

## LRS-102 Module

# ASMi-54C

## Ethernet over SHDSL.bis 8-Port Module



- 16 wire-module for Ethernet services over 2W (1-pair), 4W (2-pair), or 8W (4-pair) SHDSL.bis lines
- Two SFP or UTP 10/100BaseT Ethernet ports
- Operation opposite RAD's ASMi-54 in varied combinations over up to 8 wire
- SHDSL bonding for EFM: PAF according to IEEE 802.3

ASMi-54C is an LRS-102 SHDSL.bis Ethernet module that delivers digital data to customer premises over existing copper cables of the distribution network while eliminating the need for repeaters. It transports Ethernet over 1, 2, and 4 pairs of SHDSL.bis copper lines.

The LRS-102 chassis can contain up to 12 card modules, to provide a simple and low-cost connectivity solution using High speed Digital Subscriber Line (SHDSL.bis) technology, as standardized by ITU-T Rec. G.991.2.

Using TC-PAM 32 line coding SHDSL.bis technology, the modem can operate in full-duplex mode over 2-wire lines at data rates of up to 5.7 Mbps.

The SHDSL line supports TPS-TC framing 64/65o for EFM (IEEE 802.3) and HDLC (G.991.2).

Each SHDSL.bis module port is a multirate SHDSL modem transmitting at user-selectable data rates up to 5.7 Mbps on each pair.

The module can operate as a Central SHDSL.bis (STU-C) Termination Unit working opposite up to 8 ASMi-54 standalone units.

ASMi-54C features two types of external ports:

- Eight independently configurable external SHDSL ports for providing SHDSL services
- Two 10/100 Mbps Ethernet ports, for packet-based services.

Ethernet over  
SHDSL.bis lines



## ASMi-54C

### Ethernet over SHDSL.bis 8-Port Module

#### ETHERNET SERVICES

The Ethernet services are provided by means of an internal Layer-2 Ethernet switch that fully complies with the IEEE 802.3/Ethernet V.2 standards, and has full VLAN support.

The external Ethernet ports can be ordered with two types of interfaces:

- 10/100BaseTx interfaces terminated in RJ-45 connectors.
- Sockets for Fast Ethernet SFP transceivers. RAD offers several types of SFPs with optical interfaces, for meeting a wide range of operational requirements (SFPs with copper interfaces are also available).

It is strongly recommended to order this device with **original** RAD SFPs **installed**. This will ensure that prior to shipping, RAD has performed comprehensive functional quality tests on the entire assembled unit, including the SFP devices. RAD cannot guarantee full compliance to product specifications for units using non-RAD SFPs.

The Ethernet switch switches traffic between the module Ethernet ports, including ETH over SHDSL.

The processing and switching of Ethernet traffic over TDM (SHDSL) links is configured by means of PCS using EFM or HDLC as the Layer-2 protocol.

ASMi-54C implements the IEEE's 802.1Q standards to provide VLAN-tagging with 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.

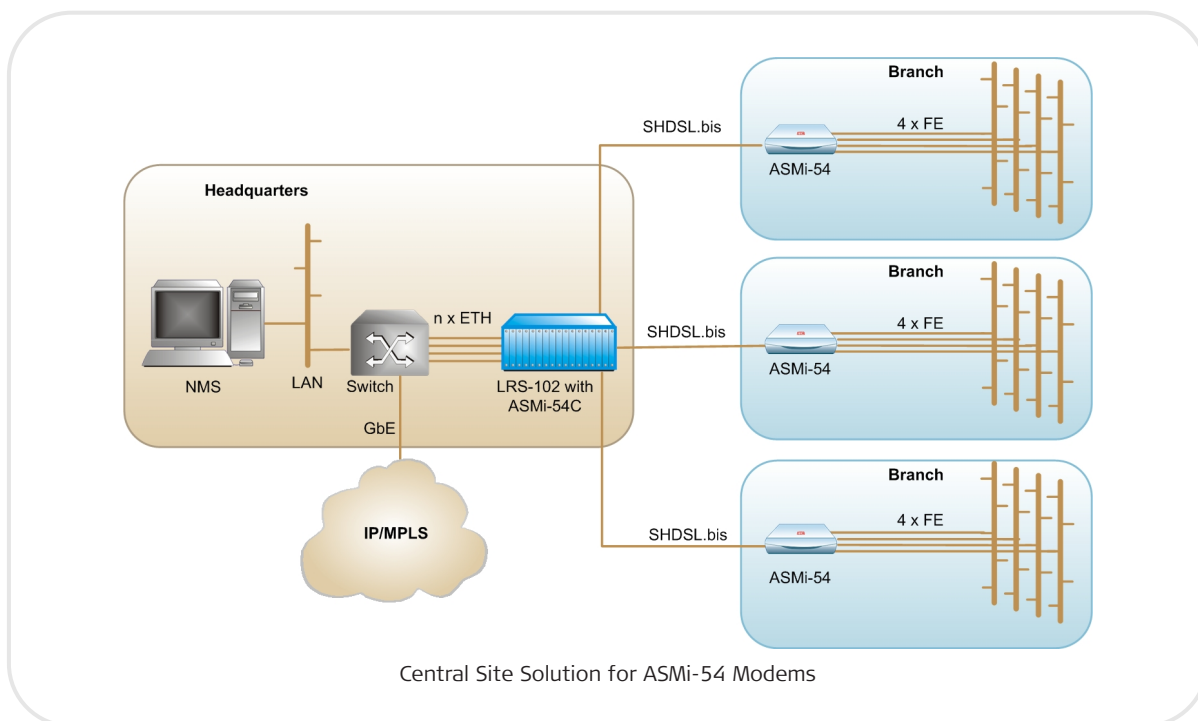
#### MONITORING

Performance statistics for the SHDSL and Ethernet ports may be obtained and analyzed via the LRS-102 management system.

#### MANAGEMENT

Setup, control, and diagnostics are performed in the following ways:

- via a supervisory port on the LRS-102 CL module using an ASCII terminal
- via a dedicated 10/100BaseT Ethernet port on the LRS-102 CL module for connection to a management station
- using inband management with dedicated VLAN for managing remote units.



## Specifications

### SHDSL.BIS INTERFACE

**Number of Ports per Module**

8 pairs

**Compliance**

ITU-T G.991.2, ETSI TS 101524

**Signal Format**

TC-PAM32

**Impedance**

135Ω

**Connector**

DB-26 convertible to 8 RJ-45 connectors via adaptor cable

**Typical Range**

See *Table 1*

### ETHERNET INTERFACE

**Number of Ports**

2 UTP or 2 fiber-optic

**Data Rate**

10/100 Mbps (Fast Ethernet)  
Autonegotiation

**Connectors**

2 x RJ-45, shielded  
2 x SFP transceivers (see *Ordering*)

**SFP Characteristics**

For full details, see the SFP Transceivers data sheet at [www.rad.com](http://www.rad.com)

**Maximum Frame Size**

1600 bytes

**Indicators (ports ETH1, ETH2)**

LINK (green) – LAN link integrity  
ACT (yellow) – LAN data activity

### GENERAL

**Performance Monitoring**

Per ITU-T Rec G.991.2, G.826

**Power Consumption**

14.5W

Table 1. Range by Data Rate

Data Rate*	Range	
	[km]	[miles]
192	6.4	4.0
1024	5.5	3.4
2048	3.8	2.4
4096	3.5	2.2
5696	2.5	1.5

\*26 AWG, noise-free

**ASMi-54C**

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**Ordering****ASMi-54C/ETH/#***Legend*

## # Interface and Connectors

UTP 2 UTP (RJ-45 connectors)

SFP\$ 2 SFP sockets including SFP transceivers (see below for a)

## \$ SFP transceivers for Ethernet

## 100BaseFx Interface

**1** Fast Ethernet/STM-1, 1310 nm, multimode, LED, 2 km (1.2 mi)**1D** Fast Ethernet/STM-1, DDM, internal calibration, 1310 nm, multimode, LED, 2 km (1.2 mi)**2** Fast Ethernet/STM-1, 1310 nm, single mode, laser, 15 km (9.3 mi)**2D** Fast Ethernet/STM-1, DDM, internal calibration, 1310 nm, single mode, laser, 15 km (9.3 mi)**3** Fast Ethernet/STM-1, 1310 nm, single mode, laser, 40 km (24.8 mi)**3D** Fast Ethernet/STM-1, DDM, internal calibration, 1310 nm, single mode, laser, 40 km (24.8 mi)**10a** Fast Ethernet/STM-1, Tx - 1310 nm, Rx - 1550 nm, single mode (single fiber), laser (WDM), 20 km (12.4 mi)**10b** Fast Ethernet/STM-1, Tx - 1550 nm, Rx - 1310 nm, single mode (single fiber), laser (WDM), 20 km (12.4 mi)**18a** STM-1/OC-3, Tx - 1310 nm, Rx - 1550 nm, 9/25 single mode (single fiber), laser (WDM), 40 km (24.8 mi)**18b** STM-1/OC-3, Tx - 1550 nm, Rx - 1310 nm, 9/25 single mode (single fiber), laser (WDM), 40 km (24.8 mi)**19a** STM-1/OC-3, Tx - 1490 nm, Rx - 1570 nm, 9/25 single mode (single fiber), laser (WDM), 80 km (49.7 mi)**19b** STM-1/OC-3, Tx - 1570 nm, Rx - 1490 nm, 9/25 single mode (single fiber), laser (WDM), 80 km (49.7 mi)**Notes.**

- For the complete list of SFPs, refer to the *SFP Transceivers data sheet*.
- It is strongly recommended to order ASMi-54C with original RAD SFPs installed. This will ensure that prior to shipping, RAD has performed comprehensive functional quality tests on the entire assembled unit, including the SFP devices. RAD cannot guarantee full compliance to product specifications for ASMi-54C units using non-RAD SFPs.

**OPTIONAL ACCESSORIES****CBL-DB26-8SHDSL**

Cable for splitting a single 26-pin connector into 8 x RJ-45 connectors

**Note:** This cable is required for the module operation. It can either be ordered from RAD or manufactured by the customer according to pinouts provided in the manual.

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