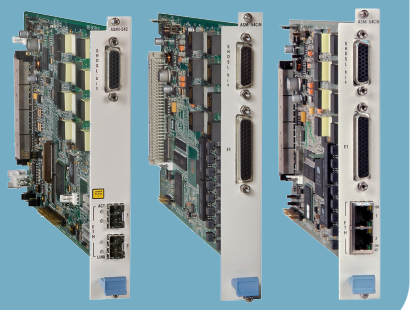
Data Sheet

Megaplex-4

ASMi-54C

Ethernet and TDM over SHDSL/SHDSL.bis 8-Port Modules



- 16-wire modules for Ethernet and TDM services over 8W (4-pair), 4W (2-pair), or 2W (1-pair) SHDSL/SHDSL.bis lines
- SHDSL: Data rates of up to 22.8 Mbps for 8W, up to 11.4 Mbps for 4W and up to 5.7 Mbps for 2W
- EFM extended rate for ASMi-54L: Data rates of up to 15.3 Mbps per 2W
- Remote power feeding over 4 wires
- Extended range with RAD's SHDSL/SHDSL.bis repeater
- Two copper/fiber Ethernet interface ports for local Ethernet termination
- EFM (Ethernet First Mile) or M-pair bonding over SHDSL/SHDSL.bis

ASMi-54C is a family of SHDSL/SHDSL.bis Ethernet and TDM modules for the Megaplex-4 chassis that delivers digital data to customer premises over existing copper cables of the distribution network.

SHDSL/SHDSL.BIS

ASMi-54C modules provide a simple, low-cost connectivity solution using High Speed Digital Subscriber Line (SHDSL/SHDSL.bis) technology.

The ASMi-54C family includes three main module types:

- ASMi-54C/ETH –Ethernet over SHDSL.bis 8-port module with EFM support
- ASMi-54C/E1/N - E1 over SHDSL/SHDSL.bis 8-Port module (starting from version 3.0)
- ASMi-54C/E1/ETH/N –E1 and Ethernet over SHDSL/SHDSL.bis 8-port module, with optional remote power feeding. (starting from version 3.0)

Note: *ASMi-54C/E1/N and ASMi-54C/E1/ETH/N modules cannot work with a mix of ASMi-54/54L and ASMi-52/52L modems at the far end.*

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

Using TC-PAM 64 line coding technology, the modems operate in full-duplex mode at up to 15 Mbps per port.

ASMi-54C can operate as a Central SHDSL.bis (STU-C) or Remote (STU-R) SHDSL.bis Termination Unit working with up to 8 standalone ASMi or ETX family devices or another ASMi-54C module.

When providing Ethernet services and operating as STU-R, ASMi-54C performs line probing according to G.991.2. The DSL interface can be configured to adapt its rate to the condition of the line (noise, loop attenuation, etc.) or operate at a fixed user-selected rate. The SHDSL line performs TPS-TC framing 64/65 for EFM (IEEE 802.3) and HDLC (G.991.2).

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

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 is not affected when a new link is added at a lower rate.

ETHERNET

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.
- SFP Sockets for Fast Ethernet transceivers. RAD offers a wide variety of SFPs, for meeting a wide range of operational requirements.

The Ethernet switch switches traffic between the module Ethernet ports and bundles, including ETH over SHDSL, and the CL module Ethernet subsystem (for connection via the CL GbE ports to a packet-switched network, or for transmission through the SDH network via virtually concatenated groups (VCGs).

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

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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.

TDM

E1 services are provided by /N options of the ASMi-54C module.

To increase the available SHDSL range, two or four pairs can be bonded to operate in the M-pair (HDLC) mode specified in ITU-T Rec. G.991.2. Bonding is available for lines handled by the same SHDSL section (the section handling either ports 1 to 4, or ports 5 to 8).

The external line ports feature user-selectable, balanced (120Ω) or unbalanced (75Ω) DSU interfaces. The framing mode is also user-selectable, in accordance with the required processing of the port traffic: G.704 basic with or without CRC-4, or unframed.

The DS0 cross-connect matrix of the Megaplex-4 chassis enables flexible payload routing in the ASMi-54C/N modules, independently configurable for each port, at the individual timeslot (DS0) level.

REMOTE POWER FEEDING AND EXTENDED RANGE

All the ASMi-54C modules have a remote power feeding version that delivers power and data over 4 wires to remote SHDSL/SHDSL.bis modems or repeaters.

Power feeding for each individual line is connected/disconnected via a software command. The power feeding status for each line and report of current overload conditions are displayed via CLI.

SDHSL EFM data transmission range can be significantly extended with RAD's new S-RPT/EFM repeater, using EFM bonding technology with local or remote power feeding, thus greatly enhancing RAD's solution for migration to Next Generation networks.

The module receives the power from the external MPF power feeder.

MANAGEMENT

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

- Via ASCII terminal connected to a supervisory port on the Megaplex-4 CL module
- Via management station connected to a dedicated 10/100BaseT Ethernet port on the Megaplex-4 CL module
- Using inband management with dedicated VLAN for managing remote units (ASMi-54/ASMi-54L)
- Using EOC from the central ASMi-54C module for managing remote units (ASMi-52/ASMi-52L/ASMi-53).

MONITORING AND DIAGNOSTICS

Performance statistics for the SHDSL, Ethernet, PCS (Physical Coding Sublayer) and E1 ports may be obtained and analyzed via the Megaplex-4 management system.

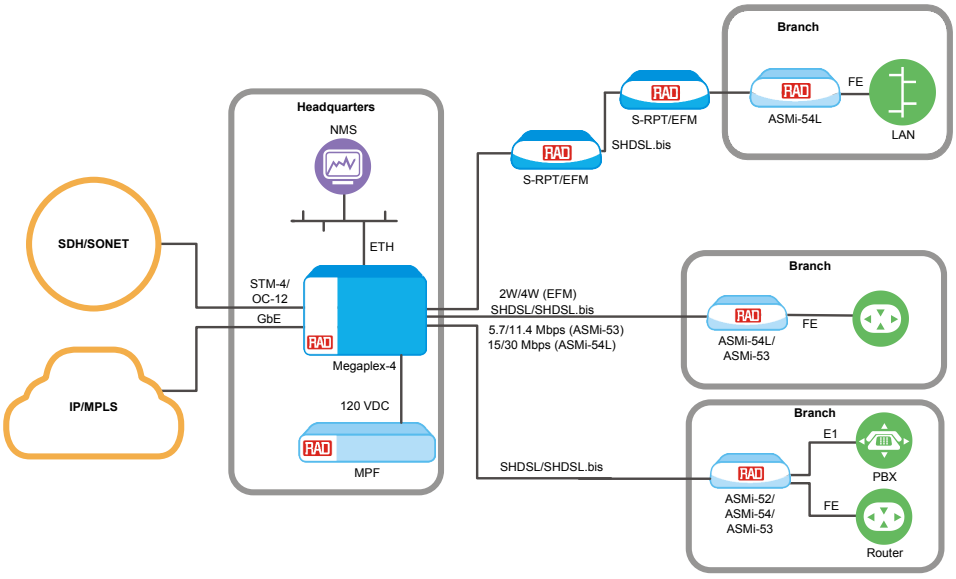

Figure 1. TDM/Ethernet Services over Copper and Fiber Infrastructure and Ethernet Service Extension over Copper Leased Lines

Specifications

SHDSL/SHDSL.bis INTERFACE

Number of Ports
8

Number of Wires
2, 4, 8

Compliance
ITU-T G.991.2, ETSI TS 101524
EFM bonding per IEEE 802.3ah, clauses 61, 63

Max. Data Rate
See *Table 2*

Line Coding
With remote ASMi-52/52L: TC-PAM 16
With remote ASMi-54, ASMi-53, ETX-203AM, ETX-2i: TC-PAM 16/32
With remote ASMi-54L: TC-PAM 16/32/64

Impedance
135Ω

Connectors
DB-26 convertible to 8 RJ-45 connectors via adaptor cable (regular model)

Typical Range
See *Table 1*

FAST ETHERNET INTERFACE

Number of Ports
2 UTP (RJ-45 shielded) or 2 SFP sockets

SFP Transceivers
For full details, see the SFP Transceivers data sheet on www.rad.com

***Note**. It is strongly recommended to order this device with original RAD SFPs. RAD cannot guarantee full compliance to product specifications for units using non-RAD SFPs.*

Data Rate
10/100 Mbps (Fast Ethernet)
Autonegotiation (copper only)

Maximum Frame Size
ASMi-54C/N (all models): 9600 bytes
ASMi-54C/ETH: 1522 bytes

E1 INTERFACE

Number of Ports
8

Coding
HDB3

Line Impedance
Balanced E1: 120Ω
Unbalanced E1: 75Ω (via adapter cable)

E1 Jitter Performance
As per ITU-T G.823

Connector
DB-44 convertible to RJ-45 or BNC connectors via adaptor cables or patch panel

DIAGNOSTICS

(ASMi-54C/N only)

- Local and remote loopbacks on local E1 ports, per port and per timeslot
- Local and remote loopbacks on local E1-i ports connected to the corresponding remote SHDSL ports, per port and per timeslot
- Remote-on-remote inband loopbacks on SHDSL ports, per port
- BER Test on local framed E1 and E1-i ports, per timeslot
- BER Test on local unframed and whole framed E1 and E1-i ports, per port

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

GENERAL

Environment
Operating temperature:
ASMi-54C/ETH: -10°C to 55°C (14°F to 131°F)
ASMi-54C/N: 0°C to 45°C (32°F to 113°F)
Storage temperature: -20°C to 70°C (-4°F to 158°F)
Humidity: up to 95%, non-condensing

Indicators (per ETHERNET port)

ASMi-54C/N
LINK/ACT (green)
10/100 (yellow)

ASMi-54C
LINK (green) – LAN link integrity
ACT (yellow) – LAN data activity

Power Consumption
ASMi-54C/ETH: 14.5W
ASMi-54C/ETH/UTP/RPF: 14.8 W
ASMi-54C/E1/N: 7.3W
ASMi-54C/E1/ETH/N: 12W
ASMi-54C/E1/ETH/UTP/N/RPF: 12.3W
***Note:** When power feeding is enabled, additional power consumption from MPF (see MPF Data Sheet) should be taken into account.*

Remote Power Feed
Number of Remote Units: Up to 8
Power Feeding: 120 VDC at 70 mA maximum per line

Table 1. Typical Ranges over 2W@26 AWG Cable

Data Rate [kbps]	Ranges [km]	[mi]
192	6.6h	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
15296	0.70	0.43

Notes

1. The SHDSL data rate depends on the module type, distance, number of wires and far-end device.

2. 15296 kbps is for TC-PAM 64 only.

3. The typical ranges are based on error-free lab tests without noise and obtained on a 26 AWG cable line simulator (DLS-400).

4. For ASMi-52/52L on the far end, only data rates up to 2048 are relevant.

Data Sheet

ASMi-54C

Ethernet and TDM over SHDSL/SHDSL.bis 8-Port Modules

Ordering

RECOMMENDED CONFIGURATIONS

MP-4100M-ASMi-54C/E1/N
E1 over SHDSL/SHDSL.bis 8-Port Module

MP-4100M-ASMi-54C/ETH/UTP
Ethernet over SHDSL.bis 8-port module with UTP connectors

MP-4100M-ASMi-54C/E1/ETH/UTP/N
E1 and Ethernet over SHDSL/SHDSL.bis 8-port module with UTP connectors

SPECIAL CONFIGURATIONS

Please contact your local RAD partner for additional configuration options.

OPTIONAL ACCESSORIES

CBL-DB26-8SHDSL
Cable for splitting a single 26-pin SHDSL.bis connector to 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.*

CBL-G703-8/RJ45/ST
Cable for splitting the 44-pin E1 connector to 8 E1 balanced RJ-45 connectors

CBL-G703-8/RJ45/X

Cross-cable for splitting the 44-pin E1 connector to 8 E1 balanced RJ-45 connectors

CBL-G703-8/COAX

Cable for splitting the 44-pin E1 connector to 8 pairs of E1 unbalanced BNC connectors

CBL-G703-8/OPEN/2M
Open-ended cable with DB-44 connector for balanced E1 applications

All cables are 2m (6.6 ft) long.

MP-PATCH-16-BNC/DB44

Low-cost adapter patch panel terminated in BNC connectors at the user's end, for connecting several ASMi-54C/N modules to equipment with unbalanced E1 interfaces

CBL-DB44-DB44

Cable for connecting each DB-44 connector of the module to the corresponding DB-44 connector of the patch panel

Table 2. ASMi-54C Module Comparison

		ASMi-54C/ETH			ASMi-54C/E1/N			ASMi-54C/E1/ETH/N		
Line type		SHDSL.bis			SHDSL/SHDSL.bis			SHDSL/SHDSL.bis		
Remote CPE and number of wires		2W	4W	8W	2W	4W	8W	2W	4W	8W
	ASMi-52	N/A	N/A	N/A	+	+	-	+	+	-
	ASMi-52L	N/A	N/A	N/A	+	+	-	+	+	-
	ASMi-54	+	+	+	+	+	+	+	+	+
	ASMi-54L	+	+	-	+	+	-	+	+	-
	ASMi-53	+	+	-	+	+	-	+	+	-
	ETX-203AM, ETX-2i	+	+	+	-	-	-	-	-	-
Data transfer		Ethernet data over 1, 2 or 4 pairs			E1 data over 1, 2 or 4 pairs			E1 and Ethernet data over 1, 2 or 4 pairs		
Central/Remote		STU-C/ STU-R			STU-C/ STU-R			STU-C/ STU-R		
EFM/M-pair		EFM/M-pair			M-pair			M-pair		
Maximum data rate, kbps	ASMi family	30592 (2 pairs)			22784 (4 pairs)			22784 (4 pairs)		
	ETX-203AM, ETX-2i	22784 (4 pairs)								
Supported in		Ver 2.x, Ver 3.x, Ver 4.x			Ver 3.x, Ver 4.x			Ver 3.x, Ver 4.x		

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