ASMi-54LRT

SHDSL.bis Modem with Integrated Router

- 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.

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.

ETHERNET

EFM Bonding

When using Ethernet sevice, EFM (Ethernet First Mile) bonding is applied.

EFM bonding allows multiple pairs to be used as a single, high capacity link, providing more bandwidth over the existing copper infrastructure.

EFM bonding shares Ethernet payload between the connected SHDSL pairs, ensuring user traffic reliability in case of one pair failure.

Quality of Service

ASMi-54LRT features the 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 taking into account user selection, service requirements and other criteria.
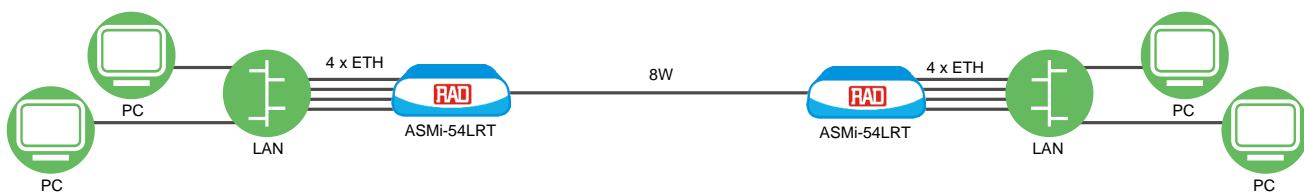

Figure 1. High Speed Internet Service for Small/Medium Businesses, Point-to-Point

RAD
Your Network's Edge

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

- DSCP
- 802.1p (VLAN) priority
- Per-ETH-Port priority.

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.

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 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.

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 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 – 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.
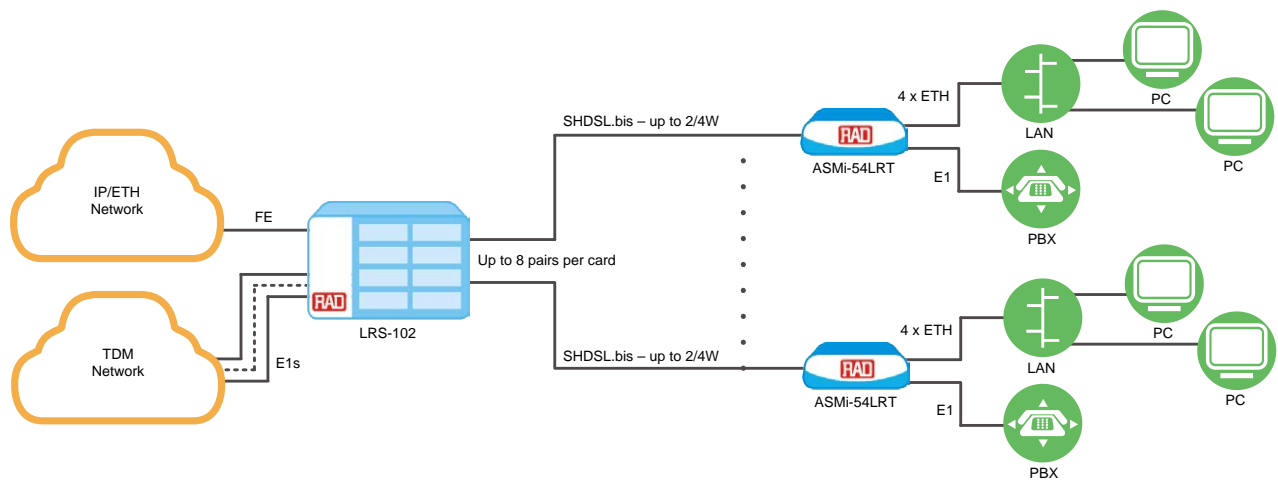

Figure 2. High Speed Point-to-Multipoint Internet Service for Small and Medium Businesses

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 to provide secure IP communications by authenticating and encrypting each IP packet of a communication session.

This allows establishing a Virtual Private Network (VPN) for connection of branch offices using data encryption through the Internet from the LAN interface.

MANAGEMENT AND SECURITY

ASMi-54LRT 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.

ARCHITECTURE

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*).

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

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

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

Specifications

LINE INTERFACE

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

Impedance
135Ω

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

Range
For 26 AWG, noise-free, copper pair:

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

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

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

Compliance
ITU-T G.991.2, ETSI TS 101524

Connectors
RJ-45

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

BRIDGE

Interface
10/100BaseT

Connectors
4 x RJ-45

Frame Size
2048 bytes

ROUTER/BRIDGE

Interface
10/100BaseT 4-port switch

Connectors
4 x RJ-45

IP Addressing and 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)

ASMi-54LRT
SHDSL.bis Modem with Integrated Router

MANAGEMENT

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

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

SNMP v1
Upload/download of configuration and binaries via FTP/TFTP
Global statistics screens (terminal, web-based)
Event and trace buffering alarms

TIMING

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

For CPE:
Receive – derived from the SHDSL line

DIAGNOSTICS

Performance Monitoring
SHDSL and E1 statistics collection

GENERAL

Environment
Storage Temperature: -40 to 70°C (-40 to 158°F)

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

Front Panel Indicators
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 Indicators
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

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)

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

Ordering

RECOMMENDED CONFIGURATIONS

ASMi-54LRT/4ETH/2W
SHDSL.bis modem with integrated router, 4x10/100BaseT ports, 2-wire

ASMi-54LRT/4ETH/2W/E1
SHDSL.bis modem with integrated router, 4x10/100BaseT ports, 2-wire, E1 port

ASMi-54LRT/4ETH/4W
SHDSL.bis modem with integrated router, 4x10/100BaseT ports, 4-wire

ASMi-54LRT/4ETH/4W/E1
SHDSL.bis modem with integrated router, 4x10/100BaseT ports, 4-wire, E1 port

ASMi-54LRT/4ETH/8W
SHDSL.bis modem with integrated router, 4x10/100BaseT ports, 8-wire

SPECIAL CONFIGURATIONS

Please contact your local RAD partner for additional configuration options.

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

International Headquarters
24 Raoul Wallenberg Street
Tel Aviv 69719, Israel
Tel. 972-3-6458181
Fax 972-3-6498250, 6474436
E-mail market@rad.com

North America Headquarters
900 Corporate Drive
Mahwah, NJ 07430, USA
Tel. 201-5291100
Toll free 1-800-4447234
Fax 201-5295777
E-mail market@radusa.com

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