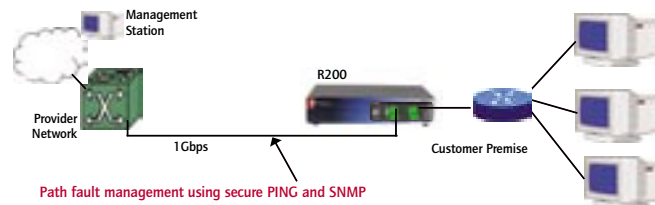
802.3ah-based NID management

The Services Line Card supports the IEEE 802.3ah standard for operations, administration and maintenance (OAM) of Ethernet in the Last Mile (EFM). The EFM/OAM standard enables IP-less remote failure indicators including Dying Gasp, frame level loopback, event notification (errored frame seconds), and MIB polling.
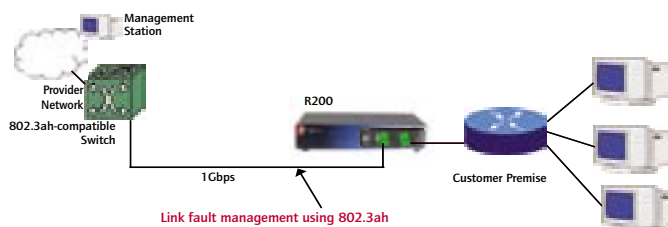
Enhanced remote site management via NetBeacon Element Manager

The NEBS Level 3-certified Radiance R5000 Central Service Platform installed at the central office or the point of presence connects to the switch or router at service provider's network. As a scalable management point, the R5000 includes a management card which collects information from the Services Line Card which is monitored and managed through NetBeacon Element Manager: This bookend approach provides a graphical view of the device and enables provisioning, quality of line, quality of equipment, optical power, and historical graphs.
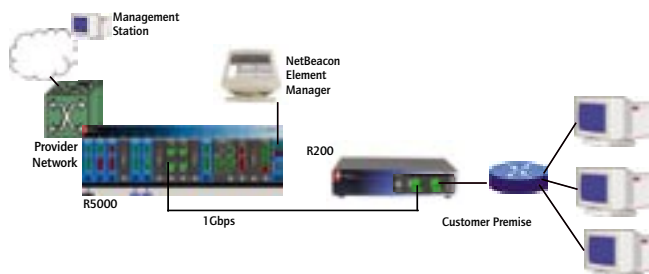
Local configuration of NID at customer site

A console port on the front of the Services Line Card provides user-friendly, local access via CLI for provisioning. The port is password-protected to prevent unauthorized access.

NetBeacon® Element Manager

NetBeacon collects statistics from the Services Line Card in the R5000 chassis in the central office and at the remote site. Using NetBeacon, network managers can access each device remotely, adjust operating parameters quickly and even switch hardware settings across the network. All platform configuration updates, maintenance, and diagnostics can be performed remotely.

Extensive real-time information on MIB-II and Metrobility-specific MIB statistics — plus alarm thresholds and notification procedures — enable early problem identification, fast fault isolation and proactive management to prevent problems before they affect endusers.

Quality of Optical Amplitude: Realtime measurement of the receive and transmit levels of the optical transceivers. Acts as integral power meter.


Quality of Equipment Monitoring: Measures temperature and logic voltage level at both ends of optical link

Quality of Line Monitoring
RMON Group 1 statistics may be viewed as list or in graph format.

Receive Path Failure Indicators: Remote loopback, Link Loss Carry Forward, Link Loss Return and Far End Fault

Database provides a history of up to 28 days for power, temperature, voltage, optical power, and RMON Group 1 statistics.
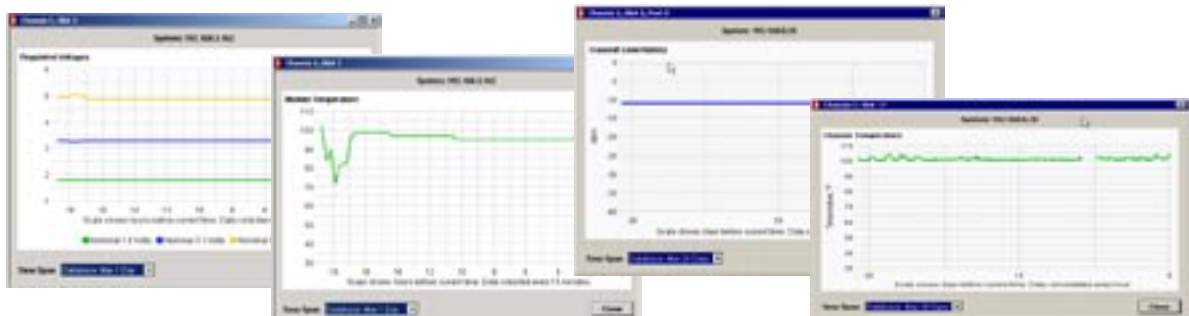
Fast Ethernet Services Line Cards

Model #	Port 1	Port 2	Max. Supported Segment Length* Port 1	Port 2
R821-1S	10/100BASE-T RJ-45	100BASE-X SFP	100m	see optics
R821-SS	100BASE-X SFP	100BASE-X SFP	see optics	see optics

R800-CA   Services Line Card Console Cable

*Actual segment length is dependent on the quality of fiber cable plant and loss budget of each device. See manual for cable type and product specifications.

SFP Optics

O280-M2	LC multimode	500m
O283-20	LC singlemode	20km
O281-40	LC singlemode	40km
O281-80	LC singlemode	80km
O293-20	LC singlemode	20km
O383-20-31	BWDM LC singlemode	20km
O383-20-55	BWDM LC singlemode	20km

CWDM 80km

O483-80-47	LC	1470nm
O483-80-49	LC	1490nm
O483-80-51	LC	1510nm
O483-80-53	LC	1530nm
O483-80-55	LC	1550nm
O483-80-57	LC	1570nm
O483-80-59	LC	1590nm
O483-80-61	LC	1610nm

Platform Options

R5000-17HS	17-slot chassis two bays for optional AC/DC power supplies
R1000-AAF	2-slot chassis with two front-facing AC power supplies
R1000-AAR	2-slot chassis with two rear-facing AC power supplies
R1000-ADF	2-slot chassis with one AC and one DC front-facing power supplies
R1000-ADR	2-slot chassis with one AC and one DC rear-facing power supplies
R1000-DDF	2-slot chassis with two front-facing DC power supplies
R1000-DDR	2-slot chassis with two rear-facing DC power supplies
R400-2HS-1A	2-slot chassis with single external AC power supply
R200-AC	1-slot chassis with single internal AC power supply
R200-DC	1-slot chassis with single internal DC power supply

Management

NetBeacon	NetBeacon Element Management Software
R502-M	Management Card (requires 1 slot in the chassis and enables NetBeacon and WebBeacon)

Standards Compliance

- IEEE 802.3-2002
- IEEE 802.1D-1998 Forwarding Aspects
- IEEE 802.1Q-202 VLAN Bridge Forwarding Aspects
- RFC 768 (UDP)
- RFC 791 (IP)
- RFC 792 (ICMP)
- RFC 793 (TCP)
- RFC 826 (ARP)
- RFC 854 (Telnet)
- RFC 950 (Internet Standard Subnetting Procedure)
- RFC 1157 (SNMPv1)
- RFC 1213 (MIB-II)
- RFC 1349 (IP) — updates RFC 791
- RFC 1350 (TFTP)
- RFC 1782 (TFTP) — updates RFC 1350
- RFC 1783 (TFTP) — updates RFC 1350
- RFC 1784 (TFTP) — updates RFC 1350
- RFC 1785 (TFTP) — updates RFC 1350
- RFC 2011 (MIB-II) — updates RFC 1213
- RFC 2012 (MIB-II) — updates RFC 1213
- RFC 2013 (MIB-II) — updates RFC 1213
- RFC 2131 (DHCP)
- RFC 2347 (TFTP) — updates RFC 1350
- RFC 2348 (TFTP) — updates RFC 1350
- RFC 2349 (TFTP) — updates RFC 1350
- RFC 2819 (RMON Group 1)
- RFC 2863 (Interfaces Group MIB) - updates RFC 1213
- RFC 3168 (TCP) — updates RFC 793
- RFC 3273 (RMON Group 1)
- RFC 3396 (DHCP) - updates 2131

MIB-II

The R821 services line card supports the following standard Management Information Base (MIB-II) managed object groups, pertaining only to the endstation traffic.

- System (end-station only)
- Interfaces (end-station and data interfaces)
- IpNetToMedia (end-station only)
- IP (end-station only)
- ICMP (end-station only)
- TCP (end-station only)
- UDP (end-station only)
- SNMP (end-station only)
- AT (end-station only)

Objects from within these MIB groups are accessible by, and available to, SNMP-based management stations over UDP/IP.

Enterprise-Specific Managed Objects

Metrobility-specific managed objects provide control of the following objects:

- End-station IP addressing information
- SNMP access communities
- SNMP trap destination addresses and communities
- Download server addresses
- Download management software
- Interface control (enable/disable)
- Input/output laser levels
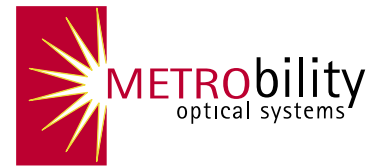
Metrobility Optical Systems is an innovative next generation optical networking company whose focus is on delivering optical access platforms and to harness the power of Ethernet and fiber optics to deliver superior network edge access, connectivity and wavelength multiplexing solutions.

Specifications

Environmental

Oper. Temp.	0°C to 50°C
Oper. Humidity	5% to 95% non-condensing
Storage Temp.	-25°C to 70°C

Regulatory (Safety/EMC)

UL, CSA, CE, CB
NEBS Level III,
EN60950 (safety)
FCC Part 15 Class A
DOC Class A (emissions)
EN55022 Class A (emissions)
EN55024:1998 (immunity)
IEC 825-1 Classification (eye safety)
Class 1 Laser Product (eye safety)

A6285   ISO 9001

Metrobility Optical Systems,Inc.