

ASMi-54LRT

SHDSL.bis Modem with Integrated Router



SHDSL.bis IP router
transporting Ethernet
and E1 traffic at high
speed over copper
links

- SHDSL.bis modem with integrated router for small/medium businesses (SOHO/SME users)
- Data rates of up to 5.7 Mbps over 2-wire, 11.4 Mbps over 4-wire or 22.8 Mbps over 8-wire lines
- Dual Bearer mode for E1 and Ethernet HDLC over 2-wire and 4-wire lines
- SHDSL bonding - for EFM: PAF according to IEEE802.3, for HDLC: M-Pair according to G.991.2
- 4-port 10/100BaseT interface with integrated bridge or router packet forwarding
- Fully compatible with ASMi-54/ASMi-54L standalone modem

ASMi-54LRT is a cost-effective, dedicated managed SHDSL.bis router that extends the range of high-speed services over existing copper pairs. The router is used for Ethernet and E1 service extension at rates of up to 22.8 Mbps using bonding technology.

Using TC-PAM 16 or TC-PAM 32 line coding SHDSL.bis technology, the router can operate in full-duplex mode over 2/4/8-wire lines at data rates of up to 5.7/11.4/22.8 Mbps.



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The SHDSL line features TPS-TC framing 64/65o for EFM (IEEE802.3) and HDLC (G.991.2) encapsulation.

ASMi-54LRT 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, the DSL line operates at a fixed rate selected by the user.

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

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 the other wires in the group. The capacity of the group does not decrease when a new link is added at a lower rate.

QUALITY OF SERVICE

ASMi-54LRT features QoS mechanisms to ensure that sudden drop in connectivity speed is taken into account when prioritizing and transmitting real time service-related data packets. In router mode DSCP (Differentiated Services Code Point) method is available for packet prioritization. DSCP enhances best effort internet services by differentiating traffic by users, service requirements and other criteria.

In bridge mode the following methods are available for packet prioritization:

- DSCP
- 802.1p (VLAN) priority
- Per Port priority – enable priority per ETH port.

These 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 for separating 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 mapped to one of four priority queues.



Figure 1. High Speed Internet Service for Small/Medium Businesses, Point-to-Point

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.

Specific rate limitation can be applied per port.

IP ROUTER

ASMi-54LRT incorporates a bridge or built-in router for secure and efficient Layer-3 IP connectivity over packet switched networks.

ASMi-54LRT can be set to use static or dynamic routing. Dynamic (NAPT) routing automatically adjusts packet routes over the network from LAN to WAN, whereas static (NAT) routing specifies a fixed routing path from LAN to WAN to enable access to servers in the Local Area Network.

The network connection can be configured as one of three types: DMZ (enabling access to the public servers), WAN, or LAN.

The router features three IP interfaces:

- WAN on the SHDSL link,
- LAN on ETH-1, ETH-2 and ETH-3 links
- DMZ on ETH-4 link.

The device uses dynamic NAPT to map multiple LAN IP addresses to a single public IP address, so that outgoing LAN traffic appears to originate from a single device – the ASMi-54LRT. Additionally, the device performs bidirectional NAT (maps a private single host IP address on the LAN to a single public IP address on the WAN subnet) for opening private IP services to the public network.

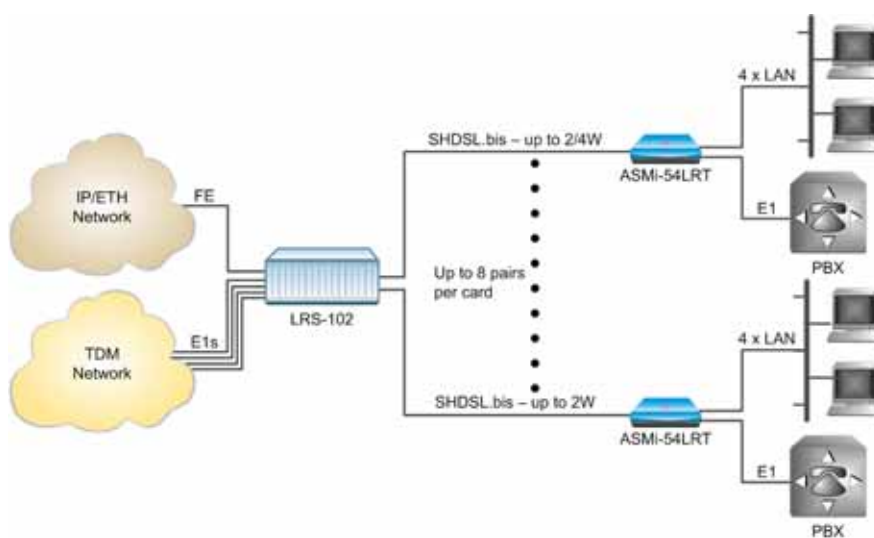


Figure 2. High Speed Internet service for Small/Medium Businesses, Point-to-Multipoint

ASMi-54LRT

SHDSL.bis Modem with Integrated Router

Firewall

A Solid Firewall™ protection for the LAN and the DMZ sub-network, provides security against unauthorized network access, including malicious denial of service (DoS) and distributed denial of service (DDoS) attacks.

Protective measures include rate limiting for ingress packets of vulnerable types .

VPN

ASMi-54LRT integrates IPSEC VPN capabilities. This allows establishing a Virtual Private Network (VPN) for connection of branch offices using data encryption through the Internet from the LAN interface.

MANAGEMENT

The ASMi-54LRT 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.

Up to eight SHDSL repeaters can be installed in line to increase the operation range of E1- and Ethernet-based modems.

PHYSICAL

ASMi-54LRT is available with several power supply options:

- AC/DC wide range (100 to 240 VAC, -48 to -60 VDC nominal)
- 24 VDC.

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).

Specifications

LINE INTERFACE

Line Type

Symmetrical PSD
2/4/8-wires unconditioned dedicated line
(twisted pair)

EFM Bonding

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

Line Coding

16 or 32 TC-PAM

Line Rate

For EFM: 192 to 5696 kbps in steps of
n x 64 kbps for each 2-wire line
For HDLC: 192 to 22784 kbps in steps of
n x 64 where n=89/178/356 for
2W/4W/8W

SHDSL Reference Clock

E1+Ethernet user interfaces:
Clock Mode 1 or 2
Ethernet only user interface:
Clock Mode 3a

Range

(26 AWG, noise-free, per pair):

Impedance

135Ω

Connectors

RJ-45

Compliance

ITU-T G.991.2, ETSI TS 101524

E1 INTERFACE

Coding

HDB3

Line Impedance

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

Jitter Performance

As per ITU G.823

Connector

RJ-45

Diagnostics

Local analog loopback
Remote digital loopback

CONTROL PORT

Interface

V.24/RS-232

Type

DCE

Format

Asynchronous; 8 bits, 1 stop bit, no parity

Data Rate

9.6, 19.2, 115.2 kbps

Connector

9-pin, D-type, female

ETHERNET BRIDGE

Interface

10/100BaseT

Connectors

4 x RJ-45

Frame Size

1580 bytes

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

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ETHERNET ROUTER/BRIDGE

Interface

10/100BaseT 4-port switch.

Connectors

4 x RJ-45

IP Addressing & Routing

NAPT (Dynamic)

Static NAT (Bidirectional)

Security

Firewall

Stateful packet inspection

IP VPNs

Tunnels: IPsec

IPsec encryption: AES, DES, 3DES

IPsec tunnel mode: AH and ESP with SHA1 and MD-5 hashing

Bridging and VLANs

Bridging or Integrated Routing

VLAN tagging and untagging

Multiple VLAN IDs per port (bridge mode)

802.1p priority tagging, TOS/COS and COS/TOS mapping (bridge mode)

EFM

IEEE 802.3 2BASE-TL (was 802.3ah)

Management

Telnet

Web-based configuration for LAN and WLAN settings by end-users (can be turned off)

SNMP v1/v3

Upload/download of configuration and binaries via FTP/TFTP

Global statistics screens (terminal, web-based)

Event and trace buffering alarms

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: a new alarm is detected in the alarm buffer

Off: no alarms are present in the alarm buffer

SHDSL SYNC (green/red) -

Green: the SHDSL line is synchronized and can pass 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

GENERAL

Power Supply

Wide-range AC/DC: 100 to 240 VAC,
-48 to -60 VDC nominal
DC: 24 VDC nominal

Timing

For CO:
Internal – derived from the modem
External – derived from E1 port
For CPE:
Receive – derived from the SHDSL line

Performance Monitoring

SHDSL and E1 statistics collection

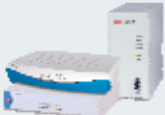




Physical

Height: 43.7 mm (1.7 in)
Width: 217 mm (8.5 in)
Depth: 170 mm (6.7 in)
Weight: 0.6 kg (1.2 lb)

Environment

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

Modem Comparison Chart

	ASMi-52	ASMi-52L	ASMi-54	ASMi-54L	ASMi-54LRT
					
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-54LRT**SHDSL.bis Modem with Integrated Router****Ordering****STANDARD CONFIGURATIONS****ASMi-54LRT/4ETH/2W****ASMi-54LRT/4ETH/2W/E1****ASMi-54LRT/4ETH/4W****ASMi-54LRT/4ETH/4W/E1****ASMi-54LRT/4ETH/8W****SPECIAL CONFIGURATIONS****ASMi-54LRT/\$/#/*/@/^***Legend*

- \$** Optional DC power supply
(Default=wide-range AC/DC power supply):
24V 24 VDC power supply
- #** 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)
8W 8-wire (4 pairs) (for Ethernet
only version)
- @** User interface (Default=no E1
interface):
E1 With E1 interface
- ^** 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)
range (according to special
request)

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 cable for converting a
balanced E1 RJ-45 connector into a pair
of BNC unbalanced coaxial connectors

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**data communications**

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