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Data Sheet

ASMi-54L

SHDSL.bis Modem

High-speed Ethernet and E1 traffic over copper links

- Managed modem transmitting full-duplex at data rates of up to 5.7 Mbps over 2-wire and 11.4 Mbps over 4-wire lines
- Dual Bearer mode for E1 and Ethernet HDLC
- Extended rates of up to 11.4/15 Mbps over 2-wire with RAD proprietary solution
- SHDSL bonding – for EFM: PAF according to IEEE802.3, for HDLC: M-Pair according to ITU-T G.991.2
- 4-port 10/100BaseT interface with integrated Ethernet switch
- Full interoperability with Megaplex-4100/LRS-102 ASMi-54C and ASMi-54C/N cards and/or point-to-point applications

ASMi-54L is a simple, cost-effective, dedicated managed SHDSL.bis modem that extends the range of high-speed services over existing copper pairs.

A special RAD proprietary solution provides the extended rates of up to:

- 15 Mbps over 2-wire lines (30 Mbps over 4-wire lines) for EFM encapsulated data

RAD
data communications
The Access Company

- 11.4 Mbps over 2-wire line (22.8 Mbps over 4-wire lines) for HDLC encapsulated data.

SHDSL/SHDSL.BIS

The modem employs TPS-TC framing 64/65o for EFM (IEEE802.3) and HDLC (G.991.2) on the SHDSL/SHDSL.bis link.

ASMi-54L performs line probing according to G.991.2. When enabled, the DSL interface adapts its rate to the condition of the line (noise, loop attenuation, etc.). When disabled, traffic on the DSL line is transmitted at a fixed rate selected by the user.

ASMi-54L can operate as a CO device or a CPE device according to user configuration.

The modem uses an Embedded Operation Channel (EOC) for controlling and monitoring the SHDSL/SHDSL.bis repeaters. Up to eight SHDSL/SHDSL.bis repeaters can be installed in line to increase the operation range of E1- and Ethernet-based modems.

EFM BONDING

EFM bonding on the Ethernet interface ensures that a failure or addition of a link does not drop the traffic being transmitted over other wires in the group. The capacity of the group does not decrease when a new link is added at a lower rate.

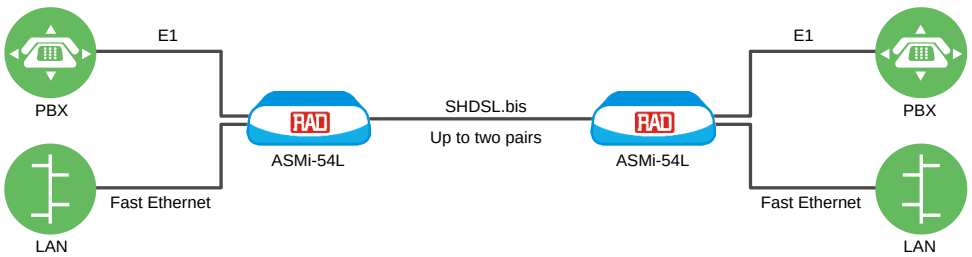

Figure 1. Multiplexing Services over SHDSL

ETHERNET

ASMi-54L features up to four Ethernet 10/100BaseT ports with half/full-duplex, autonegotiation and flow control. The fault propagation functionality enables the unit to shut down the Ethernet user port when an SHDSL line failure is detected. LANs are connected by bridging.

The internal forwarding of Ethernet traffic can be configured in two ways:

- By specifying the ports (a mode identified as ***unaware*** in accordance with Metro Ethernet Forum (MEF) standards). In this mode, all the Ethernet traffic reaching one of the ports is forwarded to the other port, and vice versa
- By using VLANs for classification: (a mode identified as aware in accordance with Metro Ethernet Forum (MEF) standards). In this mode, Ethernet traffic reaching one of the ports is forwarded to another port in accordance with its VLAN identifier

TRAFFIC MANAGEMENT /QOS

The 802.1D, DSCP, and Per Port priority schemes allow users to define different QoS levels according to application requirements.

The modem implements the IEEE's 802.1q standards to provide VLAN-tagging with four levels of prioritization, enabling carriers to offer differentiated Ethernet services. VLAN tagging can also be employed to separate traffic, ensuring transparency of the customer traffic and bolstering security of management traffic. The user can activate or deactivate the priority mechanism, and each priority (VLAN priority, DSCP or per port) can be configured and mapped to one of four priority queues.

Ingress data rate can be limited on each Ethernet port.

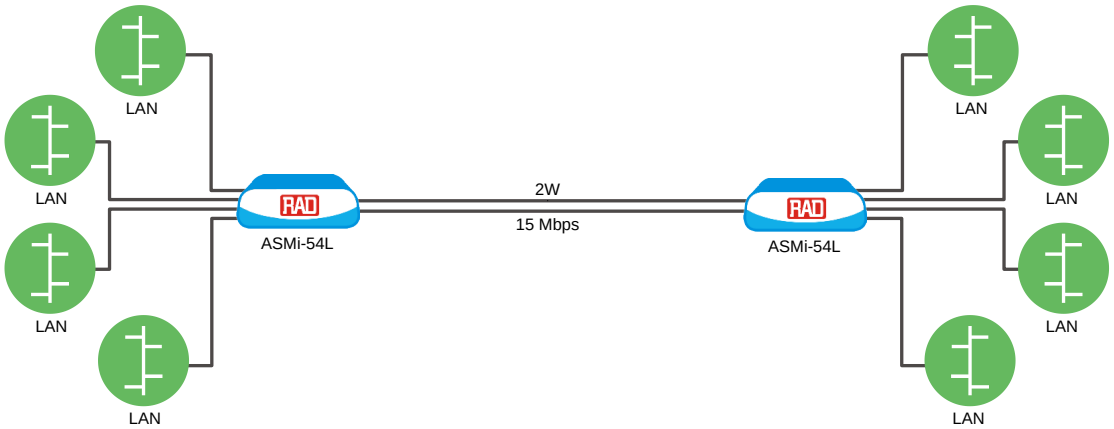

Figure 2. Extended Rates over 2-wire line (EFM Encapsulation)

TRAFFIC MANAGEMENT AND SECURITY

The ASMi-54L unit can be managed using the following connections:

- Local RS-232 terminal
- Telnet server, SNMP (Ver.1)
- Web server
- Inband management with or without dedicated VLAN.

OAM

ASMi-54L complies with the IEEE 802.3ah (IEEE 802.3-2005) standard for Operation, Administration, and Maintenance (OAM), originally developed for Ethernet in the First Mile (EFM) applications. OAM is a set of functions designed to monitor network operation on an SHDSL line, in order to detect line faults and measure performance.

RESILIENCY

Dying Gasp condition occurs if there is an interruption in the ASMi-54L power source. ASMi-54L reports power failures to the specified network management stations by sending an SNMP trap. This helps a service provider identify and isolate the end-point device that experienced a power failure.

PHYSICAL

The modem is encased in a compact half-19" plastic enclosure that can be mounted alone or in pairs in a 19-inch rack using RAD's optional rack mount kits (see *Ordering*). The modem is available in extended temperature versions (by special request).

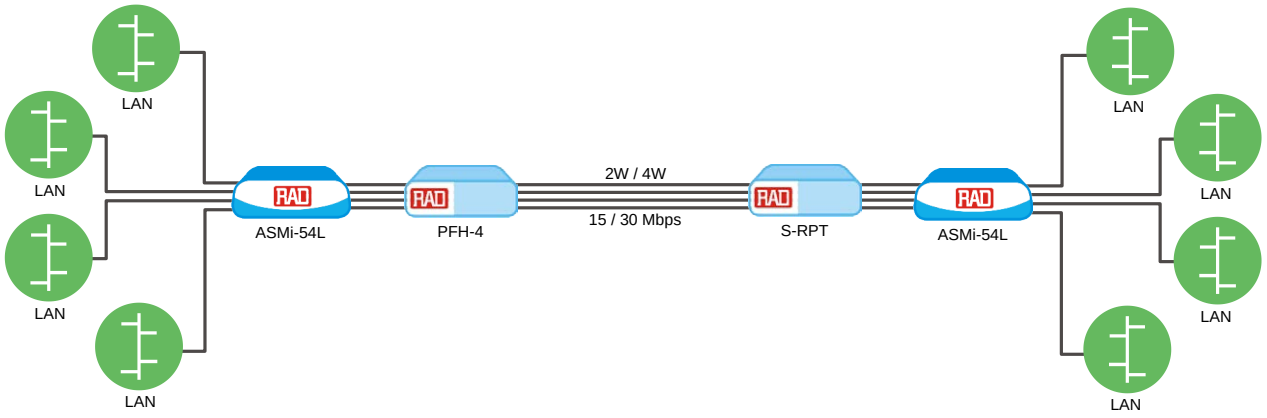

Figure 3. Extended Rates over 2-wire or 4-wire lines with S-RPT Repeater and PFH-4 Feeder

Specifications

SHDSL LINE INTERFACE

Line Type
Symmetrical PSD
2/4-wires unconditioned dedicated line (twisted pair)

EFM Bonding
Per IEEE802.3ah and ITU-T G.991.2 (for Ethernet only)

OAM
According to IEEE 802.3ah (passive and active)

Line Coding
TC-PAM 16/32/64/128

Max. Frame Size
2047 bytes

Line Rate
Up to 5.7 Mbps over 2-wire and 11.4 Mbps over 4-wire lines

Extended Rate

License key for extended rate transmitting:

- For EFM encapsulation: 192 to 15296 kbps in steps of n x 64 kbps for each pair
- For HDLC encapsulation: 192 to 11456 kbps in steps of n x 64 kbps for each pair

Range
See *Table 1.*

Impedance
135Ω

Table 1. Typical Ranges
(26 AWG, noise free)

Data Rate [kbps]	Range [km]	[miles]
192	6.6	4.1
1536	4.9	3.0
2048	4.5	2.8
4096	3.2	2.0
4608	3.0	1.9
5696	2.6	1.6
11400	1.2	0.7

Connectors
RJ-45

Compliance
ITU-T G.991.2, ETSI TS 101524

E1 USER INTERFACE

Coding
HDB3

Impedance
120Ω, balanced
75Ω, unbalanced (via adapter cable)

Jitter
As per ITU G.823

Connectors
RJ-45

Diagnostics
Local analog loopback
Remote digital loopback

ASMi-54L
SHDSL.bis Modem

ETHERNET INTERFACE

Type
10/100BaseT

Port Number
4

Connectors
RJ-45

Max. Frame Size
1580 bytes

CONTROL PORT

Interface
V.24/RS-232

Type
DCE

Format
Asynchronous; 8 bits, 1 stop bit, no parity

Rate
9.6, 19.2, 115.2 kbps

Connector
9-pin, D-type, female

INDICATORS

Front Panel
PWR (green) –
On: power supply is on
Off: power supply is off

TST (yellow) –
On: a test is active
Off: no test is active

ALM (red) –
On: new alarm in the alarm buffer
Off: no alarms in the alarm buffer

SHDSL SYNC (green/red) –
Green: the SHDSL line is synchronized and can transfer data
Green flashing: the SHDSL line is in training process
Red flashing: the SHDSL line is in PAF/M-pair establishment stage
Red: the SHDSL line is either not synchronized, or in training process, or in PAF/M-pair establishment stage

Rear Panel
Ethernet Ports LINK/ACT (per port)
ACT (yellow) –
Flashing: Ethernet traffic on the port
LINK (green) –
On: Ethernet port link is up
Off: No Ethernet link on the port
E1 LOC (red) -
On: Loss of signal or sync loss (in framed mode only) or unframed AIS is received on the E1 port
E1 REM (red) -
On: Remote alarm is received on the E1 port

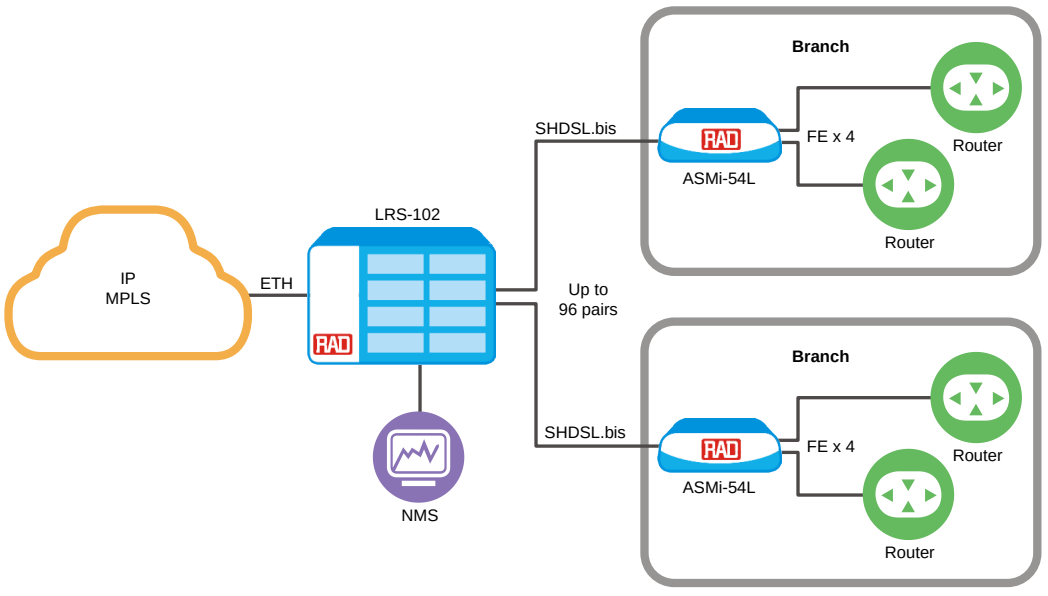

Figure 4. Up to 96 Remote ASMi-54L sites with LRS-102 as a Central Solution

TIMING

System Clock
For CO mode:
Internal – derived from the modem
External – derived from E1 port

For CPE mode:
Receive – derived from the SHDSL line

SHDSL Clock
For ASMi-54L with E1+Ethernet user interfaces:
Clock Mode 1 or 2

For ASMi-54L with Ethernet user interface only:
Clock Mode 3a

PERFORMANCE MONITORING

SHDSL and E1 statistics collection

GENERAL

Power
Wide-range AC/DC power supply:

- 100 to 240 VAC
- -48 to -60 VDC nominal

DC power supply: 24 VDC nominal

Physical
Height: 43.7 mm (1.7 in)
Width: 220 mm (8.6 in)
Depth: 170 mm (6.7 in)
Weight: 0.6 kg (1.2 lb)

Environment
Temperature: 0° to 50°C (32° to 122°F)
Extended temperature (4 x ETH interface version only): -20° to 70°C (-4° to 158°F)
Humidity: Up to 90%, non-condensing

Table 2. Modem Comparison Table

Feature	ASMi-52 (Ver. 2.9)	ASMi-52L (Ver. 2.0)	ASMi-54 (Ver. 3.5)	ASMi-54L (Ver. 2.6)	ASMi-54LRT (Ver. 2.1)
					
Max. data rate (Mbps)	2.3/4.6	2.3/4.6	5.7/11/22	5.7/11.4 (11.4/15 per pair with license key)	5.7/11
Interface	V.35, RS-530, X.21, E1, ETH	V.35, X.21, E1, ETH, 4 x ETH	4 x ETH, E1/4 x E1	4 x ETH, E1	4 x ETH, E1
Router					✓
Line	2W/4W	2W/4W	2W/4W/8W	2W/4W	2W/4W/8W

ASMi-54L
SHDSL.bis Modem

Ordering

STANDARD CONFIGURATIONS

ASMI-54L/4ETH/2W/ETR
ASMI-54L/4ETH/4W/ETR
ASMI-54L/24V/4ETH/4W/ETR
ASMI-54L/4ETH/4W/E1/ETR
ASMI-54L/4ETH/2W/E1
ASMI-54L/4ETH/4W/E1
ASMI-54L/4ETH/4W

SPECIAL CONFIGURATIONS

ASMi-54L/$/#/*/@/^/&

Legend

$ Optional 24 VDC power supply (Default=wide-range AC/DC power supply, 100 to 240 VAC, -48 to -60 VDC):
24V 24 VDC

Ethernet interface (mandatory):
4ETH Four-port ETH module with 4 x RJ-45 connectors

***** SHDSL interface:
2W 2-wire (1 pair)
4W 4-wire (2 pairs)

@ E1 user interface (Default=no E1 interface):
E1 E1

^ Extended temperature for device with 4 X ETH interface (Default= 0°C–50°C/32°F–122°F):
ETR -20°C to 70°C (-4°F to 158°F) (according to special request)

& Extended data rates (Default=regular rates):
HR License key for extended data rate

SUPPLIED ACCESSORIES

Power cord

AC/DC adapter for -48 VDC

OPTIONAL ACCESSORIES

RM-33-2
Hardware kit for mounting one or two plastic ASMi-54L units in a 19-inch rack

CBL-DB9F-DB9M-STR
Standard 9-pin male to female RS-232 control port cable

CBL-RJ45/2BNC/E1
Interface adapter for converting a balanced E1 RJ-45 connector into a pair of BNC unbalanced coaxial connectors

ASMi-54L-LIC/HR
License key for extended data rate

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