Installation and Operation Manual

ASM-60
4-Wire Symmetrical VDSL Modem

RAD
data communications

ASM-60

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RAD warrants to DISTRIBUTOR that the hardware in the ASM-60 to be delivered hereunder shall be free of defects in material and workmanship under normal use and service for a period of twelve (12) months following the date of shipment to DISTRIBUTOR.

If, during the warranty period, any component part of the equipment becomes defective by reason of material or workmanship, and DISTRIBUTOR immediately notifies RAD of such defect, RAD shall have the option to choose the appropriate corrective action: a) supply a replacement part, or b) request return of equipment to its plant for repair, or c) perform necessary repair at the equipment's location. In the event that RAD requests the return of equipment, each party shall pay one-way shipping costs.

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General Safety Instructions

The following instructions serve as a general guide for the safe installation and operation of telecommunications products. Additional instructions, if applicable, are included inside the manual.

## Safety Symbols

⚠️ **Warning**	**This symbol may appear on the equipment or in the text. It indicates potential safety hazards regarding product operation or maintenance to operator or service personnel.**
⚡	**Danger of electric shock! Avoid any contact with the marked surface while the product is energized or connected to outdoor telecommunication lines.**

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⏚	Protective earth: the marked lug or terminal should be connected to the building protective earth bus.
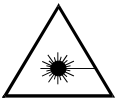
☀ **Warning**	**Some products may be equipped with a laser diode. In such cases, a label with the laser class and other warnings as applicable will be attached near the optical transmitter. The laser warning symbol may be also attached. Please observe the following precautions:**

- **Before turning on the equipment, make sure that the fiber optic cable is intact and is connected to the transmitter.**
- **Do not attempt to adjust the laser drive current.**
- **Do not use broken or unterminated fiber-optic cables/connectors or look straight at the laser beam.**
- **The use of optical devices with the equipment will increase eye hazard.**
- **Use of controls, adjustments or performing procedures other than those specified herein, may result in hazardous radiation exposure.**

ATTENTION: The laser beam may be invisible!

Always observe standard safety precautions during installation, operation and maintenance of this product. Only qualified and authorized service personnel should carry out adjustment, maintenance or repairs to this product. No installation, adjustment, maintenance or repairs should be performed by either the operator or the user.

Handling Energized Products

General Safety Practices

Do not touch or tamper with the power supply when the power cord is connected. Line voltages may be present inside certain products even when the power switch (if installed) is in the OFF position or a fuse is blown. For DC-powered products, although the voltages levels are usually not hazardous, energy hazards may still exist.

Before working on equipment connected to power lines or telecommunication lines, remove jewelry or any other metallic object that may come into contact with energized parts.

Unless otherwise specified, all products are intended to be grounded during normal use. Grounding is provided by connecting the mains plug to a wall socket with a protective earth terminal. If an earth lug is provided on the product, it should be connected to the protective earth at all times, by a wire with a diameter of 18 AWG or wider. Rack-mounted equipment should be mounted only in earthed racks and cabinets.

Always make the ground connection first and disconnect it last. Do not connect telecommunication cables to ungrounded equipment. Make sure that all other cables are disconnected before disconnecting the ground.

Connection of AC Mains

Make sure that the electrical installation complies with local codes.

Always connect the AC plug to a wall socket with a protective ground.

The maximum permissible current capability of the branch distribution circuit that supplies power to the product is 16A. The circuit breaker in the building installation should have high breaking capacity and must operate at short-circuit current exceeding 35A.

Always connect the power cord first to the equipment and then to the wall socket. If a power switch is provided in the equipment, set it to the OFF position. If the power cord cannot be readily disconnected in case of emergency, make sure that a readily accessible circuit breaker or emergency switch is installed in the building installation.

Connection of DC Mains

Unless otherwise specified in the manual, the DC input to the equipment is floating in reference to the ground. Any single pole can be externally grounded.

Due to the high current capability of DC mains systems, care should be taken when connecting the DC supply to avoid short-circuits and fire hazards.

DC units should be installed in a restricted access area, i.e. an area where access is authorized only to qualified service and maintenance personnel.

Make sure that the DC supply is electrically isolated from any AC source and that the installation complies with the local codes.

The maximum permissible current capability of the branch distribution circuit that supplies power to the product is 16A. The circuit breaker in the building installation should have high breaking capacity and must operate at short-circuit current exceeding 35A.

Before connecting the DC supply wires, ensure that power is removed form the DC circuit. Locate the circuit breaker of the panel board that services the equipment and switch it to the OFF position. When connecting the DC supply wires, first connect the ground wire to the corresponding terminal, then the positive pole and last the negative pole. Switch the circuit breaker back to the ON position.

A readily accessible disconnect device that is suitably rated and approved should be incorporated in the building installation.

Connection of Data and Telecommunications Cables

Data and telecommunication interfaces are classified according to their safety status.

The following table lists the status of several standard interfaces. If the status of a given port differs from the standard one, a notice will be given in the manual.

Ports	Safety Status	
V.11, V.28, V.35, V.36, RS-530, X.21, 10 BaseT, 100 BaseT, Unbalanced E1, E2, E3, STM, DS-2, DS-3, S-Interface ISDN, Analog voice E&M	SELV	Safety Extra Low Voltage: Ports which do not present a safety hazard. Usually up to 30 VAC or 60 VDC.
xDSL (without feeding voltage), Balanced E1, T1, Sub E1/T1	TNV-1	Telecommunication Network Voltage-1: Ports whose normal operating voltage is within the limits of SELV, on which overvoltages from telecommunications networks are possible.
FXS (Foreign Exchange Subscriber)	TNV-2	Telecommunication Network Voltage-2: Ports whose normal operating voltage exceeds the limits of SELV (usually up to 120 VDC or telephone ringing voltages), on which overvoltages from telecommunication networks are not possible. These ports are not permitted to be directly connected to external telephone and data lines.
FXO (Foreign Exchange Office), xDSL (with feeding voltage), U-Interface ISDN	TNV-3	Telecommunication Network Voltage-3: Ports whose normal operating voltage exceeds the limits of SELV (usually up to 120 VDC or telephone ringing voltages), on which overvoltages from telecommunication networks are possible.

Always connect a given port to a port of the same safety status. If in doubt, seek the assistance of a qualified safety engineer.

Always make sure that the equipment is grounded before connecting telecommunication cables. Do not disconnect the ground connection before disconnecting all telecommunications cables.

Some SELV and non-SELV circuits use the same connectors. Use caution when connecting cables. Extra caution should be exercised during thunderstorms.

When using shielded or coaxial cables, verify that there is a good ground connection at both ends. The earthing and bonding of the ground connections should comply with the local codes.

The telecommunication wiring in the building may be damaged or present a fire hazard in case of contact between exposed external wires and the AC power lines. In order to reduce the risk, there are restrictions on the diameter of wires in the telecom cables, between the equipment and the mating connectors.

Caution	To reduce the risk of fire, use only No. 26 AWG or larger telecommunication line cords.

Attention	Pour réduire les risques s'incendie, utiliser seulement des conducteurs de télécommunications 26 AWG ou de section supérieure.

Some ports are suitable for connection to intra-building or non-exposed wiring or cabling only. In such cases, a notice will be given in the installation instructions.

Do not attempt to tamper with any carrier-provided equipment or connection hardware.

Electromagnetic Compatibility (EMC)

The equipment is designed and approved to comply with the electromagnetic regulations of major regulatory bodies. The following instructions may enhance the performance of the equipment and will provide better protection against excessive emission and better immunity against disturbances.

A good earth connection is essential. When installing the equipment in a rack, make sure to remove all traces of paint from the mounting points. Use suitable lock-washers and torque. If an external grounding lug is provided, connect it to the earth bus using braided wire as short as possible.

The equipment is designed to comply with EMC requirements when connecting it with unshielded twisted pair (UTP) cables. However, the use of shielded wires is always recommended, especially for high-rate data. In some cases, when unshielded wires are used, ferrite cores should be installed on certain cables. In such cases, special instructions are provided in the manual.

Disconnect all wires which are not in permanent use, such as cables used for one-time configuration.

The compliance of the equipment with the regulations for conducted emission on the data lines is dependent on the cable quality. The emission is tested for UTP with 80 dB longitudinal conversion loss (LCL).

Unless otherwise specified or described in the manual, TNV-1 and TNV-3 ports provide secondary protection against surges on the data lines. Primary protectors should be provided in the building installation.

The equipment is designed to provide adequate protection against electro-static discharge (ESD). However, it is good working practice to use caution when connecting cables terminated with plastic connectors (without a grounded metal hood, such as flat cables) to sensitive data lines. Before connecting such cables, discharge yourself by touching earth ground or wear an ESD preventive wrist strap.

FCC-15 User Information

This equipment has been tested and found to comply with the limits of the Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the Installation and Operation manual, may cause harmful interference to the radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Canadian Emission Requirements

This Class A digital apparatus meets all the requirements of the Canadian Interference-Causing Equipment Regulation.

Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

Warning per EN 55022 (CISPR-22)

Warning	This is a class A product. In a domestic environment, this product may cause radio interference, in which case the user will be required to take adequate measures.
Avertissement	Cet appareil est un appareil de Classe A. Dans un environnement résidentiel, cet appareil peut provoquer des brouillages radioélectriques. Dans ces cas, il peut être demandé à l'utilisateur de prendre les mesures appropriées.
Achtung	Dieses ist ein Gerät der Funkstörgrenzwertklasse A. In Wohnbereichen können bei Betrieb dieses Gerätes Rundfunkströrungen auftreten, in welchen Fällen der Benutzer für entsprechende Gegenmaßnahmen verantwortlich ist.

ASM-60 with IR-ETH/QH Interface Module
Installation Instructions for
Compliance with EMC Requirements

To comply with electromagnetic compatibility requirements, use a shielded cable (STP) for connecting a 10/100BaseT LAN to the RJ-45 connector of the IR-ETH/QH interface module.

Declaration of Conformity

Manufacturer's Name: RAD Data Communications Ltd.

Manufacturer's Address: 24 Raoul Wallenberg St.
               Tel Aviv 69719
               Israel

declares that the product:

Product Name: ASM-60

conforms to the following standard(s) or other normative document(s):

EMC:	EN 55022: 1998	Information technology equipment, radio disturbance characteristics, limits and methods of measurement.
	EN 50024: 1998	Information technology equipment, Immunity characteristics, limits and methods of measurement.
Safety:	EN 60950: 2000	Safety of information technology equipment.

Supplementary Information:

The product herewith complies with the requirements of the EMC Directive 89/336/EEC, the Low Voltage Directive 73/23/EEC and the R&TTE Directive 99/5/EC for wired equipment. The product was tested in a typical configuration.

Tel Aviv, 29th October, 2002

Haim Karshen
VP Quality

European Contact: RAD Data Communications GmbH, Otto-Hahn-Str. 28-30,
         85521 Ottobrunn-Riemerling, Germany

Quick Start Guide

Installation of ASM-60 should be carried out only by an experienced technician. If you are familiar with ASM-60, use this guide to prepare the units for operation.

1.   Installing ASM-60

Setting the Internal Switches

➤ **To set internal switches:**

1. Disconnect the power cord from the power source.

2. Slide the blue side panel forward to detach it from the case.

3. Unscrew the two screws located on the bottom panel at the rear end of the unit.

4. Separate the two halves of the ASM-60 case by lifting the top cover at the end of the unit and sliding it forward.

5. Set the internal switches of the Ethernet interface board (IR-ETH, IR-ETH/QH or IR-IP).

Connecting the Interfaces

1. Connect the line to the RJ-45 rear panel connector.

2. Connect the DTE to the appropriate rear panel connector.

3. Connect the control terminal to the front CONTROL DCE connector.

Connecting the Power

• Connect the AC power to the ASM-60 modem.

    The PWR indicator turns on.

2. Operating ASM-60

Normal Indications

The table below shows the correct status of the indicators a few seconds after power-up.

Indicator	Status
PWR	ON
TD	Depends on DTE data transmission
RD	Depends on DTE data transmission
RTS	Depends on DTE RTS signal status
DCD	Depends on remote modem data transmission
TEST	OFF
ALM	OFF
SYNC A/SYNC B	Green or red, depending on remote modem data transmission

3. Configuring ASM-60

Configure ASM-60 to the desired operation mode via an ASCII terminal using the embedded management software. Configuration of the ASM-60 modem includes selection of a data rate.

Selecting the Data Rate

Main Menu
↓ **1**
Configuration
↓ **1**
Data Rate

➤ **To select the data rate:**

1. From the Configuration menu, type **1**.

    The Data Rate menu appears.

2. Select the data rate by typing the number corresponding to the desired value and then type **2** to save the changes.

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Appendix A. IR-ETH Interface Module

Appendix B. IR-ETH/QH Interface Module

Appendix C. IR-IP Interface Module

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Chapter 1

Introduction

1.1 Overview

ASM-60 is a VDSL (Very High-bitrate Digital Subscriber Line) modem handling high data rates. ASM-60 supports HSSI DTE interface, and several Ethernet interface modules, which allow LAN-to-LAN connectivity using VDSL technology.

Working in full duplex over 4-wire link, the modem can be configured to operate at the data rates of up to 10.240 Mbps.

Versions

ASM-60 is available in the two following versions:

* ASM-60/CO, for the central office deployment

* ASM-60/CPE, for customer premises deployment.

Application

Figure 1-1 shows a typical application for ASM-60, connecting the LANs over a 4-wire line.
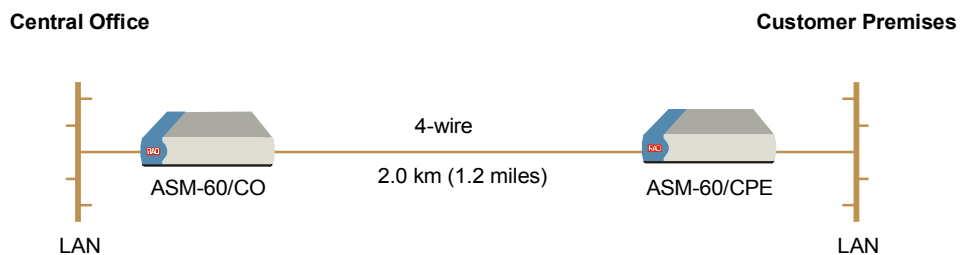
Figure 1-1. Typical ASM-60 Application

Features

ASM-60 utilizes the QAM VDSL technology to extend the range of data transmission over 4-wire 24 AWG line up to 2.0 km (1.2 miles). ASM-60 operates at the following data rates: 4.096 Mbps, 6.144 Mbps and 10.24 Mbps. *Table 1-1* lists typical ASM-60 ranges over 24 AWG STP Cat. 5 wire.

Table 1-1. Typical ASM-60 Ranges

Data Rate	24 AWG	
(Mbps)	km	miles
4.096	2.0	1.2
6.144	2.0	1.2
10.24	1.8	1.1

DTE Interface

The ASM-60 DTE interface supports the following interfaces:

- HSSI

- IR-ETH module with built-in Ethernet bridge

- IR-ETH/QH module with built-in Fast Ethernet bridge and VLAN support

- IR-IP module with built-in IP router.

Management

Setup, control, monitoring of status and diagnostics can be performed using an ASCII terminal connected to the ASM-60 async DCE control port.

Test Capabilities

ASM-60 performs an extensive self-test at start-up. During the self-test, ASM-60 checks its CPU, internal framer, DTE and interfaces and power supplies. The self-test results are displayed on the supervisory terminal.

Real Time Alarms

Real time alarms provide real time information on system status indicating loss of synchronization on line A and line B, DCD status etc.

ASM-60 also features a log file that stores all alarms and events that occurred in the unit. These alarms can be displayed and cleared.

Statistics Collection

ASM-60 stores the VDSL statistics for the line performance monitoring.

1.2 Physical Description

Figure 1-2 shows a 3D view of the ASM-60 standalone modem.

Figure 1-2. 3D View of ASM-60

The front panel includes nine LEDs, which display the status of power, data flow, control signals and provide diagnostics. The front panel also features a 9-pin D-type (CONTROL DCE) connector for terminal connection for configuration, control and monitoring. For detailed description of the front panel, see *Chapter 3*.

The rear panel includes the AC power connector, a DTE interface connectors and a line connector. The ASM-60 rear panel is described in greater detail in *Chapter 2*.

1.3 Functional Description

This section provides a functional description (*Figure 1-3*) of ASM-60 in the form of block diagrams.
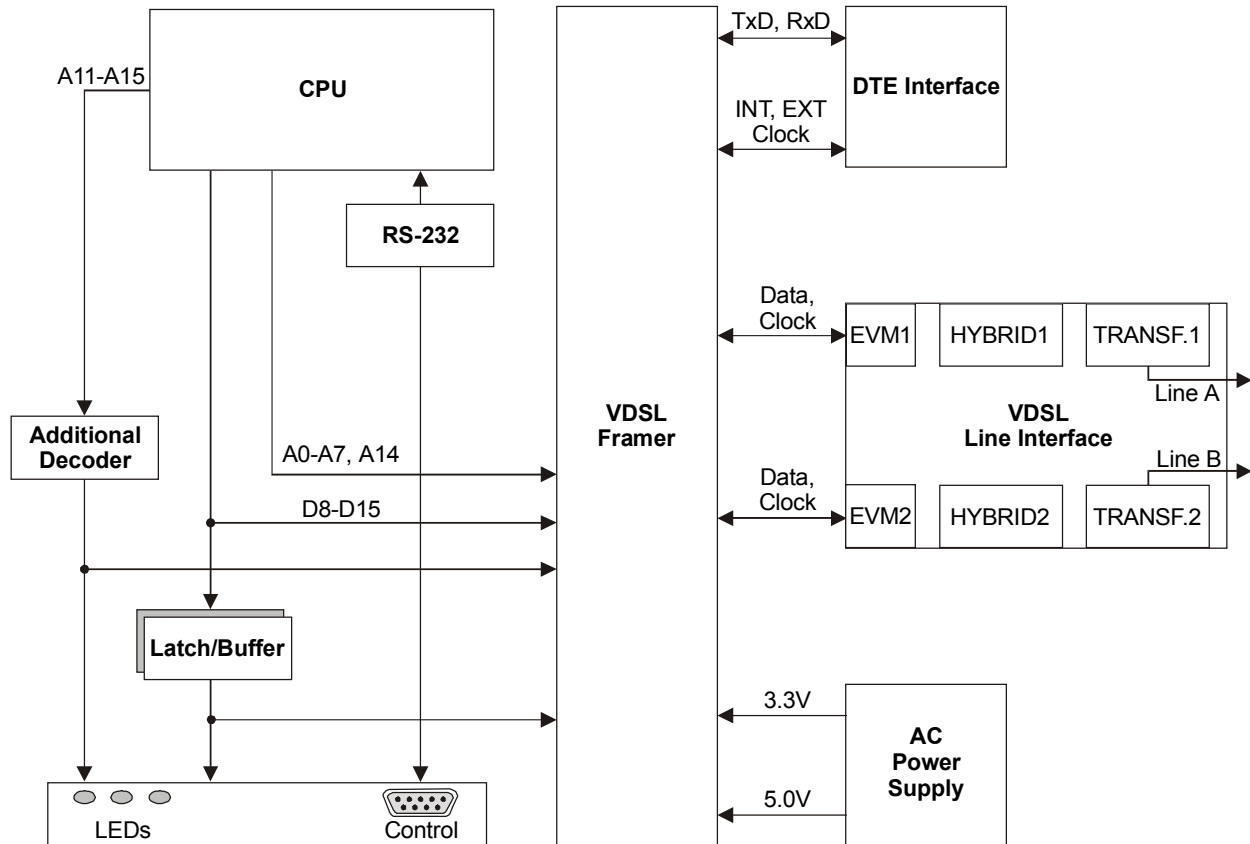
Figure 1-3. ASM-60 Block Diagram

The ASM-60 modem consists of the following major modules:

- **CPU and Peripherals** – This module, based on a microprocessor, includes Flash (1 Mb), RAM (0.5 Mb) and EEPROM (8 kb) memory and controls the ASM-60 operation.

- **VDSL Framer –** This module encapsulates data bit stream coming from DTE and transmits it over two different analog lines. At the other end, it reverses the process by converting the two line data into one bit stream for the DTE. In addition, the VDSL framer supplies clock to the DTE.

- **VDSL Line Interface** – Consists of two identical DSP modules. Each module transmits and receives signals over 2-wire at half of the data rate that running into the DTE interface.

1.4 Technical Specifications

Line Interface

Protocol	Very High-bit-rate Digital Subscriber Line (VDSL)
Type	4-wire, unconditioned dedicated lines (twisted pair), Cat.3 and Cat.5, 19 AWG to 26 AWG
Line Coding	QAM
Range	See *Table 1-1*
Levels	11 dBm
Impedance	110Ω
Return Loss	More than 15 dB
Carrier	Constantly On

DTE Interface

Data Rate	User-selectable: 4.096 Mbps, 6.144 Mbps or 10.24 Mbps
Type	• HSSI via SCSI 50, female connector
	• IR-ETH (Ethernet bridge) via RJ-45 or BNC coax connectors
	• IR-ETH/QH (Ethernet/Fast Ethernet bridge with VLAN support) via RJ-45 connector
	• IR-IP (IP router) via RJ-45 connector

Control Port

Interface	V.24/RS-232
Type	DCE
Format	8 bits, no parity, 1 stop bit
Baud Rate	19.2 kbps
Connector	9-pin, D-type, female

Diagnostics

Performance Monitoring	VDSL statistics collection
Self-Test	Self-test at start-up

Indicators	*PWR (green)*	Power
	RTS (yellow)	Request to Send
	TD (yellow)	Transmit Data
	RD (yellow)	Receive Data
	DCD (yellow)	Data Carrier Detect
	TST (red)	Test
	ALM (red)	Alarm
	SYNC A (green/red)	Synchronization line A
	SYNC B (green/red)	Synchronization line B
Physical	*Height*	44 mm / 1.7 in (1U)
	Width	215 mm / 8.5 in
	Depth	243 mm / 9.6 in
	Weight	1 kg / 3.1 lb
Power	*AC Voltage*	100 to 240 VAC (±10%), 50 to 60 Hz, 6W
	Protection	AC/DC overvoltage protection circuits are connected via transformers to the transmit and receive lines
	Fuse	0.250A, slow-blow
Environment	*Temperature*	0–50°C / 32–122°F
	Humidity	Up to 90%, non–condensing

Chapter 2

Installation and Setup

This chapter describes installation and setup procedures for the standalone ASM-60 modem.

ASM-60 is delivered completely assembled. It is designed for tabletop or 19-inch rack installation.

After installing the unit:

- Refer to *Chapter 3* for the operating instructions.

- Refer to *Chapter 4* for the detailed system configuration procedures using ASCII terminal connected to the ASM-60 control port.

If a problem is encountered, refer to *Chapter 5* for test and diagnostic instructions.

⚠️ **Warning**	**Internal settings, adjustment, maintenance, and repairs may be performed only by a skilled technician who is aware of the hazards involved. Always observe standard safety precautions during installation, operation, and maintenance of this product.**

2.1 Site Requirements and Prerequisites

AC-powered ASM-60 units should be installed within 1.5m (5 ft) of an easily-accessible grounded AC outlet capable of furnishing the voltage in accordance with ASM-60 nominal supply voltage.

Allow at least 90 cm (36 in) of frontal clearance for operating and maintenance accessibility. Allow at least 10 cm (4 in) clearance at the rear of the unit for signal lines and interface cables.

Caution	Do not stack units on top of another.

The ambient operating temperature of ASM-60 should be 0 to 50°C (32 to 122°F), at a relative humidity of up to 90%, non-condensing.

2.2 Package Contents

The ASM-60 package includes the following items:

- One ASM-60 unit

- Last Mile Access and Intelligent Modems CD

- AC power cord

- RM-28 rack installation kit (if ordered).

2.3 Installation and Setup

The ASM-60 standalone unit is designed for desktop installation and is delivered as a fully assembled unit. No provisions are made for bolting the unit to a tabletop.

➤ **To install ASM-60:**

1. Determine the required configuration of ASM-60, in accordance with your application.
2. Set the DIP switches of the Ethernet interface module accordingly.
3. Connect the line (see *Connecting the Line* below).
4. Connect the DTE (see *Connecting the DTE* below).
5. Connect power to the unit (see *Connecting the Power* below).

Performing the Internal Settings

ASM-60 with HSSI interface does not contain any jumpers or switches for user settings. For instructions on configuring ASM-60 units with an Ethernet interface module, refer to the respective appendix of this manual.

⚠ *Warning*	**Access to the inside of the equipment is permitted only to the authorized and qualified personnel.** **To avoid accidental electric shock, always disconnect the interface cables and the power cord before removing the unit from its casing.** **Line voltages are present inside ASM-60 when it is connected to power and/or the lines. Moreover, under certain fault conditions, dangerous voltages may appear on the lines connected to the unit.** **Any adjustment, maintenance and repair of the opened instrument under voltage must be avoided as much as possible and, when inevitable, should be carried out only by a skilled technician who is aware of the hazard involved. Capacitors inside the unit may still be charged even after the unit has been disconnected from its source of power.**

Caution	ASM-60 contains components sensitive to electrostatic discharge (ESD). To prevent ESD damage, avoid touching the internal components. Before moving the jumper, touch the ASM-60 frame.

Opening the ASM-60 Case

➤ **To open the ASM-60 case:**

1. Disconnect the power cord from the power source.

2. Slide the blue side panel forward to detach it from the case.

3. Unscrew the two screws located on the bottom panel at the rear end of the unit.

4. Separate the two halves of the ASM-60 case by lifting the top cover at the end of the unit and sliding it forward.

Closing the ASM-60 Case

After completing the internal settings, close the unit case.

➤ **To close the ASM-60 case:**

1. Position the lower half of the ASM-60 case on the flat surface.

2. Return the top cover. Make sure that the front board CONTROL DCE connector fits the front panel opening correctly, and the top cover guides enter the corresponding recesses at the end of the unit.

3. Secure the two screws located at the end of the unit.

4. Fit the inside tabs of the blue side panel into the unit case grooves, and slide the side panel until it snaps into place.

Connecting the Interfaces

Figure 2-1 shows the rear panel of a typical ASM-60 unit with HSSI interface.
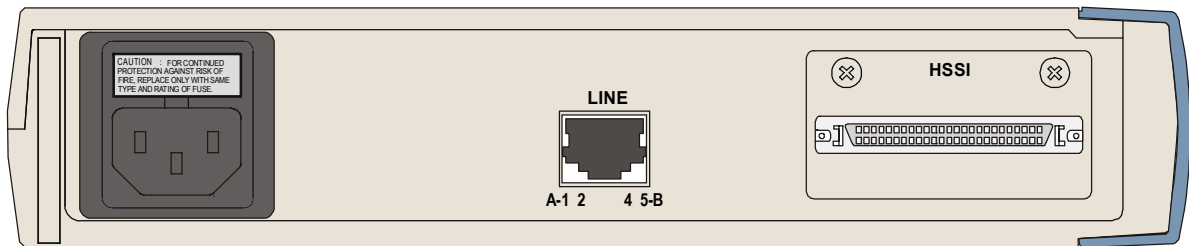
Figure 2-1 Rear Panel of ASM-60 with HSSI Interface

Connecting the Line

The ASM-60 line interface terminates in an 8-pin RJ-45 connector (see *Table 2-1*).

➤ **To connect the RJ-45 connector:**

• Connect the line cable to the RJ-45 connector designated LINE.

Table 2-1 Line Connector Pinout

Pin	Function
1, 2	Line A
4, 5	Line B
11, 12	Chassis

Connecting the DTE

The ASM-60 DTE interface provides interface for input/output data, clock reference and control signals between the modem and the DTE. The ASM-60 DTE interface can be either HSSI interface module, terminating in SCSI 50 female connector (see *Table 2-2*), or one of the Ethernet interface modules, described in greater detail in *Appendix A*, *Appendix B* and *Appendix C*.

➤ **To connect the HSSI interface:**

• Attach the HSSI cable, terminated by SCSI 50 male connector to the SCSI 50 socket on the rear panel of ASM-60.

Table 2-2. HSSI Interface Connector Pinout

Signal Name	Function	ASM-60 Signal	Direction	Pin (+Side)	Pin (-Side)
SG	Signal Ground			1	26
RT	Receive Timing	IR-DXC	From ASM-60	2	27
CA	DCE Available	DSR	From ASM-60	3	28
RD	Receive Data	IR-RXD	From ASM-60	4	29
LC	Loopback Circuit C	–	From ASM-60	5	30
ST	Send Timing	IR-TXC	From ASM-60	6	31
SG	Signal Ground	–	–	7	32
TA	DTE Available	DTR	–	8	33
TT	Terminal Timing	IR-EXTC	To ASM-60	9	34
LA	Loopback Circuit A	–	–	10	35
SD	Send Data	IR-TXD	To ASM-60	11	36
LB	Loopback Circuit B	–	–	12	37
SG	Signal Ground	–	–	13	38
5	Ancillary to DCE	–	–	14–18	39–43
SG	Signal Ground	–	–	19	44
4	Ancillary from DCE	–	–	20–23	45–48
TM	Test Mode	–	–	24	49
SG	Signal Ground	–	–	25	50

Connecting the Power

⚠️ *Warning*	**Before switching on this unit and connecting any other cable, the protective earth terminals of this unit must be connected to the protective ground conductor of the power cord. If you are using an extension cord (power cable) make sure it is grounded as well.** **Any interruption of the protective (grounding) conductor (inside or outside the instrument) or disconnecting of the protective earth terminal can make this unit dangerous. Intentional interruption is prohibited.** **The line fuse is located in an integral-type fuse holder located on the rear panel. Make sure that only fuses of the required rating, as marked on the rear panel, are used for replacement. Do not use repaired fuses or short-circuit the fuse holder. Always disconnect the mains cable before removing or replacing the fuse. Whenever it is likely that the fuse protection has been damaged, make the unit inoperative and secure it against unintended operation.**

AC power is supplied to the ASM-60 modem through a standard 3-prong plug with an integral fuse holder (see *Figure 2-1*).

AC power should be supplied through the 1.5m (5 ft) standard power cable terminated by a standard 3-prong plug. The cable is provided with the unit.

➤ **To connect the AC power:**

1. Connect the power cable to the power connector on the ASM-60 rear panel.

2. Connect the power cable to the mains outlet.

   The unit will be turned on automatically upon connection to the mains.

Chapter 3

Operation

This chapter provides the description of the ASM-60 front-panel indicators, and details the modem's operating procedures (turn-on, front-panel indications, performance monitoring and turn-off).

Installation procedures given in *Chapter 2* must be completed and checked before attempting to operate ASM-60.

3.1 Front Panel Indicators

The front panel of ASM-60 includes nine LED indicators that show the current operating status of the unit. ASM-60 also includes a proprietary 9-pin connector (CONTROL DCE) on its front panel for connection to a terminal.

Figure 3-1 shows the ASM-60 front panel. *Table 3-1* lists and describes the ASM-60 indicators.
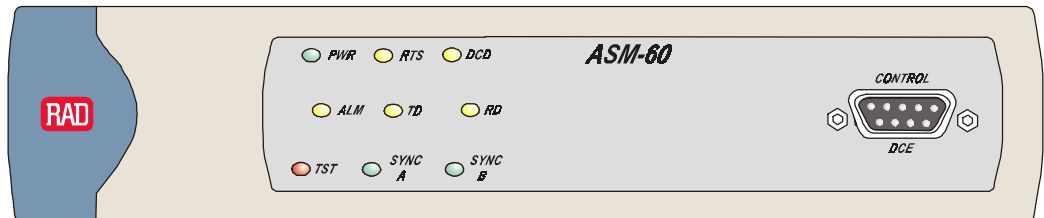
Figure 3-1 ASM-60 Front Panel

Table 3-1. LED Indicators

Name	Function
PWR (green)	ON – Power is ON
RTS (yellow)	ON – DTE activates Request To Send
DCD (yellow)	ON– Link A, link B and internal IMUX are synchronized
ALM (red)	ON – An alarm enters the alarm buffer
TD (yellow)	ON – Data is being transmitted to the DTE
	OFF – Steady mark is being transmitted
RD (yellow)	ON – Data is being received from the DTE
	OFF – Steady mark is being received
TST (red)	Reserved for future use

Table 3-1. LED Indicators (Cont.)

Name	Function
SYNC A (red/green)	ON (red) – Data link A is not synchronized with the remote modem
	ON (green) – Data link A is synchronized with the remote modem
SYNC B (red/green)	ON (red) – Data link B is not synchronized with the remote modem
	ON (green) – Data link B is synchronized with the remote modem

3.2 Operating ASM-60

Turning On ASM-60

ASM-60 is turned on as soon as the power is connected to the unit. The PWR indicator lights up and remains lit as long as ASM-60 receives power.

Normal Operation

Always operate ASM-60 in pairs: ASM-60/CO opposite ASM-60/CPE.

ASM-60 requires no operator attention once installed, with the exception of occasional monitoring of front panel indicators. Intervention is only required when ASM-60 must be adapted to new operational requirements.

Normal Indications

Table 3-2 shows the status of the ASM-60 indicators, a few seconds after power-up.

Table 3-2. ASM-60 Indicator Status

Indicator	Status
PWR	ON
TD	Depends on DTE data transmission
RD	Depends on DTE data transmission
RTS	Depends on DTE RTS signal status
DCD	Depends on remote modem data transmission
TST	OFF
ALM	OFF
SYNC A/SYNC B	Green or red, depending on remote modem data transmission

If the above LED indications are not obtained following initial power turn-on, refer to *Chapter 5* for the diagnostic test instructions.

Turning Off ASM-60

To turn off ASM-60, remove the power cord from the power source.

Chapter 4

Management from a Terminal

The configuration of ASM-60 is performed via menu-driven embedded software using a standard ASCII terminal or a PC running a terminal emulation application connected to the front panel CONTROL DCE port. This terminal can be used for performing the following management activities supported by ASM-60:

- Modifying setup configuration

- Monitoring of device status and settings

- Collect performance statistics

- Restarting ASM-60.

4.1 Preparing for the Control Session

This section describes how to prepare ASM-60 and supervisory terminal for the control session.

Control Port Interface Characteristics

ASM-60 includes a V.24/RS-232 asynchronous DCE port, designated CONTROL DCE and terminated in a 9-pin D-type female connector. The control port continuously monitors the incoming data stream and will immediately respond to any input string received through this port.

The terminal can be connected either directly to the ASM-60 control port, or through a modem or any other type of full-duplex data link. The ASM-60 control port interface type must be set in accordance with the connection method, as follows:

Preparing Terminal

Any standard ASCII terminal (a "dumb" terminal or a personal computer running terminal emulation application) equipped with a V.24/RS-232 communication interface can be used to configure ASM-60.

Control Port Handshaking Protocol

The control lines used in each DCE and DTE mode and the direction of the control signals are detailed in the following table.

Table 4-1. Control Port Control Signals

Control Line	Interface Type	
	DCE	DTE
CTS	Out	Not Used
DCD	Out	Out
DSR	Out	Out
DTR	In	In
RI	Not Used	In
RTS	In	In

Data Terminal Ready (DTR)

When connected and turned on, the terminal sets the DTR line ON (active) to gain control over ASM-60 and starts a configuration or monitoring session.

Initiating a Control Session

➤ **To initiate a control session:**

1. Connect the terminal cable to the CONTROL DCE connector of ASM-60.

2. Turn the control terminal on.

3. Configure the terminal to the default communication parameters: 19.2 kbps, one start bit, eight data bits, no parity, one stop bit, VT100.

4. Select the full-duplex mode.

5. Turn the terminal echo off

    You are now ready to start a control session.

4.2 Navigating the Management Menus

This section provides a general description of the software menu operation and conventions for navigating the menus.

Figure 4-1 shows a map of the management menus in the ASM-60 embedded software.

➤ **To choose an option:**

* Type the number corresponding to the option, and press **<Enter>**.

    The screen for the selected option is displayed.

➤ **To correct an erroneous entry:**

* Press **<Backspace>** to clear the error, then enter the correct characters.
    or
    Press **<Esc>** to exit the current menu, and then return to the menu to re-enter the required value.

Terminal Management Menus

Figure 4-1 shows a map of the management menus in the ASM-60 embedded software. The second level menus (Configuration, Display, Reset) are described in its own section in this chapter. The Alarms, Log File, VDSL Performance and Test menus are described in *Chapter 5*.
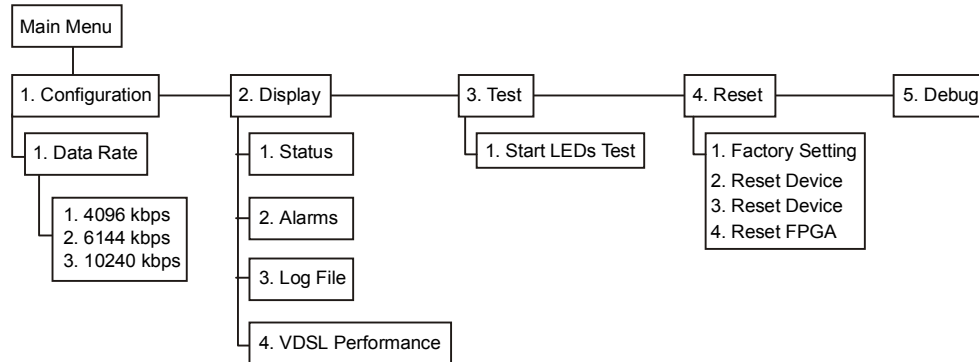
Figure 4-1. ASM-60 Management Software

Note

The Debug option is reserved for the use only by the authorized personnel.

4.3 Starting the Control Session

Once you have installed the ASM-60 modems at the central and remote locations, and completed the installation and operation procedures described in *Chapter 2* and *Chapter 3*, you can start the control session.

When the communication link between the modems is established, the ASM-60 software identifies the unit type (ASM-60/CO or ASM-60/CPE), and runs the start-up self-test.

During the initialization, the following message is displayed:

Initializing ASM-60/CO or **Initializing ASM-60/CPE**

If errors were detected during the self-test, ASM-60 displays the following message:

Initialization Failed

If the self-test is successful, ASM-60 displays the Main menu (see *Figure 4-2*).

```
ASM-60/CO Main Menu

1. Configuration

2. Display

3. Test

4. Reset

5. Debug


>
ESC - previous menu ; ! - main menu ; & - exit terminal
-------------------------------------------------------
```

Figure 4-2. Main Menu

Note	*At the bottom of the terminal screen, ASM-60 displays the latest alarms as they enter the alarm log.*

4.4 Configuring ASM-60

This section describes the configuration procedures for the ASM-60 modem.

➤ **To display the Configuration menu:**

- From the Main menu, type **1**, and then press **<Enter>**.

  The Configuration menu appears (see *Figure 4-3*).

```
ASM-60/CO Configuration

1. Data Rate (current value)


>
ESC - previous menu ; ! - main menu ; & - exit terminal
-------------------------------------------------------
```

Figure 4-3. Configuration Menu

Selecting the Data Rate

The Data Rate menu allows you to select the ASM-60 transmission rate.

Main Menu
↓ **1**
Configuration
↓ **1**
Data Rate

➤ **To select the data rate:**

1. From the Configuration menu, type **1**.

   The Data Rate menu appears (see *Figure 4-3*).

2. Select the data rate by typing the number corresponding to the desired value and then type **2** to save the changes.

```
Data Rate (current value)

Enter the Devise Bit Rate
1. 4096 kbps
2. 6144 kbps
3. 10240 kbps


>


ESC – previous menu ; ! – main menu ; & - exit terminal
-------------------------------------------------------
```

Figure 4-4. Data Rate Menu

4.5 Displaying the ASM-60 System Information

The ASM-60 software allows to display the modem system information.

➤ **To access the Display menu:**

- From the Main menu, type **2**.

    The Display menu appears (see *Figure 4-5*).

```
Display

1. Status
2. Alarms
3. Log File
4. VDSL Performance


>
ESC – previous menu ; ! – main menu ; & - exit terminal
-------------------------------------------------------
```

Figure 4-5. Display Menu

Note   *Refer to Chapter 5 for the description of the ASM-60 alarms, log file and VDSL performance monitoring.*

Displaying the ASM-60 Status

Main Menu
↓ **2**
Display
↓ **1**
Status

You can display the current status of the local and remote ASM-60 modems.

➤ **To display the ASM-60 status:**

- From the Display menu, type **1**.

    The Status screen is displayed (see *Figure 4-6*).

```
Status

Device Rate: 6144 kbps

Remote Status: ASM60/SA CO

Active Software Version: 01.00

Hardware Version (PCB): 00

AFE Version: 00.00

DTE Interface Type: ETH_UTP

DCD Status: FAILED

Line A Lock Status: SYNC LOSS

Line B Lock Status: SYNC LOSS

Test Mode: NO TEST


Press any key to return to previous menu...
0. Sync Line A is COMPLETE
1. Sync Line B is COMPLETE


>
ESC - previous menu ; ! - main menu ; & - exit terminal
-------------------------------------------------------
```

Figure 4-6. Status Screen

The Status screen provides the following information on ASM-60:

- Device rate – The current date rate of ASM-60

- Device type – ASM-60 type (ASM-60/CO or ASM-60/CPE)

- Active software version – Revision the software currently being used by ASM-60

- Hardware version (PCB) – The H/W revision of the ASM-60 main board

- AFE version – The Analog Front End revision

- DTE interface type – The ASM-60 DTE interface and its connector type

- DCD status – Data Carrier Detect status, indicating if the line A, line B and the IMUX are synchronized

- Line A lock status – The synchronization status of the 2-wire line A

- Line B lock status – The synchronization status of the 2-wire line B

- Test mode – The current status of the diagnostic test (active or not active).

4.6 Resetting ASM-60

You can perform reset of the main components of ASM-60, or reset the modem to its factory settings.

➤ **To reset ASM-60:**

1. From the Main menu, type **4**.

    The Reset menu appears (*Figure 4-7*).

2. From the Reset menu, choose one of the following:

    ▪ **1** – To reset ASM-60 to the default data rate – 10.240 kbps.

    ▪ **2** – To reset the ASM-60 CPU (if the Watchdog jumper on the V-Agent board is set to ON).

    ▪ **3** – To reset the DSP1 and DSP2.

    ▪ **4** – To reset the framer.

```
Reset

1. Factory Settings

2. Reset Device

3. Log Reset Chipset

4. Reset FPGA


>
ESC - previous menu ; ! - main menu ; & - exit terminal
-------------------------------------------------------
```

Figure 4-7. Reset Menu

Chapter 5

Diagnostics

This chapter describes the ASM-60 diagnostic functions, which include:

- Status indications, alarms, power-up self-test
- VDSL performance diagnostics
- LED testing.

5.1 Error Detection

This section explains how to detect and fix errors and other problematic conditions in ASM-60.

Power-Up Self-Test

ASM-60 performs a hardware self-test upon turn-on. The self-test sequence checks the critical circuit functions of the modem.

Front-Panel LEDs

The status of ASM-60 is indicated by the ALM, SYNC A and SYNC B indicators located on the front panel. For the description of LEDs and their functions, refer to *Chapter 3*.

Alarms

ASM-60 maintains two alarm buffers: temporary (up to 20 alarms) and permanent (up to 100 alarms). The temporary alarm buffer is displayed by the ASM-60 management software as Alarms screen (see *Figure 5-1*), and the permanent alarm buffer as Log File (see *Figure 5-2*).

An alarm enters simultaneously both Alarms display and log file, and the ALM LED turns on to indicate the condition. But once the event that caused the alarm is cleared, the alarm is removed from the temporary buffer, but it remains in the log file, enabling you to view the alarm history.

Working with the Temporary Alarms Buffer

Main Menu
↓ **2**
Display
↓ **2**
Alarms

➤ **To access the Alarms screen:**

1. From the Main menu, type **2**.

    The Display menu appears.

2. From the Display menu, type **2**.

    The Alarms screen appears (*Figure 5-1*).

```
Alarms

DCD Failed


>
ESC - previous menu ; ! - main menu ; & - exit terminal
--------------------------------------------------------
```

Figure 5-1. Alarms Screen

The display of the Alarms screen includes only the name of the alarm.

Once the event that caused the alarm is cleared, the ALM indicator turns off. You have to exit the Alarms screen to refresh its display and access the screen again to assure that the alarm was removed from the temporary buffer.

Working with the Log File

Main Menu
↓ **2**
Display
↓ **3**
Log File

➤ **To access the log file:**

1. From the Main menu, type **2**, and press **<Enter>**.

    The Display menu appears.

2. From the Display menu, type 3, and press **<Enter>**.

    The Log File screen appears (see *Figure 5-2*). Up to 12 alarms can be displayed at a time.

3. Follow the instructions at the bottom of display and type **C** to clear the log file, type **N** to display the next page, type **P** to display the previous page, or press **<Esc>** to exit the log file.

```
Log File

No. 1  SYNC LOSS LINE A Status ON T=0:0:0
No. 2  SYNC LOSS LINE A Status ON T=0:0:20


ESC - Previous Menu, C-Clear, N-Next Page
```

Figure 5-2. Log File Screen

The display of the Log File screen includes the serial number of an alarm event, its name, and time elapsed since the last ASM-60 reset. *Table 5-1* lists the ASM-60 alarms.

Table 5-1. ASM-60 Alarms

Number	Terminal Message	Description	Severity
1	FPGA DOWNLOAD FAILED	Failure to download programming to the ASM-60 FPGA microprocessor	Major
2	SELF TEST ERROR	A problem has been detected during the device self-test	Major
3	DSP1 NOT RESPONDING	No response from the ASM-60 digital signal processor 1	Major
4	DSP2 NOT RESPONDING	No response from the ASM-60 digital signal processor 2	Major
5	DCD FAILED	Data Carrier Detect failure indicating that ASM-60 cannot receive a carrier signal from the other unit	Major
6	SYNC LOSS LINE A	Loss of synchronization on the 2-wire line A	Major
7	SYNC LOSS LINE B	Loss of synchronization on the 2-wire line B	Major
8	NO INTERFACE	No DTE interface is connected	Minor
9	LAN NOT CONNECTED	The Ethernet interface module is not connected to the LAN	Minor

5.2 Displaying the VDSL Performance Diagnostics

ASM-60 has capabilities for collection of the VDSL performance diagnostics.

Main Menu
↓ **2**
Display
↓ **4**
VDSL Performance

➤ **To display the VDSL diagnostics:**

1. From the Main menu, type **2**.

    The Display menu appears.

2. From the Display menu, type **4**.

    The VDSL Performance screen appears (see *Figure 5-3*). *Table 5-2* lists the ASM-60 performance monitoring parameters.

3. Type **C** to reset the performance registers, type **R** to monitor the VDSL performance, type **S** to stop monitoring or press **<Esc>** to exit.

```
VDSL Performance

Line A Lock Status: SYNC

Line A Avg. Snr.: 34

Line A BER pre FEC: 0.000E+00

Line A BER after FEC: 0.000E+00


Line B Lock Status: SYNC

Line B Avg. Snr.: 34

Line B BER pre FEC: 0.000E+00

Line B BER after FEC: 0.000E+00


>
ESC - previous menu ; ! - main menu ; & - exit terminal
-------------------------------------------------------
```

Figure 5-3. VDSL Performance Screen

Note   *Figure 5-3 shows VDSL Performance Monitoring screen, as it appears 15 seconds after the ASM-60 power-up.*

Table 5-2. ASM-60 Performance Monitoring Parameters

Display	Description
Line A/B Lock Status	This parameter provides the information on the status of the connection between the ASM-60 units (synchronized or not synchronized). This value is updated every second.
Line A/B Avg. Snr.	This parameter provides the avarage signal-to-noise ratio in the line.
Line A/B BER pre FEC	This parameter provides the bit error rate before the Forward Error Correction is performed.
Line A/B BER after FEC	This parameter provides the bit error rate after the Forward Error Correction is performed.

5.3 Running the Diagnostic Tests

Running the LEDs Test

The ASM-60 modem can perform the front-panel indicators test to verify that the unit LEDs are functioning properly.

Main Menu
↓ **3**
Test
↓ **2**
Start LEDs Test

➤ **To run the LEDs test:**

1. From the Main menu, type **3**.

    The Test menu appears.

2. From the Test menu, type **2** to run the LEDs test on ASM-60.

    All the front-panel LED indicators light up for 3 seconds.

Appendix A

IR-ETH Interface Module

IR-ETH is an interface module for RAD modems, used for converting the Ethernet (10BaseT or 10Base2) electrical levels to the modem TTL levels. It also converts the Ethernet protocol to HDLC to enable long-distance transmission and avoid the Ethernet collision limitation.

IR-ETH includes an internal, self-learning Ethernet bridge, which enables a high performance link between two Ethernet segments at a low transmission rate. The low-speed HDLC transmission is sent over the link using the modem modulation technique. It is converted back to an Ethernet signal at the remote modem.

Figure A-1 shows a typical application using an Ethernet interface bridge. Each modem is connected to an Ethernet network via the Ethernet interface bridge.
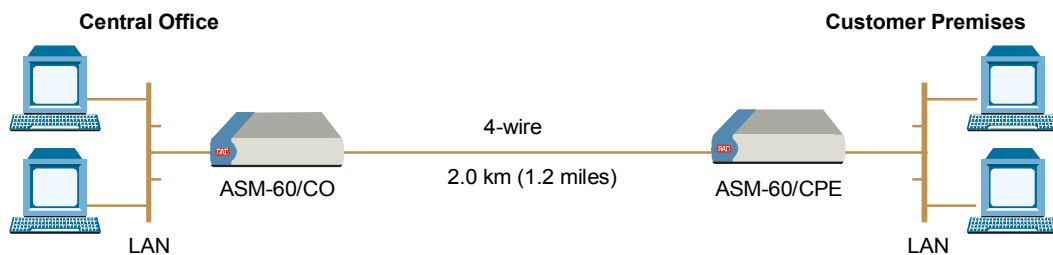

Figure A-1. Typical Application of ASM-60 with IR-ETH Module

A.1 IR-ETH Connector Options

Figure A-2 and *Figure A-3* show the rear panel of ASM-60 with the IR-ETH connector options. *Table A-1* lists the RJ-45 connector pinout.
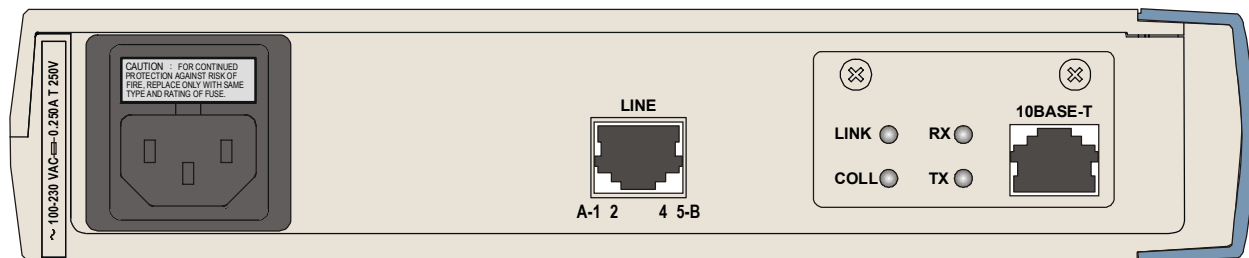
Figure A-2. Rear Panel of ASM-60 with IR-ETH Module (RJ-45 Connector)
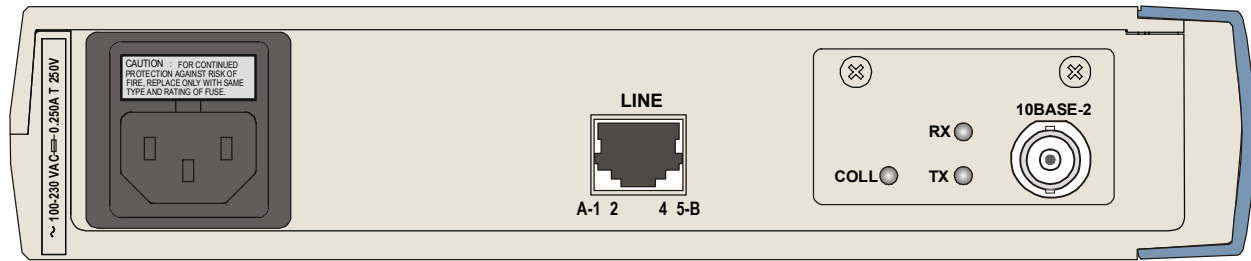
Figure A-3. Rear Panel of ASM-60 with IR-ETH Module (BNC Connector)

Table A-1. RJ-45 Pinout

Pin	Function
3	RCV (+)
6	RCV (-)
1	XMT (+)
2	XMT (-)
–	GND

A.2 Technical Specifications

General	*LAN Table*	10,000 addresses
	Filtering and Forwarding	15,000 pps
	Buffer	256 frames
	Delay	1 frame
LAN	*Standard*	Conforms to IEEE 802.3/Ethernet
	Data Rate	10 Mbps (20 Mbps 10BaseT FDX)
	Connectors	• 10BaseT (UTP): Shielded RJ-45
		• 10Base2: BNC connector
WAN	*Protocol*	HDLC
	Data Rate	According to the modem transmission rate

A.3 Installation and Operation

Figure A-4 shows the Ethernet bridge layout, the location of the DIP switch, and the rear panel components of the IR-ETH interface module with RJ-45 connector.
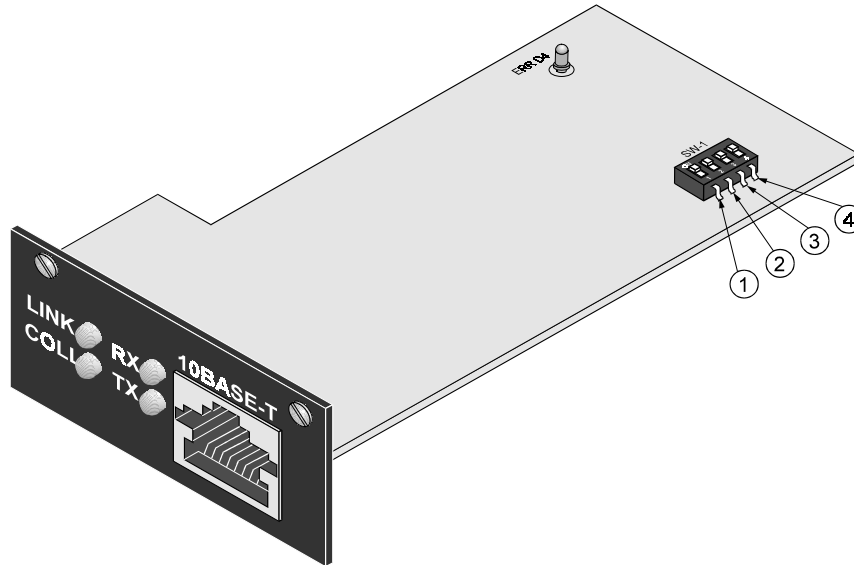
Figure A-4. IR-ETH Layout (UTP Option)

DIP Switch Settings

Table A-2 describes functions and default settings of the DIP switch SW-1 sections.

Table A-2. DIP Switch Settings

Section Number	Name	Description	Default Setting
1	SQ/FD	ON – Full-duplex operation	
		OFF – Half-duplex operation	OFF
2	CMP	ON – Strips padding bits inserted in 64-byte frame	
		OFF – Transmits frames over WAN as is	OFF
3	FIL	ON – Passes only frames destined for another LAN	
		OFF – Disables LAN filter; passes all frames transparently	OFF
4	(nc)		

LED Indicators

Table A-3 lists the IR-ETH LED indicators and describes their functions.

Table A-3. IR-ETH Bridge LED Indicators

LED Name	Description	Location	Color
LINK	ON – Good link integrity	Rear panel	Green
COLL	ON – Collision on the attached Ethernet segment is detected	Rear panel	Yellow
RX	ON – Data is received from the Ethernet attached segment	Rear panel	Yellow
TX	ON – Data is transmitted from the modem to the Ethernet segment	Rear panel	Yellow
ERR D4	ON – Bridge buffer overrun is detected	IR-ETH board	Red

Connecting to LAN

When connecting an IR-ETH interface module with the UTP option, use either a straight cable or a cross cable for the LAN connection. Use a cross cable when connecting to a port that does not implement the crossover function internally. Otherwise, use a straight cable.

Note *Hubs usually do implement the crossover function internally, while network interface cards and other devices do not.*

Appendix B

IR-ETH/QH Interface Module

B.1 Introduction

The IR-ETH/QH interface module includes a high performance self-learning Fast Ethernet bridge, which is connected to the LAN via a single 10BaseT or 100BaseT port, operating in full duplex and providing offer simple and cost-effective interconnection between 10/100BaseT LANs via VDSL links. The IR-ETH/QH interface module also supports IEEE 802.1/Q frames, enabling VLAN applications.

The module automatically learns MAC addresses of the LAN to which it is connected. Its LAN table stores up to 1,000 addresses with 5-minute automatic aging.

Filtering and forwarding is performed at the maximum theoretical rate of 150,000 packets per second (wire speed). The buffer with 1 Mb DRAM can hold 170 frames with a throughput latency of one frame. The forwarding of the broadcast and multicast messages from LAN to WAN can be disabled.

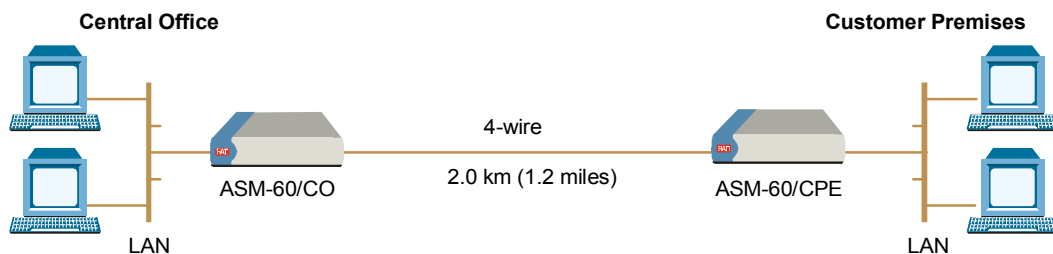*Figure B-1* shows a typical application using ASM-60 with IR-ETH/QH module.

Figure B-1. Typical Application of ASM-60 with IR-ETH/QH Module

B.2 IR-ETH/QH Connector

Figure B-2 shows the rear panel of ASM-60, equipped with IR-ETH/QH module. *Table B-1* lists the module's RJ-45 connector pinout.
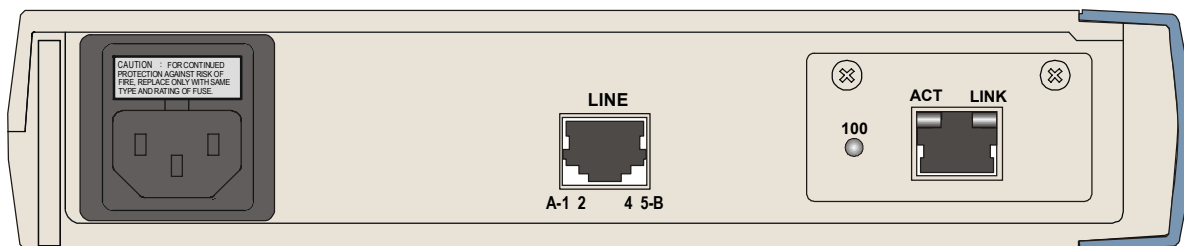
Figure B-2. Rear Panel of ASM-60 with IR-ETH/QH Module

Table B-1. RJ-45 Connector Pinout

Pin	Signal	Function
1	RD (+)	Receive Data (positive)
2	RD (-)	Receive Data (negative)
3	TD (+)	Transmit Data (positive)
6	TD (-)	Transmit Data (negative)

B.3 Technical Specifications

Bridge

LAN Table	1,000 MAC addresses
Aging	5 minute, automatic
Filtering and Forwarding Rate	150,000 packets per second
Buffer Size	170 frames
Delay	1 frame

LAN

Standard   IEEE 802.3/Ethernet V.2, IEEE 802.1/Q

Data Rate
- 10BaseT: 10 Mbps (20 Mbps in full duplex)
- 100BaseT: 100 Mbps (200 Mbps in full duplex)

Transmission Line   4-wire, Category 5 UTP, 19 AWG to 26 AWG

Line Code
- 10BaseT: Manchester
- 100BaseT: MLT3

Connector   RJ-45

WAN

Protocol   Point-to-point

Data Rate   512 kbps to 45 Mbps

B.4 Installation and Operation

Figure B-3 shows location of the configuration DIP switch on the module's board.

Figure B-3. DIP Switch Location

Setting the DIP Switch

Configure the IR-ETH/QH module by setting the DIP switch in accordance with *Table B-2*. The DIP switch is located on the reverse side of the IR-ETH/QH module. To change the switch settings, you must undo three screws on the board and detach the module from the main unit.

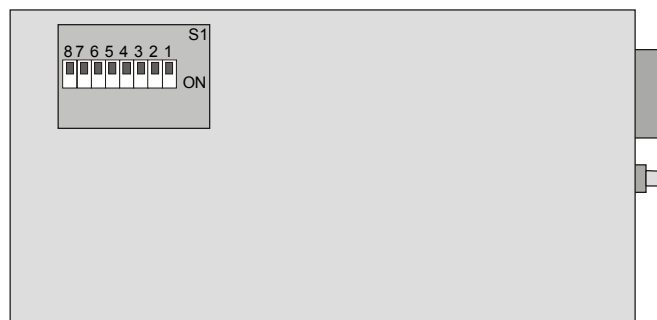*Table B-2. DIP Switch Settings*

Section	Name	Description	Possible Settings	Factory Setting
1	NC			OFF
2	FLC	Enables or disables flow control	**ON** – Flow control is enabled	
			OFF – Flow control is disabled	OFF
3	10/100	Selects the LAN speed	**ON** – LAN speed is set to 100 Mbps	
			OFF – LAN speed is set to 10 Mbps	OFF
4	AN1	Controls the LAN autonegotiation	**ON** – LAN autonegotiation is disabled	
			OFF – LAN autonegotiation is enabled	OFF
5	HF1	Selects the LAN mode	**ON** – LAN full duplex mode	
			OFF – LAN half duplex mode	OFF
6	BPR	Controls the backpressure	**ON** – Backpressure is enabled	
			OFF – Backpressure is disabled	OFF
7	MUL	Controls LAN to WAN multicasting	**ON** – Multicast messages from LAN to WAN are blocked	
			OFF – Multicast messages from LAN to WAN are not blocked	OFF
8	BRD	Controls LAN to WAN broadcasting	**ON** – Broadcast messages from LAN to WAN are blocked	
			OFF – Broadcast messages from LAN to WAN are not blocked	OFF

Note   *After configuring the Ethernet interface, reset ASM-60 by turning it off and on. The changes take effect only after the reset.*

LED Indicators

Table B-3 lists the IR-ETH/QH rear-panel LED indicators and describes their functions.

Table B-3. IR-ETH/QH LED Indicators

LED Name	Color	Description	Location
LINK	Green	ON – LAN is connected to the IR-ETH/QH module	Connector
ACT	Yellow	ON – LAN is receiving/transmitting data	Connector
100	Green	ON – LAN is operating at 100 Mbps	Rear panel
		OFF – LAN is operating at 10 Mbps	

Connecting the LAN

Use either a straight cable or a cross cable for the LAN connection.
Use a cross cable when connecting to a port that does not implement the crossover function internally. Otherwise, use a straight cable.

Note   *Hubs usually implement the crossover function internally, while NICs and other devices do not.*

Appendix C
IR-IP Interface Module

C.1 Introduction

Overview

IR-IP is a high-performance, miniature IP router based on RAD's unique IP router chip, the ChipRouter.

IR-IP works by taking each Ethernet frame from the LAN and determining whether the IP packet is destined for the IP net on the Ethernet LAN. If not, IR-IP forwards the packet to the WAN (line) link. IP packets received from the WAN link are automatically forwarded to the LAN if the IP net matches.

IR-IP includes hardware filters which handle all filtering operations at wire speed from both LAN-to-WAN and WAN-to-LAN, without dropping a single packet. Filtering and forwarding are performed at the maximum rate of 35,000 and 30,000 frames per second (wire speed), respectively. The buffer can hold 256 frames of maximum size of 1534 bytes and a throughput latency of one frame.

IR-IP is available with 10BaseT (UTP) interface and is fully IEEE 802.3/Ethernet v2 compliant. The IR-IP interface can also operate in full duplex Ethernet applications.

ASM-60 equipped with IR-IP interface module can be used as a Frame Relay Access Device (FRAD) with an integral IP router. RFC 1490 is supported for a single DLCI on the WAN link. Detection of the DLCI and the maintenance protocol is performed automatically. This allows the IR-IP to be used as the termination unit of IP services over Frame Relay at the customer premises, opposite a Frame Relay switch in the backbone.

Alternatively, Point-to-Point Protocol (PPP) can be run on the WAN link with automatic negotiation on power-up, as well as support for PAP and CHAP authentication. With this feature, IR-IP can operate opposite any PPP compliant access server or backbone router.

IR-IP supports HDLC, which is especially important for broadcast and multicast applications where bandwidth overhead is critical.

IR-IP supports IP multicast at wire speed, making it suitable for any multicast environment including high speed downstream environments, such as satellite and xDSL. Users on the LAN who register with IR-IP for an IP multicast group using the IGMP protocol filter IP multicast packets at wire speed.

Management and advanced configuration are performed via Telnet.

Application

Figure C-1 shows a typical application of the ASM-60 modem equipped with the IR-IP interface module.

Figure C-1. Typical Application of ASM-60 with IR-IP

C.2 Technical Specifications

Router

LAN IP Net	Up to 256 hosts on LAN IP net
Filtering and Forwarding	30 kbps/35 kbps
Buffer	256 frames (maximum size – 1534 bytes)
Delay	1 frame

LAN

Standard	Conforms to IEEE 802.3/Ethernet v2
Data Rate	10 Mbps (20 Mbps 10BaseT in full duplex topology)
Connector	10BaseT (UTP): Shielded RJ-45

WAN

Protocols

- PPP (PAP/CHAP)
- Frame Relay (RFC 1490)
- HDLC

C.3 Physical Description

Figure C-2 shows the rear panel of ASM-60 with the IR-IP interface module.
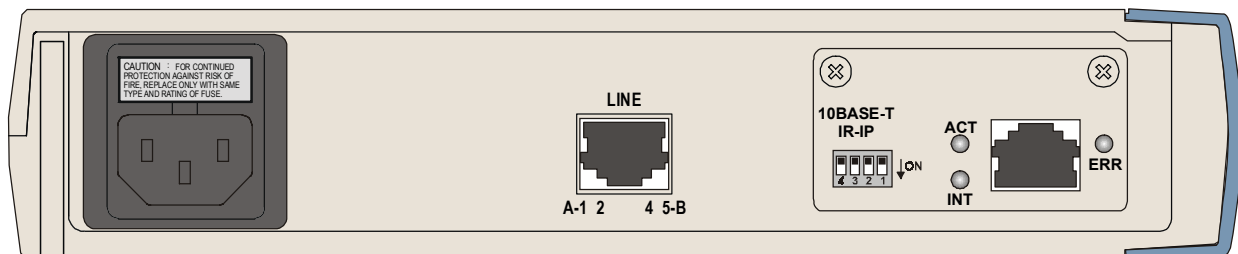

Figure C-2. Rear Panel of ASM-60 with the IR-IP Module

IR-IP LEDs

IR-IP contains three LEDs, which indicate the module activity. *Table C-1* lists the LEDs functions.

Table C-1. IR-IP LEDs Functions

Name	Type	Function
INT	Green LED	ON – LAN integrity is established.
ACT	Yellow LED	Blinks – Transmit/receive activity is detected on the Ethernet link.
ERR	Red LED	ON – Buffer overflow occurred (during normal operation). During power-up, provides additional indications, described below.

IR-IP DIP Switch

IR-IP interface module contains a four-section DIP switch, as seen in *Figure C-3*. *Table C-2* lists the DIP switch functions.
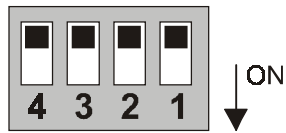
Figure C-3. IR-IP DIP Switch

Table C-2. IR-IP DIP Switch Functions

No	Function	Values	Default Setting
1	Enables IR-IP to learn its IP	**ON** – IP address learning is enabled	
		OFF – IP address learning is disabled	OFF
2	Selects the WAN protocol	**ON** – PPP protocol	
		OFF – Frame Relay protocol	OFF
3	Selects the LAN mode	**ON** – Full duplex operation	
		OFF – Half duplex operation	OFF
4	Controls the remote WAN test loopback, which returns packets received from the WAN back toward the WAN	**ON** – The test loopback is activated	
		OFF – The test loopback is disabled	OFF

Table C-3 provides the pinout of the IR-IP RJ-45 connector.

Table C-3. RJ-45 Pinout

Pin	Name	Function
1	TD (+)	Transmit data (positive)
2	TD (-)	Transmit data (negative)
3	RD (+)	Receive data (positive)
6	RD (-)	Receive data (negative)

C.4 IR-IP Management Subsystem, General

Introduction

The IR-IP interface module management subsystem supports the following functions:

- Preliminary configuration
- Configuration of management access parameters
- Advanced configuration of IR-IP parameters
- Collection and display of statistical performance data
- Maintenance functions, which include:
  - Software downloading
  - Resetting of various subsystems
  - Display of error log
  - Ping utility, for checking IP connectivity.

The management subsystem of the IR-IP interface module is a separate, independent entity.

The communication with the IR-IP management subsystem is made through the local LAN interface connector of the IR-IP module, designated 10BASE-T, using the Telnet protocol. Passwords can be used to prevent unauthorized access.

Accessing the IR-IP Management Subsystem

The IR-IP interface module must be configured in accordance with the specific requirements of the user's application before it can be used in the user's network. As a result, it is not possible to supply default parameters to enable IR-IP to start service without any preliminary configuration.

Therefore, to enable the user to establish Telnet communication and configure IR-IP, IR-IP is delivered with a default set of parameters. The default parameters are automatically used:

- Before the IP router is configured by the user, e.g., when a new ASM-60 with IR-IP interface module is put into operation
- After the user's configuration parameters have been erased.

When the factory-default parameters are used, the ERR indicator located on the ASM-60 rear panel, near the IR-IP Ethernet interface connector flashes rapidly (about three times per second).

Note   *The flashing of the ERR indicator also serves as a warning to the user that the IR-IP WAN interface does not send, nor does it receive packets, and therefore IR-IP can be accessed only from the LAN.*

After configuring IR-IP, it starts normal operation and routes the traffic in accordance with the user-selected configuration parameters.

To change the parameters of an already-configured IR-IP, establish communication from a Telnet host using the assigned IP address.

Default IP Communication Parameters

The default IP communication parameters of the interface module are:

- The default IP address of the IR-IP Ethernet port is 192.168.205.1, and the default IP subnet mask is 255.255.255.252.

- The port will accept IP communication only from the IP address 192.168.205.2. Therefore, as long as the factory defaults are in effect, you must assign this address to the Telnet host used to configure IR-IP.

Using the IP learning mechanism, as explained below you can change the default parameters.

Note   *In the default configuration, the IR-IP WAN interface is disabled. In order to enable the WAN interface, you have to modify the Ethernet port address or the IP subnet mask.*

C.5 Performing Preliminary Configuration

General

The software necessary for performing all the management and configuration functions is stored in the IR-IP interface module, and therefore you only need a regular Telnet host to perform all the activities described in this appendix.

A Telnet host is any computer, e.g., an IBM PC or compatible that fulfills the following minimum requirements:

- A standard 10BaseT Ethernet interface

- A TCP/IP protocol stack, and therefore is capable of supporting IP communication through the Ethernet interface

- Telnet client software

- A ping utility.

Outline of Preliminary Configuration

➤ **To perform the preliminary configuration procedure:**

1. Connect the Telnet host to the IR-IP interface module.
2. Configure the Telnet host to enable communication with the IR-IP interface module using the default IP parameters.
3. Establish communication with IR-IP and assign the prescribed IP address to its LAN interface.
4. Establish again communication with IR-IP and continue the preliminary configuration in accordance with the *Quick Setup Menu* section below.

Connecting the Telnet Host

Before starting the management and configuration activities, it is necessary to establish IP communication between your Telnet host and the IR-IP interface module. For this purpose, it is necessary to provide a communication path.

Because of the method used to assign an IP address to IR-IP Ethernet port, it is recommended to connect the Telnet host directly to the IP router 10BASE-T connector. This is made by connecting an Ethernet cross cable between the Ethernet connector of the Telnet host and the IR-IP connector.

However, you may also connect through a common LAN: in this case, connect your Telnet host and IR-IP to Ethernet hub ports using straight cables.

Preliminary Telnet Host Configuration

You can use the IP learning mechanism to configure the IP communication parameters of the IR-IP LAN interface. In this case, skip to the *Assigning the Router LAN Interface Address* section below.

If you prefer to use the factory-default parameters to establish IP communication between your Telnet host and IR-IP, configure the Telnet host as follows:

1. Temporarily configure the host IP address as 192.168.205.2.

2. The initial destination IP address to be used by the host is 192.168.205.1.

Note   *The first step in the preliminary configuration process is to assign the desired IP address to the LAN interface of the IR-IP interface module.*
After an IP address is assigned and saved, you must change the destination IP address of the Telnet host to the new address, otherwise it is not possible to continue the configuration process. At the same time, you can also change the temporary IP address assigned to the host (192.168.205.2) back to its permanent address.

Assigning the Router LAN Interface Address

The IP address of the IR-IP LAN interface must be configured as part of the preliminary configuration process. To simplify this process, IR-IP includes a simple and convenient IP address learning mechanism.

The IP address can be configured and changed at any time, even after the complete IR-IP configuration process has been performed, because it does not affect other configuration parameters. Moreover, the IP subnet mask is automatically adapted to the new IP address.

IP Learning Mechanism

To simplify the configuration process, IR-IP has a special mechanism for configuring the IP address of its LAN interface. Setting section 1, called IP address learning, of the IR-IP DIP switch (*Figure C-3*) to ON enables this mechanism.

The IP learning mechanism enables IR-IP to learn its LAN interface IP address by receiving frames sent by a ***ping*** utility to the prescribed LAN IP address.

Note   *To use the IP learning mechanism, you do not need to know the current address of IR-IP LAN interface, but only the prescribed IP address.*

The IP address is actually retrieved from the ARP frames sent during pinging to locate the **ping** destination, not from the **ping** frames.

To ensure that the process is correctly performed, it is recommended to check the contents of the ARP table before starting the **ping** utility, to make sure that it does not contain the address to be assigned to the IP router LAN interface.

➤ **To view and edit the ARP table contents:**

If the Telnet host you are using runs under Microsoft Inc. Windows™ 95, 98 or NT, use the following procedure to view and edit the ARP table contents:

1. Display the table using the `arp -a` command.

2. If the table includes the intended IP address, remove it from the table using the `arp -d` command.

If for some reason the IP learning process does not succeed, before repeating it make sure to remove the IP address from the table.

Assigning a LAN IP Address to a New IR-IP

The following procedure enables you to configure the LAN IP address of a new IR-IP router, i.e., a router using the default parameters (see the *Accessing the IR-IP Management Subsystem* section above).

If ASM-60 is already operating, skip Step 2 in the following procedure.

➤ **To configure the IP router LAN address:**

1. Make sure the preparations described above have been completed, including the configuration of the **ping** utility.

2. Turn ASM-60 on and monitor the IP router indicators:

    ▪ The INT indicator turns on

    ▪ The ERR indicator lights steadily for approx. 15 seconds, and then starts flashing at a rapid rate (about three times per second).

      If the ERR indicator turns off, skip to the *What to Do If …* section below.

3. Set section 1 of IR-IP DIP switch to ON.

      The ERR indicator starts flashing faster (approximately four times a second).

4. Send a **ping** to the new address to be used by IR-IP. A confirmation should be received after the third **ping**: after the confirmation, the flashing will slow down to approximately twice a second.

If your host does not begin to receive **ping** replies after three unsuccessful attempts, skip to the *What to Do If …* section below.

5. Return section 1 of the IR-IP DIP switch to the OFF position.

      The ERR indicator must turn off.

At this stage, the communication with IR-IP router is lost, because its IP address has been changed. Therefore, you must reconfigure the destination IP address of the Telnet host. If you wish, you may also change the temporary IP address assigned to the host (192.168.205.2) back to its permanent address.

After changing the destination IP address of the Telnet host, it is recommended to turn ASM-60 off for a few seconds and then back on, before continuing the configuration of the IP router in accordance with the *Quick Setup Menu* section below. At this time, in Step 2 the ERR indicator turns off after the 15-second interval.

Changing the LAN IP Address of a Configured IR-IP

The LAN IP address of an already-configured IR-IP can be changed while it operates, this means it is not necessary to turn ASM-60 off before starting the configuration procedure. Note however that the IP traffic flow through IR-IP will be disrupted until the other stations in the IP network learn the new address.

To change the LAN IP address of an already-configured IR-IP, use the procedure described above for a new IR-IP with the following differences:

1. Configure the destination address of the ***ping*** utility to the new LAN interface IP address. It is not necessary to change the Telnet host source address.

2. When ready, set section 1 of the IR-IP DIP switch to ON.

    The ERR indicator starts flashing faster (approximately four times a second).

3. Perform Steps 4, 5 of the procedure used for a new IR-IP.

What to Do If …

➤ **The INT indicator does not light immediately after ASM-60 is turned on**

The IR-IP interface module does not receive power from the ASM-60 power supply. Service is required.

Note   *After the power-up process ends, the INT indicator shows LAN integrity. It may stay turned off without indicating power supply failure.*

➤ **The ERR indicator does not light immediately after ASM-60 is turned on**

IR-IP is faulty and must be replaced.

➤ **After turn-on, the ERR indicator lights for 15 seconds and then turns off. ACT does not light, and there is no response from IR-IP**

No software loaded into IR-IP. Download software using the procedure described in the *New Software Download Menu* section below.

➤ **After turn-on, the ERR indicator lights for 15 seconds, and then turns off. ACT lights from time to time, but there is no response from IR-IP**

IR-IP has been configured. If you do not know the current IP address of the LAN interface, erase IR-IP router configuration using the procedure given in the *Erasing User's Configuration* section below.

➤ **No ping replies from IR-IP**

- If your host does not begin to receive ***ping*** replies after three unsuccessful attempts, check the physical connection path between the Telnet host Ethernet interface and the IR-IP 10BASE-T connector.

➤ **The IP learning process is not successful**

- Check that the prescribed IP address does not appear in the ARP table.

C.6 IR-IP Management Utility

General Operating Procedures

The IR-IP interface module is managed via a simple, menu-driven utility that uses a basic terminal user interface. A typical screen is shown in *Figure C-4*.

As seen in *Figure C-4*, each screen has a header that identifies the device being configured and its logical name, assigned by the user, followed by the running software revision and date. The bottom line of the screen displays prompts that guide you in the execution of the various activities.

Use the following general procedures to perform the desired activity:

- To change a parameter or to select a menu item, type the corresponding line number.

- For a parameter, which has a discrete set of values, the parameter values are enclosed in brackets [ ]. To select a new value, press the spacebar to scroll among the available values until the desired value is displayed, and then press **<Enter>** to select the displayed value.

- To enter a value which requires free text entry, type in the desired string and then press **<Enter>**. Use backspace to erase the current string.

- After all the parameters have been selected, a prompt appears, requesting that you confirm the changes.

Note *For proper display of the screens, you must:*

- *Select a fixed-pitch system font for the display. Use your operating system documentation to find how to select a proper font.*

- *Configure the Telnet utility to use VT-100 terminal emulation.*

Starting a Management Utility

The management utility is started automatically when Telnet communication is established. If password protection is enabled (see the *Management Access Menu* section below), you will be prompted to enter the Telnet password. The opening screen, which appears after the Telnet session activation, is the IR-IP Main menu (see *Figure C-4*).

```
IR_IP                    <IR-IP>              S/W Ver. 1.00 31/IR (date)

1. Quick Setup
2. Management Access
3. Advanced Setup
4. Device Control
5. View
6. Diagnostic Tool (PING terminal)

Press one of the numbers to select or ESC:
```

Figure C-4. IR-IP Main Menu

To end the utility, press **<Esc>** when the Main menu is displayed. This will also end the Telnet session.

Menu Structure of Management Utility

Figure C-5 shows the menu structure of the IR-IP management utility.
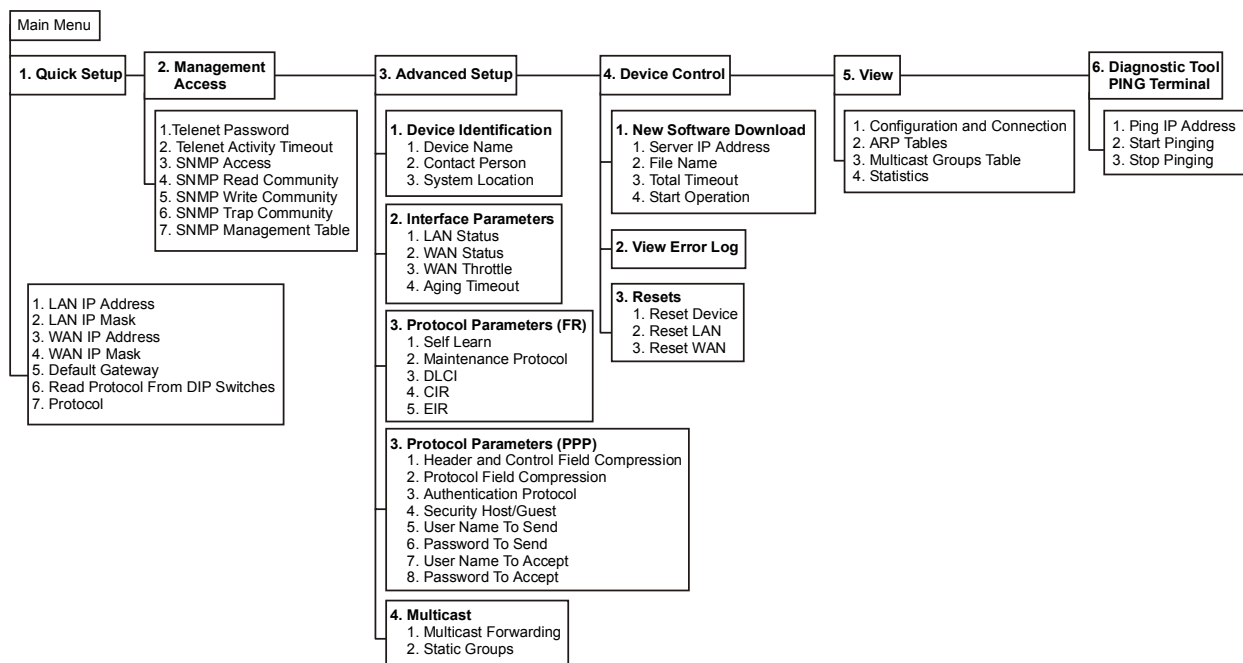
Figure C-5. Management Utility, Menu Structure

C.7 Quick Setup Menu

The Quick Setup menu is used to select the main parameters' values that must be defined before you start using IR-IP.

Use the Advanced Setup menu (see the *Advanced Setup Menu* section below) to specify values for other IR-IP configuration parameters not included in this menu.

➤ **To access the Quick Setup menu:**

• From the Main menu, type **1**.

The Quick Setup menu appears (*Figure C-6*).

```
IR_IP                      <IR-IP>              S/W Ver. 1.00 31/IR (date)
Quick Setup
==================================================================
1. LAN IP Address                                   :192.168.100.001
2. LAN IP Mask                                      :255.255.255.000
3. WAN IP Address (empty for unnumbered)            :...............
4. WAN IP Mask (empty for unnumbered)               :...............
5. Default Gateway (empty - WAN interface)          :...............
6. Read Protocol From DIP Switches                  :[ Yes ]
7. Protocol                                         :[ Frame Relay ]

Press one of the numbers to select or ESC:
```

Figure C-6. Quick Setup Menu

LAN IP Address

Used to enter the IP address for the IP router LAN interface. This is the address to which nodes connected to the local LAN send packets addressed to the WAN.

LAN IP Mask

Used to enter the IP subnet mask. The IP router supports a maximum of 254 hosts on the LAN, therefore you must use Class C subnet masks. The basic subnet IP mask for Class C addresses, which supports the maximum possible number of hosts, 254, is 255.255.255.0. To help you understand the selection of IP subnet masks, *Figure C-7* provides a configuration example for a LAN with 6 nodes: the IP subnet mask for a 6-node IP network is 255.255.255.248.

ASM-60 with IR-IP

LAN IP Address: 192.168.1.2
Mask: 255.255.255.248

IP Address	192.168.1.2	.3	.4	.5	.6
Mask	255.255.255.248	.248	.248	.248	.248
Default Gateway	192.168.1.1	192.168.1.1	192.168.1.1	192.168.1.1	192.168.1.1
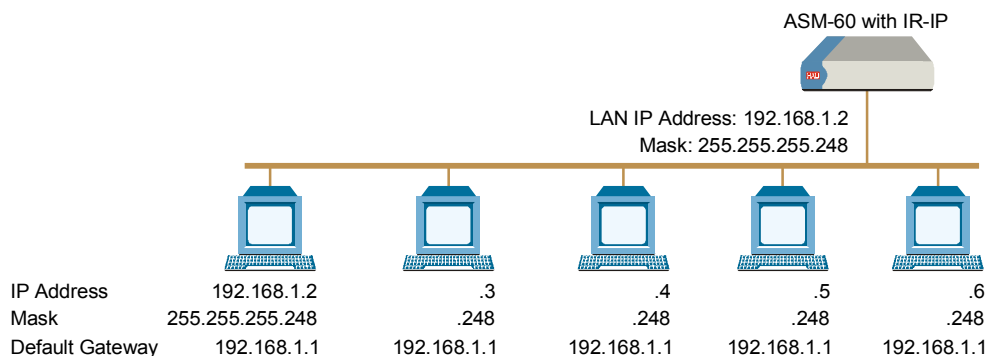
Figure C-7. Selecting the IP Subnet Mask

WAN IP Address

Used to enter the IP address for the IR-IP WAN interface, i.e., the IP address to be used by IP hosts on the WAN to reach this IR-IP interface module.

If the WAN IP Address field remain blank, IR-IP operates in the Unnumbered Router Mode.

WAN IP Mask

Used to enter the IP subnet mask for the WAN interface.

Default Gateway

Operation without Default Gateway

The IP interface module is intended to enable the extension of LANs through the ASM-60 link. Therefore, its default routing operation is different from the default routing operation of standard IP routers:

- IR-IP forwards packets with destinations not located on the local LAN through the WAN interface

- Packets received from the WAN interface and destined to hosts located on the local LAN are forwarded to the LAN; other packets are discarded.

The default operation is used when the Default Gateway field is blank.

Operation with Default Gateway

You can instruct IR-IP to send packets with destinations not located on the local LAN to a specific router, which is called the ***default gateway***. The default gateway must be connected to the local LAN.

To use this option, enter the IP address of another router attached to the local LAN in the Default Gateway field.

Note

It is very important to obtain the correct parameters from the system administrator or ISP. The most common problem when establishing an IP connection is incorrect configuration of IP parameters and default gateway. Do not try to guess these parameters.

Read Protocol from DIP Switches

Selecting YES for this parameter forces IR-IP router card to use the WAN protocol selected by section 2 of its DIP switch: PPP or Frame Relay.

If you want to be able to select the WAN protocol by means of the Protocol field (parameter 7) of the Quick Setup menu, select NO.

Protocol

Used to select the WAN protocol to be used by the IP router card: PPP, HDLC or Frame Relay.

This parameter is available only if the Read Protocol from DIP Switches parameter is set to NO.

C.8 Management Access Menu

The Management Access menu is used to enable the use of passwords to protect the access to IR-IP management utility, and control the inactivity time-out interval.

When password protection is enabled, a Telnet management session can start only after the correct password is entered.

➤ **To access the Management Access menu:**

• From the Main menu, type **2**.

The Management Access menu appears (*Figure C-8*).

```
IR_IP                        <IR-IP>              S/W Ver. 1.00 31/IR (date)


Quick Setup
Management Access
======================================================================
      1. Telnet Password                              :..........
      2. Telnet Inactivity Timeout (min)             :300..
      3. SNMP Access                                 :Disabled
      4. SNMP Read Community                         :public....
      5. SNMP Write Community                        :public....
      6. SNMP Trap Community                         :public....
      7. SNMP Management Table                       :>>>


Press one of the numbers to select or ESC:
```

Figure C-8. Management Access Menu

Note   *Since the IP router card does not support SNMP management, the SNMP Read Community, SNMP Write Community, SNMP Trap Community, and SNMP Management Table parameters are not used.*

Telnet Password

By default, management access to IR-IP via Telnet is unrestricted. To restrict access, enter a Telnet password by selecting **1** in the Management Access menu. The password can include up to 10 characters, and is case-sensitive. The next time a Telnet session is opened, a password must be entered to enable you to access the IR-IP menus.

At any time, only one Telnet connection to IR-IP is permitted. Any attempt to open an additional connection while the current session is open is rejected.

Telnet Inactivity Timeout

This parameter specifies the time a Telnet session is kept open when there is no keyboard activity. When the specified time-out expires, the Telnet session is closed and another user can access IR-IP.

C.9 Advanced Setup Menu

The Advanced Setup menu is used to select the desired group of IR-IP configuration parameters.

The parameters accessed through Advanced Setup menu supplement the parameters available on the Quick Setup screen, by providing control over all the other IR-IP parameters.

➤ **To access the Advanced Setup menu:**

• From the Main menu, press **3**.

The Advanced Setup menu appears (*Figure C-9*).

```
IR_IP                    <IR-IP>              S/W Ver. 1.00 31/IR (date)


Quick Setup
Management Access
Advanced Setup
=====================================================================
    1.  Device identification
    2.  Interface Parameters
    3.  Protocol Parameters
    4.  Multicast IP

Press one of the numbers to select or ESC:
```

Figure C-9. Advanced Setup Menu

Device Identification Menu

The Device Identification menu is used to define and store in the IR-IP logistic information: the logical name of IR-IP, information on the contact person and device location.

➤ **To access the Device Identification menu:**

• From the Advanced Setup menu, type **1**.

The Device Identification menu appears (*Figure C-10*).

```
IR_IP                    <IR-IP>              S/W Ver. 1.00 31/IR (date)

Quick Setup
Management Access
Advanced Setup
.....................................................................
    Device identification
=====================================================================
    1.  Device Name                        :IR-IP..
    2.  Contact Person                      :Name of contact Person
    3.  System Location                     :The location of this device

Press one of the numbers to select or ESC:
```

Figure C-10. Device Identification Menu

Device Name

Select this parameter to assign an arbitrary name to IR-IP for identification by the system manager (up to eight characters). The assigned name is displayed in the screen header.

Contact Person

Select this parameter to enter the name of the person to be contacted with matters pertaining to this equipment unit.

System Location

Select this parameter to enter the physical location of the device.

Interface Parameters Menu

The Interface Parameters menu is used to control the operation of IR-IP interfaces.

➤　**To access the Interface Parameters menu:**

• From the Advanced Setup menu, type **2**.

The Interface Parameters menu appears (*Figure C-11*).

```
IR_IP                    <IR-IP>              S/W Ver. 1.00 31/IR (date)

Quick Setup
Management Access
Advanced Setup
.........................................................................
    Device identification
    Interface Parameters
==================================================================
    1.  LAN Status                                    :[ Open  ]
    2.  WAN Status                                    :[ Open  ]
    3.  WAN Throttle                                  :[ Full  ]
    4.  Aging Timeout (min)                           :5.

Press one of the numbers to select or ESC:
```

Figure C-11. Interface Parameters Menu

LAN Status

Used to enable/disable the flow of packets through LAN interface:

• **Open** – the flow of packets is enabled.

• **Closed** – the flow of packets is disabled. As a result, IR-IP does not accept, nor sends packets to the LAN, but its WAN interface may still be active, and can interact with other IP hosts on the WAN.

WAN Status

Used to enable/disable the flow of packets through the WAN interface:

• **Open** – the flow of packets is enabled.

• **Closed** – the flow of packets through the WAN interface is disabled. As a result, IR-IP does not accept from, nor sends packets to the WAN. However, the LAN interface of the IP router is still active.

WAN Throttle

This parameter specifies the maximum data rate at which frames are sent to the WAN (i.e., to the ASM-60 line).

The available selections are:

- 64 kbps
- 128 kbps
- 256 kbps
- 512 kbps
- 1024 kbps
- Full (no restriction on the rate).

Since the IP router buffers have a limited capacity (256 frames), it is recommended to select the WAN Throttle parameter in accordance with the line rate.

Aging Timeout

Used to specify the time after which inactive LAN stations are removed from the IR-IP ARP table.

A station is defined as inactive when no IP traffic is received from it by the IR-IP LAN interface.

WAN Protocol Parameters – Frame Relay Protocol Menu

The Frame Relay Protocol Parameters menu is used to configure the parameters Frame Relay WAN for protocol (the WAN protocol is selected by means of the *Quick Setup Menu*) in *Figure C-6*.

➤ **To access the Protocol Parameters menu:**

- From the Advanced Setup menu, type **3**.

Self Learn

Used to specify whether the Frame Relay DLCI and maintenance protocol is learned automatically (ENABLED), or is manually entered (DISABLED).

Maintenance Protocol

When the Self Learn parameter is DISABLED, use this parameter to specify the desired maintenance protocol.

DLCI

When the Self Learn parameter is DISABLED, use this parameter to specify the DLCI used for exchanging maintenance protocol messages.

CIR

Used to specify the maximum amount of data, in bits, which the Frame Relay network guarantees to transfer during the measurement interval (the measurement interval is usually one second).

The value of this parameter is obtained from your Frame Relay service provider.

EIR

Used to specify the maximum amount of data, in bits, that the Frame Relay network will attempt to deliver during the measurement interval. The value of this parameter is obtained from the Frame Relay service provider.

A typical Frame Relay Protocol Parameters menu is shown in *Figure C-12*.

```
IR_IP                      <IR-IP>              S/W Ver. 1.00 31/IR (date)


Quick Setup
Management Access
Advanced Setup
...............................................................
      Device identification
      Interface Parameters
      Protocol Parameters
=====================================================================
      1. Self Learn                             :[ Enabled  ]
      2. Maintenance Protocol                   :[ ANSI T1.617 ANNEX D ]
      3. DLCI (0-None)                          :0..
      4. CIR                                    :0.......
      5. EIR                                    :64000...


Press one of the numbers to select or ESC:
```

Figure C-12. Frame Relay Protocol Parameters Menu

WAN Protocol Parameters – PPP Protocol Menu

The PPP Protocol Parameters menu is used to configure the parameters PPP WAN for protocol (the WAN protocol is selected by means of the (the WAN protocol is selected by means of the *Quick Setup Menu*) in *Figure C-6*.

➤ **To access the Protocol Parameters menu:**

- From the Advanced Setup menu, type **3**.

Header and Control Field Compression

Used to control the use of header and control field compression type according to RFC 1661. It is strongly recommended that this compression be used for troubleshooting only.

Protocol Field Compression

Used to control the use of protocol field compression type according to RFC 1661. It is strongly recommended that this compression be used for troubleshooting only.

Authentication Protocol

Used to select the authentication protocol used by an IP router configured as host to validate incoming connections.

Security Host/Guest

This option can be used to configure the IP router either as a guest unit, to be authenticated by another router, or as a host unit, that authenticates other routers.

User Name To Send

The name by which an IP router card configured as guest identifies itself.

Password To Send

The password by which an IP router card configured as guest identifies itself.

User Name To Accept

The user name to be accepted by an IP router configured as host, when an incoming connection request is received.

Password To Accept

The user password to be accepted by an IP router configured as host, when an incoming connection request is received.

A typical PPP Protocol Parameters menu is shown in *Figure C-13*.

```
IR_IP                     <IR-IP>              S/W Ver. 1.00 31/IR (date)

Quick Setup

Management Access

Advanced Setup
..................................................................
     Device identification
     Interface Parameters
     Protocol Parameters
======================================================================
     1. Header and Control Field Compression      :[ No  ]
     2. Protocol Field Compression:               :[ No  ]
     3. Authentication Protocol                   :[ NONE/NONE  ]
     4. Security Host / Guest                     :[ Guest  ]
     5. User Name To Send                         :.................
     6. Password To Send                          :.................
     7. User Name To Accept                       :.................
     8. Password To Accept                        :.................

Press one of the numbers to select or ESC:
```

Figure C-13. PPP Protocol Parameters Menu

Multicast IP Menu

The Multicast IP menu is used to specify the IP multicast frame forwarding parameters, and to access the static multicast groups' table.

➤ **To access the Multicast IP menu:**

- From the Advanced Setup menu, press **4**.

    The Multicast IP menu appears (*Figure C-14*).

```
IR_IP                     <IR-IP>          S/W Ver. 1.00 31/IR (date)


Quick Setup
Management Access
Advanced Setup
.................................................................
    Device identification
    Interface Parameters
    Protocol Parameters
    Multicast IP
===================================================================
    1. Multicast forwarding                      :[ Disable ]
    2. Static groups                             :>>>


Press one of the numbers to select or ESC:
```

Figure C-14. Multicast IP Menu

Multicast Forwarding

Used to control the forwarding of IP multicast frames. The following selections are available:

- **DISABLED** – Disables multicast forwarding in both directions.

- **LAN to WAN** – Enables forwarding of IP multicast frames addressed to groups appearing in the Static Multicast Groups table, from the LAN to the WAN.

- **WAN to LAN** – Enables forwarding of IP multicast frames addressed to groups appearing in the Static Multicast Groups table, from the WAN to the LAN.

- **BIDIRECTIONAL** – Enables forwarding of IP multicast frames addressed to groups appearing in the Static Multicast Groups table, in both directions.

- **WAN to LAN + IGMP** – Enables forwarding of IP multicast frames addressed to groups appearing in the Static Multicast Groups table, from the WAN to the LAN. In addition, more groups can be added dynamically (the additional can be viewed using the View menu – *Figure C-19*).

- **TRANSPARENT** – All the IP multicast frames are forwarded, irrespective of the Static Multicast Groups table.

Static Groups

Select this parameter to access the static multicast groups table. The table is used to specify the IP addresses for up to 10 IP multicast groups. You can add, change, or delete each entry in the table (see the prompt line).

➤ **To access the Static Groups menu:**

* From the Multicast IP menu, type **2**.

   The following screen appears:

```
IR_IP                    <IR-IP>              S/W Ver. 1.00 31/IR (date)


                      Static Multicast Groups Table
                      -----------------------------
   Group IP Address
1.  ................
2.  ................
3.  ................
4.  ................
5.  ................
6.  ................
7.  ................
8.  ................
9.  ................
10. ...............

Press 'A'-add, 'E'-edit, 'D'-delete, 'C'-clear all, 'ESC'-exit:
```

Figure C-15. Static Multicast Groups Table

C.10   Device Control Menu

The Device Control menu is used to download software from TFTP servers and perform interface and device resets.

➤ **To access the Device Control menu:**

* From the Main menu, type **4**.

   The Device Control menu appears (*Figure C-16*).

```
IR_IP                    <IR-IP>              S/W Ver. 1.00 31/IR (date)

Quick Setup
Management Access
Advanced Setup
Device Control
---------------------------------------------------------
    1. New Software Download
    2. View error LOG
    3. Resets
Press one of the numbers to select or ESC:
```

Figure C-16. Device Control Menu

New Software Download Menu

IR-IP operates as a TFTP client, and therefore it is possible to update its software by downloading new software from another computer that operates as a TFTP server.

The New Software Download menu is used to specify the software downloading parameters.

➤ **To access the New Software Download menu:**

- From the Device Control submenu, type **1**.

  New Software Download menu appears (*Figure C-17*).

```
IR_IP                    <IR-IP>              S/W Ver. 1.00 31/IR (date)

Quick Setup

Management Access

Advanced Setup

Device Control
.................................................................
     New Software Download
====================================================================

     1. Server IP Address                          :..............

     2. File Name                                  :..................

     3. Total Timeout (sec)                        :..

     4. Start operation                            :>>>
Press one of the numbers to select or ESC:
```

Figure C-17. New Software Download Menu

Server IP Address

Used to enter the IP address of the TFTP server.

File Name

Used to enter the name and path of the file to be transferred from the TFTP server.

Total Timeout

Used to enter the time IP router should wait for an acknowledgment from the TFTP server, for example 60 seconds.

Start Operation

After selecting all the necessary parameters, type **4** on the New Software Download screen and then press **<Enter>** to start the downloading.

You can follow the progress of the downloading process (indicated by arrows).

Upon completion of the download process, the unit performs a reset. The Telnet connection is lost and must be restarted if required.

View Error Log Screen

This item of the Device Control submenu is used to view the error log file. This file logs errors detected in IR-IP for debug and technical support purposes.

Resets Menu

The Resets menu allows you to perform reset of IR-IP, or its interfaces.
This operation can be used to restore normal operation after service is disrupted by an abnormal condition. Any data stored in the IR-IP buffers is discarded, and the flow of traffic is temporarily interrupted.

➤ **To access the Resets menu:**

- From the Device Control menu, type **3**.

    The following screen appears:

```
IR_IP                      <IR-IP>             S/W Ver. 1.00 31/IR (date)


Quick Setup
Management Access
Advanced Setup
Device Control
.................................................................
    New Software Download
    View error LOG
    Resets
=================================================================
    1. Reset Device
    2. Reset LAN
    3. Reset WAN
Press one of the numbers to select or ESC:
```

Figure C-18. Resets Menu

Reset Device

➤ **To restart IR-IP:**

- From the Resets menu, type **1**.

    You will be prompted to confirm the reset operation.

Note   *Resetting the device will restart the IR-IP interface module, and therefore traffic flow is temporarily interrupted, and the Telnet connection is lost.*

Reset LAN

➤ **To reset the LAN interface:**

- From the Resets menu, type **2**.

    You will be prompted to confirm the reset operation.

Note   *This operation restarts the IR-IP LAN controller.*
To continue your Telnet session, press any key within 15 seconds following the confirmation of the reset operation.

Reset WAN

➤ **To reset the WAN interface:**

- From the Resets menu, type **3**.

    You will be prompted to confirm the reset operation.

Note   *Resetting the WAN interface causes the WAN controller to be restarted. This results in renegotiation of the WAN protocol parameters.*
To continue your Telnet session, press any key within 15 seconds following the confirmation of the reset operation.

C.11   View Menu

The View menu is used to view the IR-IP configuration data, and display information on its ARP tables, multicast Groups tables and statistics.

➤ **To access the View menu:**

- From the Main menu, type **5**.

    The View menu appears (*Figure C-19*).

```
IR_IP                    <IR-IP>           S/W Ver. 1.00 31/IR (date)


Quick Setup

Management Access

Advanced Setup

Device Control

View

----------------------------------------------------------

    1. Configuration and Connection

    2. ARP Tables

    3. Multicast Groups Table

    4. Statistics


Press one of the numbers to select or ESC:
```

Figure C-19. View Menu

Configuration and Connection

This screen is used to view the configuration parameters of IR-IP. In addition, you can also view the current status of the LAN and WAN interface.

➤ **To access the Configuration and Connection screen:**

- From the View menu, type **1**.

    The View Configuration screen appears (*Figure C-20*).

```
IR_IP                        <IR-IP>              S/W Ver. 1.00 31/IR (date)

                             VIEW CONFIGURATION
                             ------------------
BOOT Version       :1.06  18.03.1999
Device Name        :IP router card
System Location    :The location of this device
Contact Person     :Name of contact Person

MAC Address        : 00-20-D2-16-3F-9B
Default Gateway    : WAN


Intrf Type    Baud(Kbps)  Prot   IP Address        IP Mask           Status
.............................................................................
LAN   UTP     -------     Ethr   192.168.205.005   255.255.255.000   Connected
WAN   V.110               FR                                         Not Conn.

Press any key to continue:
```

Figure C-20. View Configuration Screen

ARP Tables

This screen is used to display the IR-IP ARP table. This table shows the IP address assigned to each station on the LAN (the stations are identified by their MAC addresses).

➤ **To access the ARP Tables screen:**

- From the View menu, type **2**.

  The ARP Tables screen appears (*Figure C-21*).

```
IR_IP                        <IR-IP>              S/W Ver. 1.00 31/IR (date)


                             ARP Table
                             ---------

    IP Address           MAC Address          IP Address     MAC Address

    192.168.205.003      00-40-33-20-C8-3C

Press any key for exit
```

Figure C-21. ARP Tables Screen

Multicast Groups Table Screen

This screen is used to display information about the multicast group IP addresses and their status.

➤ **To access the Multicast Groups Table screen:**

- In the View menu, type **3**.

  The Multicast Groups Table screen appears (*Figure C-22*).

```
IR_IP                      <IR-IP>                S/W Ver. 1.00 31/IR (date)


Multicast Groups Table
----------------------

     Group IP Address Status         Group IP Address Status

Press any key for exit
```

Figure C-22. Multicast Groups Table Screen

Statistics Screen

The Statistics screen is used to display statistical information on the traffic between the networks connected by IR-IP. The data displayed on this screen enables you to evaluate the IR-IP performance. Two different Statistics screens are used, one for the LAN side and the other for the WAN side.

➤ **To access the Statistics menu:**

- In the View menu, type **4**.

    The LAN and WAN Statistics screens appear (*Figure C-23* and *Figure C-24*).

```
IR_IP                      <IR-IP>                S/W Ver. 1.00 31/IR (date)

                          SYSTEM STATISTICS
                          -----------------
      Counter Name            Val      Counter Name                  Val
LAN in Octets                83504    LAN IP Header Errors           0
LAN Unicast Frames In            1    LAN IP Address Errors          0
LAN Non-Unicast Frames In        9    LAN Alignment Errors           0
LAN Out Octets               83504    LAN CRC Errors                 0
LAN Unicast Frames Out        3560    LAN Single Collisions          0
LAN Non-Unicast Frames Out       0    LAN Multiple Collisions        0
LAN to WAN Frames Passed      1698    LAN Late Collisions            0
LAN IP Datagram Received      2638    LAN Excessive Collisions       0
LAN to CPU Frames Discarded      0    LAN Frames Too Long Errors     0
LAN to WAN Frames Discarded      0    LAN RX FIFO Overrun Error      0
LAN Out Errors                   0    LAN SQE Transmitted            0
LAN RX Frames Errors             0    LAN Deferred Frames            1
LAN MAC Receive Errors           0    LAN Carrier Sense Lost         0
LAN MAC TX Errors                0    LAN FIFO Underrun              0


    N - Next Screen. ESC - Back To Previous Menu.
    R - Refresh Page. C - Clear The Counters Of This Page.
```

Figure C-23. LAN Statistics Screen

```
IR_IP                        <IR-IP>              S/W Ver. 1.00 31/IR (date)

                            SYSTEM STATISTICS
                            -----------------
     Counter Name               Val      Counter Name              Val
WAN in Octets                  83504   WAN Alignment Errors       0
WAN Out Octets                  1950   WAN Aborted Frames         0
WAN Out Frames                  1723   WAN Short Frames           0
WAN to LAN Frames Transfer      1698   WAN RX FIFO Overrun Error  0
WAN IP Datagram Received        1723   WAN to CPU Frames Errors   0
WAN to CPU Discarded               0   WAN Frame Too Long Errors  0
WAN to LAN Discarded               0   WAN IP Header Errors       0
WAN Out Errors                     0   WAN IP Addres Errors       0
WAN CRC Errors                     0

PPP Address Error                  0
PPP Control Error                  0
DLCI Unrecognized Error            0
Frame Relay Forward Conge          0
Frame Relay Backward Conge         0


    P - Previous Screen. ESC - Back To Previous Menu.
    R - Refresh Page. C - Clear The Counters Of This Page.
```

Figure C-24. WAN Statistics Screen

C.12   Diagnostic Tool (Ping Terminal) Menu

This section provides information on the diagnostic tool provided with IR-IP (the *ping* utility).

➤ **To access the Diagnostic Tools menu:**

- In the Main menu, type **6**.

   The Diagnostic Tools menu appears (*Figure C-25*).

```
IR_IP                        <IR-IP>              S/W Ver. 1.00 31/IR (date)

Quick Setup
Management Access
Advanced Setup
Device Control
View
Diagnostic Tools (PING terminal)
======================================================================
    1. Ping IP Address                           :192.168.100.011
    2. Start Pinging                             :>>>
    3. Stop Pinging                              :>>>

Press one of the numbers to select or ESC:
```

Figure C-25. Diagnostic Tools Menu

Using the Ping Function

The Ping option is used to confirm IP connectivity by ***pinging*** other IP hosts. Connectivity is confirmed by receiving a reply from the remote (pinged) IP host.

➤   **To ping a host:**

1. From the Diagnostic Tools menu, type **1** and enter the desired host IP address.

2. Press **<Enter>** to confirm the destination IP address.

3. To start pinging, type **2** on the Diagnostic Tools screen.

   After pinging starts, you can monitor the ***ping*** status. A typical screen is shown in *Figure C-26*.

Note   *After pinging is started, it continues in the background even if you exit the Diagnostics Tools screen. In this case, a Ping Running message appears in the top upper left-hand corner of the screen.*

4. To stop pinging, type **3** from the Diagnostic Tools menu.

   A **Ping Stopped** message is displayed.
   To clear the message and return to the Diagnostic Tools screen, press any key.

```
IR_IP                    <IR-IP>              S/W Ver. 1.00 31/IR (date)


Quick Setup
Management Access
Advanced Setup
Device Control
View
Diagnostic Tools (PING terminal)

====================================================================
    1. Ping IP Address                           :192.168.100.011
    2. Start Pinging                             :>>>
    3. Stop Pinging                              :>>>


Pinging 192.168.212.001 Sent 27 Recvd 25  Lost 2  Resp.Time 60 ms



Press one of the numbers to select or ESC:
```

Figure C-26. Diagnostic Tools Menu after Receiving Pinging Response

C.13   Erasing User's Configuration

The user-defined configuration parameters are stored in the IP router card flash memory. After the user-defined configuration parameters are erased, the IP router card automatically loads the default parameters.

You may want to erase the current configuration parameters:

1. Before IR-IP is prepared for operation in a new application.

2. When you cannot configure IR-IP because its current LAN-interface IP address and/or the Telnet password, are not known.

➤ **To erase the user's configuration:**

1. Turn ASM-60 off.

2. Set all the four sections of the IR-IP DIP switch to ON.

3. Turn ASM-60 on and monitor the ERR indicator: it must turn on and start blinking.

4. While the ERR indicator is blinking (within 15 seconds), set sections 1 and 2 of the DIP switch to OFF.

   When the ERR indicator stops blinking and lights steadily, the IP router configuration becomes erased.

Note

If you do not set sections 1 and 2 to OFF within 15 seconds of power-up, the IP router card ignores the setting of all the four sections to ON and starts normal operation. In this case, it is recommended to turn ASM-60 off and then back on. To abort the whole operation, turn ASM-60 off, return all the four-switch section to the desired positions, and then turn ASM-60 on again.

5. Turn ASM-60 off, and the return all the four sections of the DIP switch to the desired positions.

C.14   Erasing IR-IP Software

You may erase the IR-IP application software, without erasing the user-defined parameters.

After the application software is erased, IR-IP starts its TFTP server application, and waits for the downloading of software by a TFTP client connected to its LAN interface. The procedure to be used to download the application software in this case is also described below.

You may want to erase the application software if the downloading of new software using the Device Control menu (see *Figure C-16*) fails, and IR-IP does not function properly.

Erasing Application Software

➤ **To erase the application software:**

1. Turn ASM-60 off.

2. Set all the four sections of IR-IP DIP switch to ON.

3. Turn ASM-60 on and monitor the IP router ERR indicator: it must turn on and start blinking.

4. While the ERR indicator is blinking (within 15 seconds), set sections 3 and 4 of the DIP switch to OFF.

   When the ERR indicator stops blinking and lights steadily, the IP router configuration becomes erased.

Note

If you do not set sections 3 and 4 to OFF within 15 seconds of power-up, IR-IP ignores the setting of all the four sections to ON and starts normal operation. In this case, it is recommended to turn ASM-60 off and then back on.
Alternately, to abort the whole operation, turn ASM-60 off, return all the four switches to the desired positions, and then turn ASM-60 on again.

5. Turn ASM-60 off, and the return all the four sections of the DIP switch to the desired positions.

Downloading New Software

After erasing the application software, you can download new software from any computer that can serve as a TFTP client.

To enable the downloading, IR-IP automatically activates its TFTP server application with the following factory-default IP parameters:

- IP address: 192.168.205.1

- Subnet mask: 255.255.255.252.

Connect the computer serving as a TFTP client to the IR-IP 10BASE-T connector in the way as a Telnet host used for preliminary configuration (see the *Performing Preliminary Configuration* section). The computer IP parameters must be configured as follows:

- IP address   192.168.205.2

- Subnet mask   255.255.255.252

- Default gateway   192.168.205.1

➤ **To download new software:**

1. If necessary, turn ASM-60 off.

2. Set all the four sections of the IR-IP DIP switch to OFF.

3. Turn ASM-60 on and monitor the ERR indicator: it must start flashing.

4. Connect the computer to the IP router LAN interface and configure its IP parameters as explained above.

5. Run a standard TFTP client application on the Telnet host, and download the appropriate software file.

   If the download is successful, IR-IP starts using the new software.

   If the downloading fails, repeat the download process.

Customer Response Form

RAD Data Communications would like your help in improving its product documentation. Please complete and return this form by mail or by fax or send us an e-mail with your comments.

Thank you for your assistance!

Manual Name: __ASM-60_____

Publication Number: __145-200-11/02_____

Please grade the manual according to the following factors:

	Excellent	Good	Fair	Poor	Very Poor
Installation instructions	❐	❐	❐	❐	❐
Operating instructions	❐	❐	❐	❐	❐
Manual organization	❐	❐	❐	❐	❐
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What did you like about the manual?

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Error Report

Type of Error(s)   ❏   Incompatibility with product

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   ❏   Regulatory information (Safety, Compliance, Warnings, etc.)

   ❏   Difficulty in finding needed information

   ❏   Missing information

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You are: ❏   Distributor

   ❏   End user

   ❏   VAR

   ❏   Other _____

Who is your distributor?   _____

Your name and company: _____

Job title: _____

Address: _____

Direct telephone number and extension: _____

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