LA-210

EFM DSL Network Termination Unit

Delivering Ethernet services over SHDSL.bis lines using EFM technology

- EFM network termination unit with SHDSL.bis or VDSL2 line interface, transporting up to 22 Mbps synmetric over SHDSL.bis or 100 Mbps/50 Mbps over VDSL2
- Designed for large and small-to-medium enterprises to deliver business-class Ethernet services
- MEF-certified featuring Ethernet Private Line (EPL) and Ethernet Virtual Private Line (EVPL) services with flexible mapping of user traffic into Ethernet flows
- Robust bandwidth control mechanism and SLA monitoring per Ethernet flow assuring delivery of contracted Ethernet services
- Complete Ethernet OAM solution based on IEEE 802.3-2005 (formerly 802.3ah), IEEE 802.1ag and ITU-T Y.1731

EtherAccess

LA-210 EFM (Ethernet in the First Mile) DSL network termination unit operates at Ethernet access rates of up to 22 Mbps over bonded SHDSL.bis copper lines or 100 Mbps (downstream)/50 Mbps (upstream) over VDSL2 lines. As part of RAD's EtherAccess® portfolio, it offers Carrier Ethernet features, including Ethernet OAM for proactive SLA monitoring, quality of service (QoS) per Ethernet flow, and advanced traffic management capabilities – all starting at the service hand-off points.

The unit is certified by the Metro Ethernet Forum to deliver Ethernet services:

- Ethernet Private Line (EPL) – Site-to-site connectivity over dedicated bandwidth without service multiplexing (see *Figure 1*)
- Ethernet Virtual Private Line (EVPL) – Site-to-site connectivity over shared bandwidth with service multiplexing (see *Figure 2*).

Designed to deliver business-class Ethernet services, LA-210 can operate in bridge or flow mode.

CARRIER ETHERNET MEF Certified Compliant

RAD data communications
The Access Company

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FLEXIBLE TRAFFIC MAPPING

Traffic is mapped to the Ethernet flows (EVCs) using the following per-port classification criteria:

- Port-based (All-to-one bundling)
- CE-VLAN
- CE-VLAN priority
- DSCP
- IP precedence
- Source/destination IP address
- CE-VLAN + CE-VLAN priority
- CE-VLAN +SP-VLAN
- CE-VLAN ID + IP precedence (user to network only)
- CE-VLAN + DSCP (user to network only)
- Non-IP
- CE-VLAN + non-IP
- Untagged.

LA-210 performs several per-flow VLAN tagging actions, including adding and removing VLAN tags. The device also performs SP P-bit marking.

BRIDGE MODE

The internal bridge can operate in VLAN-aware or VLAN-unaware mode.

VLAN stacking can be used for traffic separation between different users or services, by defining a Service VLAN ID per customer or service, that is added to user traffic and removed from network traffic.

QoS AND TRAFFIC PRIORITIZATION

LA-210 prioritizes traffic and offers QoS to ensure service level agreements (SLA) that comply with business customers' high demands.

Traffic policing is applied per flow and operates according to the dual token bucket mechanism based on user-configurable CIR + CBS and EIR + EBS.

User traffic is mapped into up to four separate queues, which can be configured to work as strict priority or weighted fair queue (WFQ). The queues handle traffic with different service demands, such as real-time traffic, premium data, or best-effort data.

Shaping can be performed at the network queue and network port egress level.

ETHERNET OAM

End-to-end OAM based on IEEE 802.1ag and ITU-T Y.1731 enables Ethernet service providers to monitor their services proactively, measure end-to-end performance, and guarantee that the customers receive the contracted SLA. Fault monitoring and performance measurement include frame delay, frame delay variation, frame loss and availability.

Single segment (link) OAM according to IEEE 802.3-2005 (formerly 802.3ah) provides fault indication, including remote loopback.

LAYER-2 LOOPBACK WITH MAC SWAPPING

Layer-2 link integrity can be tested by a non-disruptive loopback with MAC address swapping. The loopback can be performed per flow. It passes through Ethernet bridges and does not disrupt traffic flows that are not being tested.

L2CP HANDLING

LA-210 can be configured to pass through Layer-2 control frames across the network, to peer-supported protocols (802.3ah), or to discard the L2CP frames.

MANAGEMENT

The unit can be managed using the following ports and applications:

- Remote inband management via the network ports using Telnet or RADview, RAD's SNMP-based management system
- Out-of-band management via one of the user ports configured as a management port
- Local management via an ASCII terminal connected to the RS-232 port.

Management traffic can be separated from user traffic by creating dedicated flows for management.

Databases and scripts of commonly used commands can be easily created and applied to multiple units using RAD's command line interface.

Up to ten different stations can manage LA-210, monitoring the network status from different locations.

SECURITY

LA-210 ensures client-server communication security and correct user authentication using the following protocols:

- SNMPv3
- RADIUS (client authentication only)
- SSH for Secure Shell communication session
- Password-protected Telnet and local terminal access.

Figure 1. Connecting LANs via Ethernet Private Line (EPL) Service

Specifications

VDSL2 NETWORK INTERFACE

Type
VDSL2

Line Coding
DMT

Impedance
100Ω

Compliance
ITU-T G.993.2

VDSL2 Profiles
See *Table 1*

Line Rate
100 Mbps downstream
50 Mbps upstream

SHDSL NETWORK INTERFACE

Type
SHDSL.bis

Line Coding
16 or 32 TC-PAM

Line Rate
192–5696 kbps, see *Table 2*

Impedance
135Ω

Compliance
ITU-T G.991.2, ETSI TS 101524

Bonding
Compliance: IEEE 802.3ah, ITU-T G.998.2

Operation Modes
STU-C, STU-R

USER ETHERNET INTERFACE

Number of Ports
1 or 4

Type
10/100BaseT

Connector
RJ-45

GENERAL

Compliance
IEEE 802.3, 802.3u, 802.1D, 802.1Q, 802.1p, 802.3ah, MEF 9 and MEF 14

Max. Frame Size
1580 bytes

***Note**: The Ethernet port maximum frame size is 1900 bytes, but any frame transmitted via the PCS port is limited to 1580 bytes.*

MAC Address Table Size
2,048 entries

Management
Local terminal port (V.24/RS-232 DCE; 9.6, 19.2, 115.2 kbps; DB-9 female connector)

Power
AC/DC: 100–240 VAC, 50/60 Hz or
48/60 VDC nominal (40–72 VDC)

Power Consumption
2-wires: 7W
4-wires: 8W
8-wires: 8.5W
VDSL: 10.5W

Physical
Height: 43.7 mm (1.7 in)
Width: 217 mm (8.5 in)
Depth: 170 mm (6.7 in)
Weight: 0.5 kg (1.1 lb)

Environment
Temperature: 0–50°C (32–122°F)
Humidity: Up to 90%, non-condensing

Table 1. VDSL2 Supported Profiles

Profile	Bandwidth [MHz]	No. carriers	Carrier bandwidth [kHz]	Power [dBm]	Max. throughput downstream [Mbps]
8a	8,832	2048	4,3125	+17,5	50
8b	8,832	2048	4,3125	+20,5	50
8c	8,5	1972	4,3125	+11,5	50
12a	12	2783	4,3125	+14,5	68
12b	12	2783	4,3125	+14,5	68
17a	17,664	4096	4,3125	+14,5	100

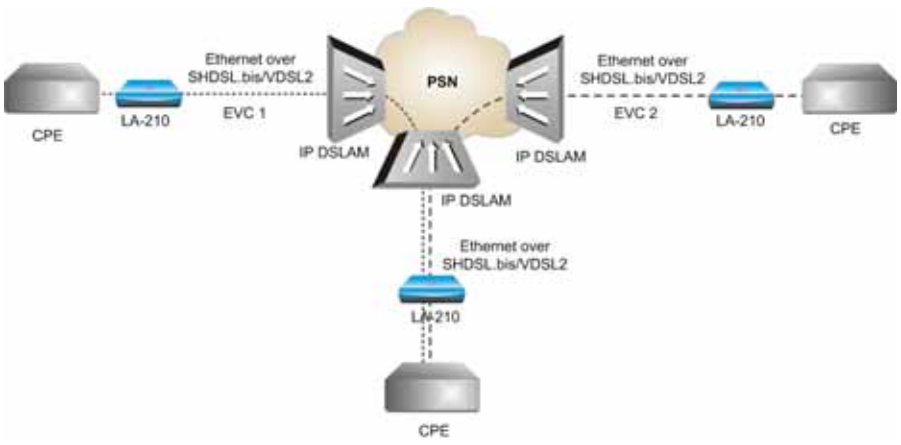

Figure 2. Providing L2 VPN Using Ethernet Virtual Private Line (EVPL) Service

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Ordering

STANDARD CONFIGURATIONS

LA-210/ESHDSL/2W/ETH
SHDSL.bis (2-wire), 1 Ethernet port

LA-210/ESHDSL/2W/4ETH
SHDSL.bis (2-wire), 4 Ethernet ports

LA-210/ESHDSL/4W/4ETH/EVPL
SHDSL.bis (4-wire), 4 Ethernet ports, Ethernet flows

LA-210/ESHDSL/8W/4ETH/EVPL
SHDSL.bis (8-wire), 4 Ethernet ports, Ethernet flows

LA-210/ESHDSL/8W/4ETH/EVPL/E1
SHDSL.bis (8-wire), 4 Ethernet ports, Ethernet flows, E1 port

LA-210/VDSL2/4ETH/EVPL
VDSL2, 4 Ethernet ports, Ethernet flows

SPECIAL CONFIGURATIONS

LA-210/&/!/$/*/@

Legend

& DSL technology:
- **ESHDSL** SHDSL.bis
- **VDSL2** VDSL2

! SHDSL interface:
- **2W** 2-wire SHDSL interface
- **4W** 4-wire SHDSL interface
- **8W** 8-wire SHDSL interface

Note: *The VDSL2 option arrives with the 2W (2-wire) interface.*

$ Operation mode (Default= Bridge mode):
- **EVPL** Ethernet Virtual Private Line services using Ethernet flows

***** Number of Ethernet ports:
- **ETH** One Ethernet port
- **4ETH** Four Ethernet ports

@ TDM port:
- **E1** One E1 port

Note: *Available with SHDSL interface only.*

LICENSE PACKAGES

Software packages to activate Ethernet Virtual Private Line services using Ethernet flows

LA-210-2W-EVPL
Software license for 2-wire SHDSL interface

LA-210-4W-EVPL
Software license for 4-wire SHDSL interface

LA-210-8W-EVPL
Software license for 8-wire SHDSL interface

LA-210-VDSL2-EVPL
Software license for VDSL2 interface

SUPPLIED ACCESSORIES

AC power cord

DC connection kit

OPTIONAL ACCESSORIES

RM-33-2
Hardware kit for mounting one or two LA-210 units in a 19-inch rack

CBL-DB9F-DB9M-STR
Control port cable

Table 2. SHDSL Typical Ranges (26 AWG)

Data Rate	2-wire		4-wire		8-wire	
[kbps]	[km]	[mi]	[km]	[mi]	[km]	[mi]
192	8	4.9	8	4.9	8	4.9
512	6.4	3.9	6.7	4.1	6.7	4.1
1536	5.7	3.5	6	3.7	6.5	4
2048	5.1	3.1	5.7	3.5	6.4	3.9
4096	3.9	2.4	5.1	3.1	5.7	3.5
4608	3.5	2.1	5	3	5.5	3.4
5696	2.9	1.8	4.6	2.8	5.1	3.1
11392	–	–	2.9	1.8	4.6	2.8
17088	–	–	–	–	3.5	2.1
22784	–	–	–	–	2.9	1.8

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