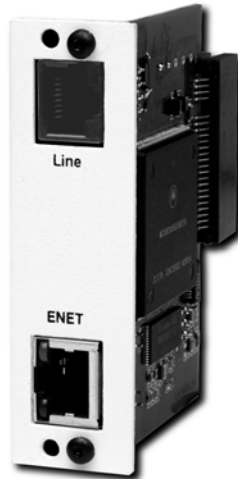


USER MANUAL

MODEL IM2RC/I-100B Ethernet Bridge Module



Part# 07MIM2RC-I100B-UM
Rev. A
Revised 11/26/10

SALES OFFICE
(301) 975-1000
TECHNICAL SUPPORT
(301) 975-1007

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1.0 WARRANTY INFORMATION

Patton Electronics warrants all Model IM2RC/I-100B components to be free from defects, and will—at our option—repair or replace the product should it fail within one year from the first date of the shipment.

This warranty is limited to defects in workmanship or materials, and does not cover customer damage, abuse or unauthorized modification. If this product fails or does not perform as warranted, your sole recourse shall be repair or replacement as described above. Under no condition shall **Patton Electronics** be liable for any damages incurred by the use of this product. These damages include, but are not limited to, the following: lost profits, lost savings and incidental or consequential damages arising from the use of or inability to use this product. **Patton Electronics** specifically disclaims all other warranties, expressed or implied, and the installation or use of this product shall be deemed an acceptance of these terms by the user.

1.1 SERVICE

All warranty and non-warranty repairs must be returned freight prepaid and insured to Patton Electronics. All returns must have a Return Materials Authorization number on the outside of the shipping container. This number may be obtained from Patton Electronics Technical Services at:

- Tel: **+1 (301) 975-1007**
- Email: **support@patton.com**
- URL: **<http://www.patton.com>**

Note Packages received without an RMA number will not be accepted.

1.2 SAFETY WHEN WORKING WITH ELECTRICITY



- Do not open the device when the power cord is connected. For systems without a power switch and without an external power adapter, line voltages are present within the device when the power cord is connected.
- For devices with an external power adapter, the power adapter shall be a listed *Limited Power Source*. The mains outlet that is utilized to power the device shall be within 10 feet (3 meters) of the device, shall be easily accessible, and protected by a circuit breaker in compliance with local regulatory requirements.
- For AC powered devices, ensure that the power cable used meets all applicable standards for the country in which it is to be installed.
- For AC powered devices which have 3 conductor power plugs (L1, L2 & GND or Hot, Neutral & Safety/Protective Ground), the wall outlet (or socket) must have an earth ground.
- For DC powered devices, ensure that the interconnecting cables are rated for proper voltage, current, anticipated temperature, flammability, and mechanical serviceability.
- WAN, LAN & PSTN ports (connections) may have hazardous voltages present regardless of whether the device is powered ON or OFF. PSTN relates to interfaces such as telephone lines, FXS, FXO, DSL, xDSL, T1, E1, ISDN, Voice, etc. These are known as “hazardous network voltages” and to avoid electric shock use caution when working near these ports. When disconnecting cables for these ports, detach the far end connection first.
- Do not work on the device or connect or disconnect cables during periods of lightning activity.



This device contains no user serviceable parts. This device can only be repaired by qualified service personnel.



This device is NOT intended nor approved for connection to the PSTN. It is intended only for connection to customer premise equipment.



Electrostatic Discharge (ESD) can damage equipment and impair electrical circuitry. It occurs when electronic printed circuit cards are improperly handled and can result in complete or intermittent failures. Do the following to prevent ESD:

- **Always follow ESD prevention procedures when removing and replacing cards.**
- **Wear an ESD-preventive wrist strap, ensuring that it makes good skin contact. Connect the clip to an unpainted surface of the chassis frame to safely channel unwanted ESD voltages to ground.**
- **To properly guard against ESD damage and shocks, the wrist strap and cord must operate effectively. If no wrist strap is available, ground yourself by touching the metal part of the chassis.**



In accordance with the requirements of council directive 2002/96/EC on Waste of Electrical and Electronic Equipment (WEEE), ensure that at end-of-life you separate this product from other waste and scrap and deliver to the WEEE collection system in your country for recycling.

2.0 GENERAL INFORMATION

Thank you for your purchase of this Patton Electronics product. This product has been thoroughly inspected and tested and is warranted for One Year parts and labor. If any questions arise during installation or use of this product, please contact Patton Electronics Technical Support at: (301) 975-1007.

2.1 FEATURES

- Installs in Patton's NetLink Rack Systems
- Provides MAC level connection between two peered Ethernet LANs
- RJ-45 line connection
- Operates transparently to higher level protocols such as TCP/IP, DECnet, NETBIOS and IPX
- PPP (RFC 1661) with Bridging Control Protocol (RFC 1638)
- No configuration necessary
- Automatically discovers, loads and deletes MAC addresses
- Modular 10/100Base-T connection (RJ-45)
- Two LED indicators: status & link integrity

2.2 DESCRIPTION

The Patton IM2RC/I-100B, Ethernet Bridge Module installs in the NetLink Rack system to provide seamless Ethernet LAN extension. The Patton IM2RC/I-100B performs the bridging function between two physically separate Ethernet LANs at the MAC level. Operation of the Patton IM2RC/I-100B is transparent to higher network level protocols such as TCP/IP, DECnet, NETBIOS and IPX. The Model IM2RC/I-100B is 802.3 compliant and supports PPP (RFC 1661) with Bridging Control Protocol (RFC 1638).

Once installed in the local Patton NetLink rack, the Patton IM2RC/I-100B works in a "plug and play" manner to forward LAN broadcasts, multicasts and frames destined for the peered Ethernet LAN at the remote end (the Patton base unit at the remote end must be equipped with an IM1/I module). Using the Patton IM2RC/I-100B in conjunction with a G.SHDSL front card (3088RC) or NTU (2701RC), peered Ethernet LANs can be linked over leased 2-wire or E1 circuits. The NTU features externally-accessible DIP switches, loopback diagnostics, SNMP/HTTP remote-management

capabilities using RocketLink Plug 'n' Play, as well as in-band management.

2.3 TYPICAL APPLICATION

The Model IM2RC/I-100B is designed to plug directly into the rear of a Patton Electronics rack card modem (i.e. Model 3088RC or 2701RC). The Model IM2RC/I-100B is designed to be used as one of a pair of units. Figure 1 (below) illustrates a typical Model IM2RC/I-100B installation.

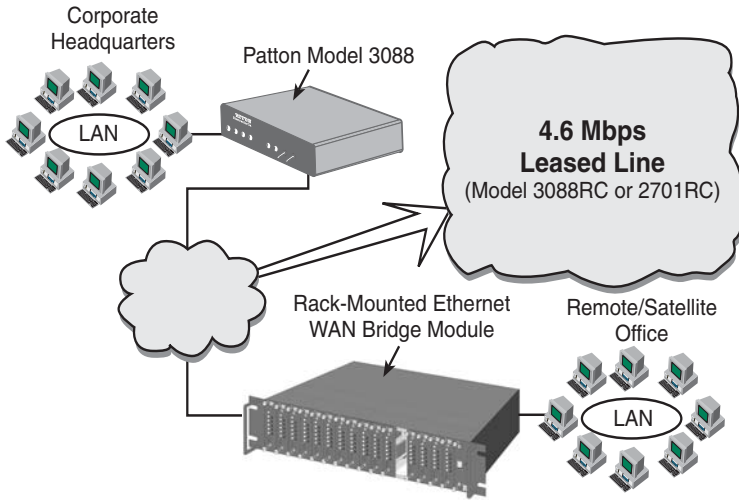


Figure 1. Typical Model IM2RC/I-100B application

3.0 PPP OPERATIONAL BACKGROUND

PPP is a protocol used for multi-plexed transport over a point-to-point link. PPP operates on all full duplex media, and is a symmetric peer-to-peer protocol, which can be broken into three main components: 1. A standard method to encapsulate datagrams over serial links; 2. A Link Control Protocol (LCP) to establish, configure, and test the data-link connection; 3. A family of Network Control Protocols (NCPs) to establish and configure different network layer protocols.

In order to establish communications over a point-to-point link, each end of the PPP link must first announce its capabilities and agree on the parameters of the link's operation. This exchange is facilitated through LCP Configure-Request packets.

Once the link has been established and optional facilities have been negotiated, PPP will attempt to establish a network protocol. PPP will use Network Control Protocol (NCP) to choose and configure one or more network layer protocols. Once each of the network layer protocols have been configured, datagrams from the established network layer protocol can be sent over the link. The link will remain configured for these communications until explicit LCP or NCP packets close the link down, or until some external event occurs.

The PPP Bridging Control Protocol (BCP), defined in RFC 1638, configures and enables/disables the bridge protocol on both ends of the point-to-point link. BCP uses the same packet exchange mechanism as the Link Control Protocol (LCP). BCP is a Network Control Protocol of PPP, bridge packets may not be exchanged until PPP has reached the network layer protocol phase.

3.1 APPLICATIONS

In situations where a routed network requires connectivity to a remote Ethernet network, the interface on router can be configured as a PPP IP Half Bridge. The serial line to the remote bridge functions as Virtual Ethernet interface, effectively bridge functions as a Virtual Ethernet interface, effectively extending the routers serial port connection to the remote network. The bridge device sends bridge packets (BPDU's) to the router's serial interface. The router will receive the layer three address information and will forward these packets based on its IP address.

Figure 2 on page 9 shows a typical Cisco router with a serial interface configured as a PPP Half Bridge. The router serial interface uses a remote device that supports PPP bridging to functions as a node on the remote Ethernet network. the serial interface on the Cisco will have an IP address on the same Ethernet subnet as the bridge.

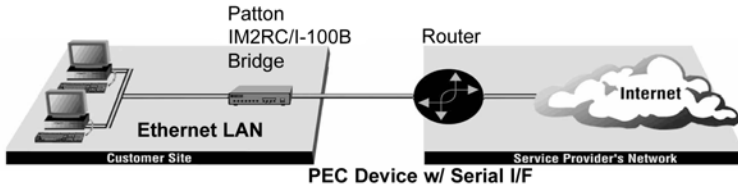


Figure 2. Cisco router with serial interface, configured as PPP Half Bridge

For example, the customer site is assigned the addresses 192.168.1.1 through 192.168.1.254. The address 192.168.1.1 is also the default gateway for the remote network. The above settings remove any routing/forwarding intelligence from the CPE. The associated Cisco configuration will set serial interface (s0) to accommodate half bridging for the above example.

Authentication is optional under PPP. In a point-to-point leased-line link, incoming customer facilities are usually fixed in nature, therefore authentication is generally not required. The IM2RC/I-100B does not require authentication. It also does not respond to authentication requests.

Some networking systems do not define network numbers in packets sent out over a network. If a packet does not have a specific destination network number, a router will assume that the packet is set up for the local segment and will not forward it to any other sub-network. However, in cases where two devices need to communicate over the wide-area, bridging can be used to transport non-routable protocols.

Figure 3 illustrates transparent bridging between two routers over a serial interface (s0). Bridging will occur between the two Ethernet Interfaces on Router A (e0 and e1) and the two Ethernet Interfaces on Router B (e0 and e1).

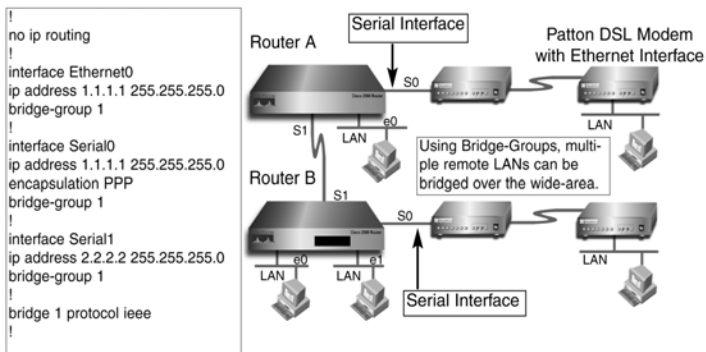


Figure 3. Transparent bridging between two routers over a serial link.

4.0 CONFIGURATION

The Model IM2RC/I-100B module plugs into Patton's 3088RC and 2701RC modems to provide Ethernet LAN extension. The IM2RC/I-100B has no switches or jumpers and does not need to be configured. However, factors such as the type of medium, throughput across the link and clocking mode must be determined by the settings of the baseband modems. Please refer to your baseband modem (i.e. 3088RC and 2701RC) to make the following settings.

1. **Bit Rate:** The DTE rate setting of your base unit corresponds to the throughput of your IM2RC/I-100B bridge module. Use higher speeds to allow maximum throughput to your extended LAN. Use lower speeds to limit the access of your extended LAN.

Note The IM2RC/I-100B only supports synchronous speeds.

2. **Clocking Mode:** Set the clocking modes on the base units so that one unit is configured for Internal clocking mode and the other unit is set for Receive Recover clocking mode.

BASE UNIT CLOCK MODES	
Unit "A"	Unit "B"
Internal Clock Setting	Receive/Recover Clock Setting
Note Unit "A" and Unit "B" are arbitrarily chosen. It does not matter which unit is "A", and which is "B".	

3. When using the IM2RC/I-100B, DISABLE, the "Enable Loop from DTE" Switch on the front function card (3088RC or 2701RC).
4. All other base unit settings depend upon your application and on the application medium (twisted pair or coaxial cable).

4.1 CONNECTING THE INTERFACE DRIVER BOARD

This package contains an interface driver board that allows you to configure your front function card for ethernet operation. Figure 4 shows the Interface Driver Board connected to a Model 2701RC front function card.

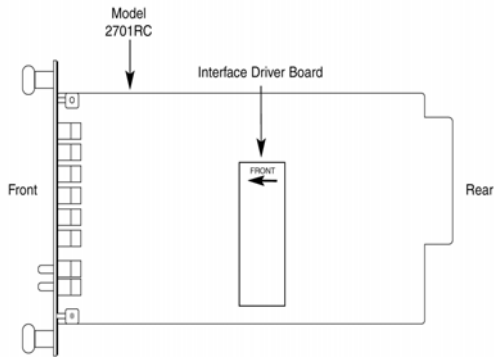


Figure 4. Model IM2RC/I-100B Driver Board mounted on Model 2701RC

Follow the instructions below to connect the interface driver board to the front function card:

1. With the function card (such as 2701RC, shown above) pulled out of the NetLink rack or clusterbox chassis, locate the driver board to be replaced on the top of the base unit front card.
2. Lift the old interface board gently off of the printed circuit board.
3. Position the IM2RC/I-100B driver board on top of the function card's pc board with the sockets oriented toward the male pins. Please be sure the label marked **FRONT** ← is pointed toward the front of the function card (toward the LEDs).
4. Push the Interface Driver Board gently onto the socket and re-install the function card into the rack or cluster system.

5.0 INSTALLATION

This section describes the NetLink Model 1001R14 rack chassis. Included are installation instructions for the IM2RC/I-100B rear card, plus ethernet and line interface connections to the IM2RC/I-100B card. Please refer to the appropriate function card (i.e. 3088RC) user manual to configure and install the function card.

5.1 THE MODEL 1001R14 RACK CHASSIS

The Model 1001R14 Rack Chassis (Figure 5) has fourteen short range modem card slots, plus its own power supply. Measuring only 3.5" high, the Model 1001R14 is designed to occupy only 2U in a 19" rack. Sturdy front handles allow the Model 1001R14 to be extracted and transported conveniently.

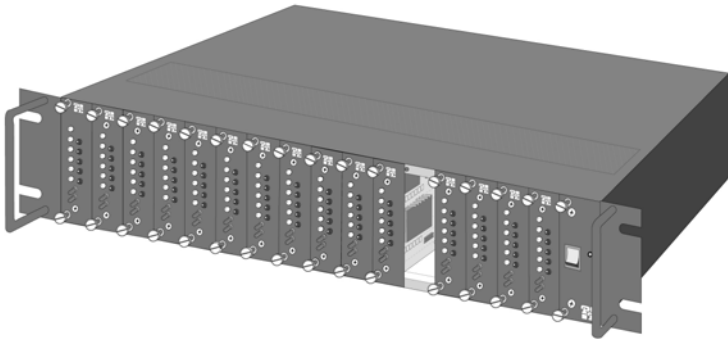


Figure 5. Model 1001R14 Rack Chassis with power supply

The Rack Power Supply

The Patton NetLink rack system is designed to allow single or redundant (dual) power supplies. Using the same mid-plane architecture as the function/rear cards, the front function card and the power supply slide in from the front, while the rear card and power entry modules slide in from the rear. They plug into one another in the middle of the rack. The front card is then secured by thumb screws and the rear card by conventional metal screws..



There are no user-serviceable parts in the power supply section of the Model 1001R14. Voltage setting changes and fuse replacement should only be performed by qualified service personnel. Contact Patton Electronics Technical support at (301) 975-1007 for more information.

5.2 INSTALLING THE REAR IM2RC/I-100B CARD AND FRONT FUNCTION CARD

The Model IM2RC/I-100B is a rear-mountable ethernet interface card that works with Patton Models 3088RC and 2701RC access products. The two cards meet inside the rack chassis and plug into each other by way of mating 50 pin card edge connectors. Use the following steps as a guideline for installing each Model IM2RC/I-100B and its function card mate into the rack chassis:



The IM2RC/I-100B card contains sensitive integrated circuitry. Failure to ground yourself during installation may result in damage to the IM2RC/I-100B-100B card or the front function card.

1. Slide the IM2RC/I-100B rear card into the back of the chassis along the metal rails provided.
2. Secure the IM2RC/I-100B rear card using the metal screws provided.
3. Slide the front function card into the front of the chassis. It should meet the IM2RC/I-100B rear card when it is almost all the way into the chassis.
4. Push the front card gently into the card-edge receptacle of the rear card. It should “click” into place.
5. Secure the front card using the thumb screws.

5.3 CONNECTING TO THE 10/100BASE-T ETHERNET PORT

The Model IM2RC/I-100B provides line side connections through a terminal block or through a RJ-45 connector. Figure 6 below shows the rear panel and the locations of the connectors.

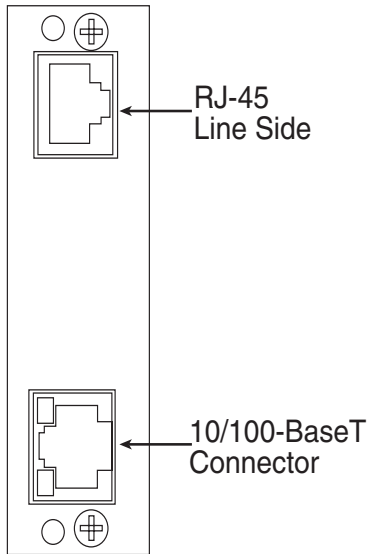


Figure 6. IM2RC/I-100B Rear Panel

The IM2RC/I-100B Ethernet interface is designed to connect directly to a 10/100Base-T network. Figure 7 shows the signal/pin relationships on this interface. You may connect this port to a hub or PC using a straight through or crossover cable that is up to 330 feet long.

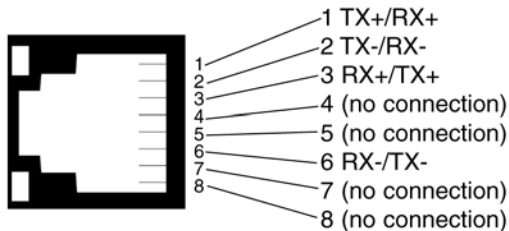


Figure 7. IM2RC/I-100B Ethernet Connector Pinout

5.4 CONNECTING THE LINE INTERFACE

The Model IM2RC/I-100B is to be used with Patton function card access products (i.e. 3088RC) There are two essential requirements for connecting the line interface on Model IM2RC/I-100B:

1. These units work in pairs with one IM2RC/I-100B connected to another IM2RC/I-100B over 2 or 4-Wire Twisted pair (2 or 4-Wire operation is determined by the front function card).
2. To function properly, the Model IM2RC/I-100B needs one or two twisted pairs of metallic wire (two or four wire). The twisted pairs must be unconditioned, dry, metallic wire, between 19 (.9mm) and 26 AWG (.4mm) (Appendix B describes cable requirements). Standard dial-up telephone circuits, or leased circuits that run through signal equalization equipment, or standard, flat modular telephone type cable, are not acceptable.

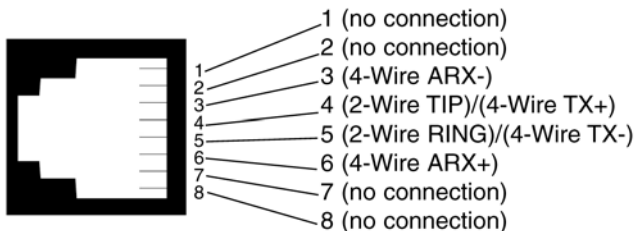


Figure 8. RJ-45 Line Interface

Note Two-wire modems use RJ-45 pins 4 and 5 and 4-wire modems use RJ-45 pins 3, 4, 5 and 6, as shown above. Refer to the Function Card User Manual for more details.

6.0 OPERATION

Once the Model IM2RC/I-100B is installed, it should operate transparently. The following sections describes the power-up, general operating instructions, and the LED status monitors.

6.1 OPERATING INSTRUCTIONS

In order to operate, the Model IM2RC/I-100B must be installed in the rack unit. It also requires a 10/100Base-T connection. After power is applied, the IM2RC/I-100B automatically starts performing the bridging function without further user intervention. MAC addresses discovered are automatically loaded into the MAC address table. They are automatically deleted from the MAC address table if they experience an inactivity of 8 minutes.

6.2 POWER-UP

The Model IM2RC/I-100B is a hot-swappable rear card that receives power from the NetLink rack power bus. Therefore, it is powered up as soon it is plugged into the rack and the rack power supply is turned on.

6.3 LED STATUS MONITORS

The Model IM2RC/I-100B features two LEDs that monitor the link and activity status of the 10/100BaseT interface. Figure 9 (below) shows the LEDs located directly beneath the RJ-45 jack.

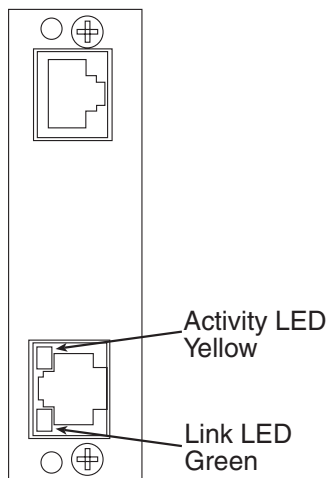


Figure 9. IM2RC/I-100B Rear Panel, LED Locations

APPENDIX A

SPECIFICATIONS

A.1 LAN CONNECTION

RJ-45, 10/100Base-T, 802.3af Ethernet

A.2 LINE CONNECTION

RJ-45, female connector

A.3 PROTOCOL

PPP (RFC 1661) with Bridging Control Protocol (RFC3518)

A.4 MAC ADDRESS AGING

MAC addresses deleted after 6 minutes inactivity

A.5 ON-BOARD MEMORY

128MB DDR2 SDRAM; 16MB FLASH

A.6 INTERFACE

Card-edge connection to Patton modems

A.7 LED INDICATORS

(1) general status; (1) link integrity

A.8 POWER CONSUMPTION

200mA @ 12VDC, supplied by chassis power supply

A.9 TEMPERATURE RANGE

32 to 122°F (0 to 50° C)

A.10 DIMENSIONS

2.04" x 3.24" (5.2 mm x 8.26 mm)

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