

# LRS-52

## Managed SHDSL Modem Rack



### FEATURES

- SHDSL modem rack with SNMP management
- Operates over 2-wire and 4-wire lines, enabling service over any copper infrastructure
- Utilizes TC-PAM line coding for extending the operation range to 9.5 km (5.9 miles) and eliminating the need for repeaters
- Operates at multiple data rates between 64 kbps and 4608 kbps enabling single-platform system upgrades
- Supports 6, 12 or 24 V.35, X.21 or G.703/G.704 E1 DTE interfaces
- Operates opposite RAD's ASMi-52 modems
- Supports embedded operation channel for end-to-end system management and supervision as per ITU-T G.991.2
- Operates in internal, external, and station clock modes
- Supports management via an ASCII terminal, Telnet hosts or RADview-EMS, Java-based, modular, client-server, scalable element management system
- Allows daisy-chaining of several units via Ethernet ports for uninterrupted management
- Provides extensive diagnostics, including loopbacks, SHDSL and E1 performance monitoring
- Includes optional dual hot-swappable power supply modules for load sharing and redundancy
- Supports alarm relay via dedicated pins of the station clock connector

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## Managed SHDSL Modem Rack

### DESCRIPTION

- LRS-52, an SHDSL modem rack, operates in full duplex mode over 2-wire and 4-wire lines.
- Multiple data rates in the range of 64 to 4608 kbps are supported. The data rates depend on the line interface and DTE interface types, and operating clock modes.
- LRS-52 employs standard SHDSL TC-PAM technology to extend the transmission range (see *Table 1*), enabling carriers to reach more customers at lower costs.
- The following DTE interfaces are available:
  - V.35
  - X.21
  - G.703/G.704 E1.2-wire units include up to 24 DTE ports, 4-wire units include up to 12 DTE ports.
- Control and monitoring of the remote units is performed via an Embedded Operation Channel (EOC) for the unit. The management channel operates without interfering with the data transmission, in compliance with ITU-T G.991.2 requirements.
- LRS-52 operates in a CO (central office) mode with the following timing:
  - Internal – All ports operate in CO mode and receive clock from a built-in oscillator.
  - External – All ports operate in CO mode and receive clock from adjacent DTEs.
  - Station Square – All ports operate in CO mode and receive RS-422 square-wave signals from an external dedicated station clock source.
  - Station G.703 – All ports operate in CO mode and receive G.703 unframed “all 1s” signals from an external dedicated station clock source.
  - Mixed – All ports operate in CO mode, and each of them can be individually set to operate with a master clock (internal or station) or an external clock.
- Each 4-wire line port can be configured to operate over 2-wire lines.
- The minor and major alarms are relayed to a remote alarm device via dedicated pins of the DB-15 rear panel station clock connector.
- Supervision and configuration activities are performed using ASCII terminals, IP hosts using the Telnet protocol, or RADview-EMS, Java-based, modular, client-server, scalable element management system, providing secure configuration and fault management capabilities.

One of the Ethernet management ports is configured for direct hub connection. The other Ethernet port is configured for LAN cross-connection. Several units can be managed by daisy-chaining their Ethernet ports.

- Comprehensive diagnostic capabilities include:
  - Real-time alarms to alert user on fault conditions
  - V.54 local analog and remote digital loopbacks
  - SHDSL and E1 statistics collection for 15-minute and day intervals.
- LRS-52 provides high voltage line protection in compliance with ITU K.21 and UL1950.

### APPLICATION

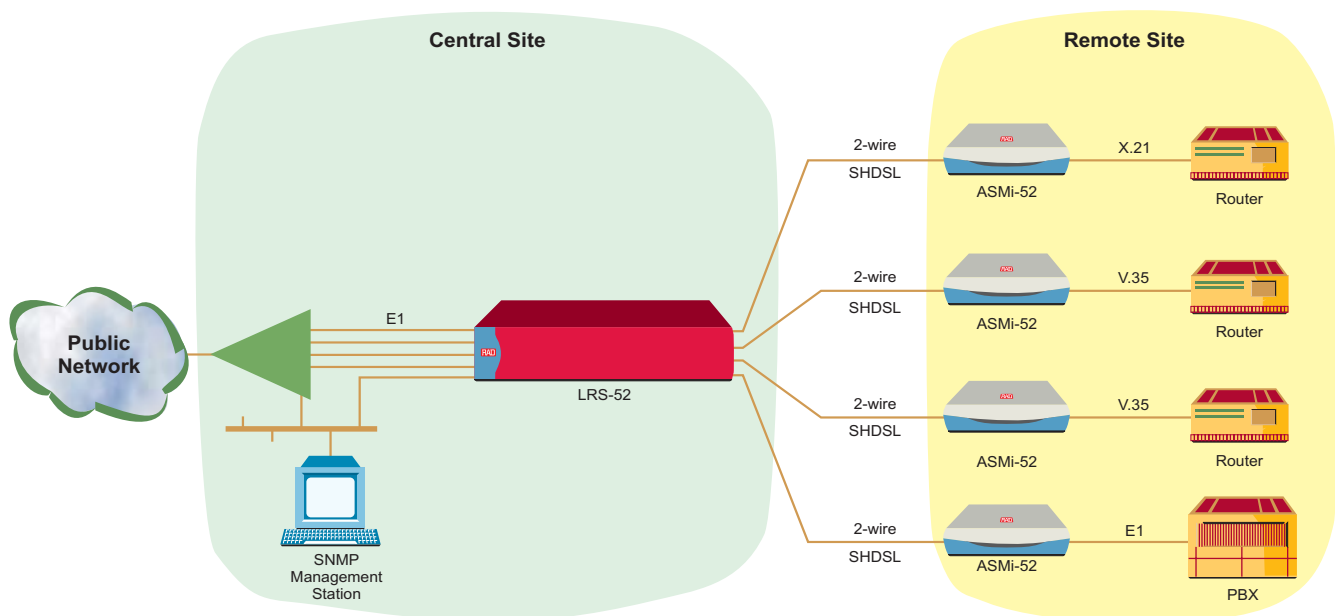


Table 1. Typical LRS-52 Ranges over 24 AWG Lines

Data Rate [kbps]	2-wire		4-wire	
	[km]	[miles]	[km]	[miles]
64	9.5	5.9	–	–
128	9	5.5	–	–
256	8	4.9	–	–
384	–	–	7.5	4.6
512	7	4.3	7.5	4.6
1024	6	3.7	6.7	4.1
2048	5	3.1	5.7	3.5
2304	4.2	2.6	5	3.1
4096	–	–	4	2.4
4608	–	–	3.5	2.1

**Notes:**

- Typical ranges are based on the error-free real line lab tests without noise.
- LRS-52 supports higher data rates (2304 kbps over 2-wire and 4608 kbps over 4-wire) when it is equipped with a serial DTE interface and operates in external clock mode.

## SPECIFICATIONS

**LINE INTERFACE**

- **Type**  
2/4-wire unconditioned dedicated line (twisted pair)
  - **Number of Ports**
    - 2-wire: 12 or 24 ports
    - 4-wire: 6 or 12 ports
  - **Line Coding**  
TC-PAM
  - **Range**  
See Table 1
  - **Impedance**  
135Ω
  - **Standards**
    - ITU-T 991.2
    - ETSI 101 524
  - **Protection**  
As per ITU K.21 and UL1950
  - **Connector**  
RJ-45
- DTE INTERFACE**
- **Type and Connector**
    - V.35: DB-25, female (via CBL-HS2/V1/M adapter cable)
    - X.21: DB-25, female (via CBL-HS2/X2/52/M adapter cable)
    - E1: RJ-45, balanced
  - **Number of Ports**
    - 2-wire: 12 or 24 ports
    - 4-wire: 6 or 12 ports
  - **Data Rate**  
Depends on the DTE/line interface type, and clock mode:
    - 2-wire: 64–2304 kbps
    - 4-wire: 64–4608 kbps
  - **E1 Coding**  
HDB3
  - **E1 Line Impedance**  
120Ω, balanced

**MANAGEMENT**

- **ASCII Terminal**
  - Interface: V.24/RS-232, DTE/DCE
  - Format: 7 or 8 bits; odd, even or no parity
  - Baud rate: 9.6, 19.2, 38.4, 57.6, 115.2 kbps
  - Connector: 9-pin, D-type, female
- **Ethernet Ports**
  - Number of ports: two, straight and cross
  - Protocol: Telnet
  - Connector: RJ-45

**GENERAL**

- **Timing**
  - Internal, from internal oscillator
  - External, from attached DTE
  - Station square, from an external dedicated square-wave station clock source
  - Station G.703, from an external dedicated G.703 station clock source
- **Diagnostics**
  - Loopbacks:
    - Local analog loopback in compliance with ITU V.54
    - Remote digital loopback in compliance with ITU V.54
  - Performance monitoring:
    - SHDSL and CRC-6 statistics collection
    - E1 with CRC-4: per ITU G.706
    - E1 without CRC-4: BPV

# LRS-52

## Managed SHDSL Modem Rack

- **Indicators**

- PS1 (green) – Power supply 1 is ON
- PS2 (green) – Power supply 2 is ON
- POWER (green/red) – A power supply is ON (green) or OFF (red)
- SYNC A/B (green/red) – Sync status of DSL line
- SYNC (red) – Loss of E1 sync (E1 interface only)
- AIS (yellow) – “All 1s string” is received (E1 interface only)
- ALM (red) – An alarm enters the buffer
- TST (red) – Test in progress
- LINK (green) – Ethernet link integrity
- ACT (yellow) – Ethernet traffic status

- **Physical**

- LRS-52/E1:
  - Height: 88 mm / 3.4 in
  - Width: 438 mm / 17.2 in
  - Depth: 240 mm / 9.4 in
  - Weight: 6.5 kg / 14.3 lb
- LRS-52/V.35, LRS-52/X.21:
  - Height: 133 mm / 5.2 in
  - Width: 438 mm / 17.2 in
  - Depth: 240 mm / 9.4 in
  - Weight: 6.5 kg / 14.3 lb

- **Power**

- AC: 100 to 240 VAC ( $\pm 10\%$ ), 50 to 60 Hz, 82 VA (LRS-52/E1), 108 VA (LRS-52/V.35/X.21)
- DC: -40 to -72 VDC (2A@-48 VDC nominal)

*Note: Two hot-swappable power supply modules can be installed for redundancy and load-sharing.*

- **Power Consumption**

- LRS-52/E1: 40W
- LRS-52/V.35/X.21: 56W

- **Environment**

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

## ORDERING

### LRS-52/\*/\$/#

Managed SHDSL modem rack

- \* Specify power supply:
  - AC for 100 to 240 VAC
  - DC for -48 VDC
  - ACR for AC power supply with redundancy
  - DCR for DC power supply with redundancy
- \$ Specify DTE interface type:
  - E1B for E1 balanced interface
  - V35 for V.35 interface
  - X21 for X.21 interface
- # Specify the number and type of ports:
  - 24/2W for 24 ports, 4-wire
  - 12/2W for 12 ports, 2-wire
  - 12/4W for 12 ports, 4-wire
  - 6/4W for 6 ports, 4-wire

### RM-36

Special hardware for mounting one LRS-52/E1 unit in an ETSI or ANSI-type 19-inch rack

### RM-38/ETSI

Special hardware for mounting one LRS-52/V.35 or LRS-52/X.21 unit in an ETSI-type 19-inch rack

### RM-38/ANSI

Special hardware for mounting one LRS-52/V.35 or LRS-52/X.21 unit in an ANSI-type 19-inch rack



data communications

[www.rad.com](http://www.rad.com)

- **International Headquarters**  
24 Raoul Wallenberg Street  
Tel Aviv 69719, Israel  
Tel: (972) 3-6458181  
Fax: (972) 3-6498250, 6474436  
Email: [rad@rad.co.il](mailto:rad@rad.co.il)
- **U.S. Headquarters**  
900 Corporate Drive  
Mahwah, NJ 07430  
Tel: (201) 529-1100  
Toll free: 1-800-444-7234  
Fax: (201) 529-5777  
Email: [market@radusa.com](mailto:market@radusa.com)

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