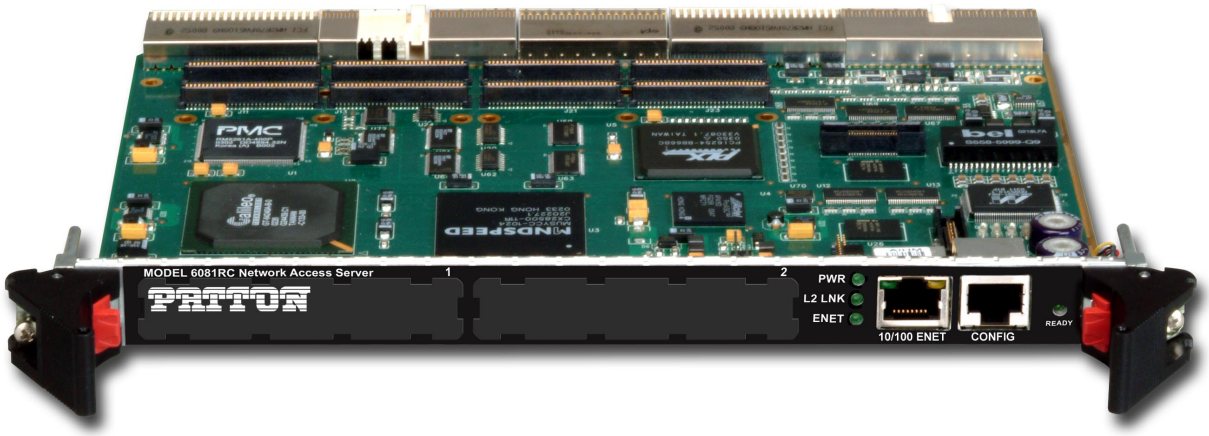
PATTON Electronics Co.

Model 6081RC
EdgeRoute Network Access Server

Getting Started Guide



Sales Office: **+1 (301) 975-1000**
Technical Support: **+1 (301) 975-1007**
E-mail: **support@patton.com**
WWW: **www.patton.com**

Document Number: **13402U1-001 Rev. C**
Part Number: **07MD6081RC-GS**
Revised: **October 31, 2005**

Patton Electronics Company, Inc.
7622 Rickenbacker Drive
Gaithersburg, MD 20879 USA
Tel: +1 (301) 975-1000
Fax: +1 (301) 869-9293
Support: +1 (301) 975-1007
Web: www.patton.com
E-mail: support@patton.com

Summary Table of Contents

1 Model 6081RC overview 13
2 Hardware installation 22
3 Initial configuration of the Model 6081RC 30
4 Configuring Ethernet ports 39
5 H.110 port configuration 43
6 PPP configuration 49
7 VLAN configuration 58
8 Configuring for bridged Ethernet applications 61
9 Operation and shutdown 74
10 Troubleshooting and maintenance 76
11 Contacting Patton for assistance 84
A Compliance information 87

Table of Contents

Summary Table of Contents **3**
Table of Contents **4**
List of Figures **7**
List of Tables **9**
About this guide **10**
Audience 10
Structure 10
Precautions 11
Typographical conventions used in this document 11
General conventions 11
Mouse conventions 12
1 Model 6081RC overview **13**
Introduction 14
Product overview 14
Hardware overview 16
LAN Ethernet port 18
Packet switched Ethernet bus (PSB) 18
Backplane Ethernet interfaces 18
RS-232 control port 19
Power system 19
Central processing unit 19
Temperature 19
Altitude 19
Humidity 19
Physical dimensions 19
Management services 20
LED display 21
2 Hardware installation **22**
Introduction 23
Unpacking the Model 6081RC 23
Installing the PMC Ethernet Access Module onto the 6081RC front blade 24
Model 6081RC blades installation 25
Cable installation 27
Connecting the Ethernet ports 27
Connecting the 10/100Base-T Ethernet port to an Ethernet switch or hub 28
Connecting the 10/100Base-T Ethernet port to an Ethernet-capable workstation or PC 28
Connecting the EIA-561 RS-232 configuration port (DCE configured) 29
Completing the hardware installation 29

3 Initial configuration of the Model 6081RC 30
Introduction 31
Configuration prerequisites 31
Initial configuration through the RS-232 control port 31
Connecting the DB9-RJ45 adapter with the included cable 31
Setting up the HyperTerminal (or similar program) session 32
IP address modification 34
Web operation and configuration 35
PC configuration 36
Using a browser to complete Model 6081RC configuration 36
Displaying the 6081RC web administration pages 36

4 Configuring Ethernet ports 39
Introduction 40
Ethernet interface configuration 40
Optional Fast-Ethernet PMC Module for the 6081RC Front Module 40
IP address configuration 42

5 H.110 port configuration 43
Introduction 44
Defining H.110 channels 45
Defining H.110 ports, timeslots, and direction 46

6 PPP configuration 49
Introduction 50
Bridged PPP configuration 50
Creating a bridge group 50
PPP channel configuration 53
Interface Configuration 55

7 VLAN configuration 58
Introduction 59
Attaching a VLAN ID to an Ethernet interface 59
Attaching a bridge interface to a VLAN module 60

8 Configuring for bridged Ethernet applications 61
Introduction 62
Bridged Ethernet operation 62
Basic assumptions 63
Defaults settings 63
CPE configuration 63
Initiating bridged Ethernet data communications 64
Configuring the 6081RC for bridging application 64
H.110 channel configuration 65
Defining H.110 channels 65
Configuring channel parameters 66
Bridge group configuration 68

Defining a bridge group 69
Configuring bridge group parameters 70
PPP channel configuration 70
Interface configuration 72

9 Operation and shutdown 74
Introduction 75
Activating the Model 6081RC 75
De-activating the Model 6081RC 75

10 Troubleshooting and maintenance 76
Introduction 77
Fault analysis 78
Periodic maintenance 78
Calibration 78
Maintenance 79
Replacing the Model 6081RC 79
Exporting the current Model 6081RC configuration 79
Removing the defective Model 6081RC 81
Installing the replacement Model 6081RC 82
Importing a saved configuration 82
Completing the installation 82

11 Contacting Patton for assistance 84
Introduction 85
Contact information 85
Warranty Service and Returned Merchandise Authorizations (RMAs) 85
Warranty coverage 85
Out-of-warranty service 85
Returns for credit 85
Return for credit policy 86
RMA numbers 86
Shipping instructions 86

A Compliance information 87
Compliance 88
Radio and TV interference 88
CE notice (Declaration of Conformity) 88

List of Figures

1 Model 6081RC EdgeRoute Network Access Router . . . 14
2 Model 6081RC front panel . . . 17
3 Model 6081RC Ethernet port LEDs . . . 18
4 Model 6081RC LEDs . . . 20
5 Installing the PMC card . . . 24
6 Alignment/ESD pin and card handle . . . 26
7 Model 6081RC network and configuration ports . . . 27
8 Ethernet RJ-45 pin and signal definitions for Model 6081RC . . . 28
9 Cross-over RJ-45-to-RJ-45 Ethernet cable diagram . . . 28
10 DB-9-to-RJ-45 cable diagram . . . 29
11 Model 6081RC interface ports . . . 32
12 Connection Description window . . . 32
13 Connect To window . . . 33
14 COM1 Properties window . . . 33
15 Terminal keys configuration . . . 34
16 6081RC Configuration Menu home page . . . 37
17 HOME page window panes . . . 37
18 Immediate Actions buttons . . . 38
19 Physical Ethernet Ports page . . . 41
20 Interface Configuration page . . . 42
21 Diagram of Model 6081RC and mid-plane . . . 44
22 H.110 port correspondence and direction . . . 45
23 H110 Channel Configuration page . . . 45
24 H110 Channel Configuration page showing new channel . . . 46
25 Channel timeslot mapping page . . . 46
26 H.110 Settings page showing map information for new channel . . . 48
27 Bridge Configuration page . . . 51
28 Bridge Configuration page showing new bridge . . . 51
29 Bridge 2 Configuration page . . . 52
30 PPP Configuration page . . . 53
31 PPP Options page . . . 54
32 PPP Status page . . . 55
33 Interface Configuration page showing Interface menu contents . . . 55
34 Interface Configuration page . . . 56
35 IP Address Configuration section of the Interface Configuration page . . . 56
36 VLAN connection diagram . . . 59
37 VLAN (802.1Q) Configuration page . . . 59
38 Configured VLAN Interfaces section of VLAN (802.1Q) Configuration page . . . 60
39 Interface page . . . 60
40 Bridged Ethernet operation diagram . . . 62
41 H110 Channel Configuration page . . . 65
42 H110 Channel Configuration page showing new channel . . . 66
43 Channel timeslot mapping page . . . 66
44 H.110 port correspondence and direction . . . 67
45 H.110 Settings page showing map information for new channel . . . 68
46 H110 Channel Configuration page showing new channel . . . 68
47 Bridge Configuration page . . . 69

48 Bridge Configuration page showing new bridge 69
49 Bridge 2 Configuration page 70
50 PPP Configuration page 70
51 PPP Options page 71
52 PPP Status page 71
53 Interface Configuration page 72
54 IP Address Configuration section of the Interface Configuration page 73
55 Import & Export Configuration page 79
56 Example Network Access Router flash memory configuration file displayed in a browser 80
57 Saving the access server flash memory configuration data as a text file 81

List of Tables

1 General conventions 11
2 Mouse conventions 12
3 LED definitions 21
4 Symptoms 77
5 LED definitions 78

About this guide

This guide describes installing and configuring a Patton Electronics Model 6081RC EdgeRoute Network Access Router. By the time you are finished with this guide, your Network Access Router will be ready to accept routing or bridgin configurations. The instructions in this guide are based on the following assumptions:

- The Model 6081RC will be installed in a Patton ForeFront chassis
- There is a LAN connected to the Ethernet port of the Network Access Router
- There are function cards (i.e. 3096RC, 3196RC, 2616RC, etc.) already installed in the ForeFront chassis

Audience

This guide is intended for the following users:

- Operators
- Installers
- Maintenance technicians

Structure

This guide contains the following chapters and appendices:

- Chapter 1 describes the Model 6081RC Network Access Router
- Chapter 2 describes installing the Model 6081RC hardware
- Chapter 3 describes initial Model 6081RC configuration
- Chapter 4 describes how to configure the Model 6081RC Ethernet ports
- Chapter 5 describes how to configure the H.110 port
- Chapter 6 describes how to configure PPP channels
- Chapter 7 describes how to configure VLAN connections
- Chapter 8 describes how to configure for bridged Ethernet applications
- Chapter 9 details how to power up and deactivate the Model 6081RC
- Chapter 10 contains troubleshooting and maintenance information
- Chapter 11 contains information on contacting Patton technical support for assistance
- Appendix A lists compliance information

For best results, read the contents of this guide *before* you install the Model 6081RC.

Precautions

Notes and cautions, which have the following meanings, are used throughout this guide to help you become aware of potential Model 6081RC problems. *Warnings* relate to personal injury issues, and *Cautions* refer to potential property damage.

Note Calls attention to important information.

The shock hazard symbol and WARNING heading indicate a potential electric shock hazard. Strictly follow the warning instructions to avoid injury caused by electric shock.

The alert symbol and WARNING heading indicate a potential safety hazard. Strictly follow the warning instructions to avoid personal injury.

The shock hazard symbol and CAUTION heading indicate a potential electric shock hazard. Strictly follow the instructions to avoid property damage caused by electric shock.

The alert symbol and CAUTION heading indicate a potential hazard. Strictly follow the instructions to avoid property damage.

Typographical conventions used in this document

This section describes the typographical conventions and terms used in this guide.

General conventions

The procedures described in this manual use the following text conventions:

Table 1. General conventions

Convention	Meaning
Garamond blue type	Indicates a cross-reference hyperlink that points to a figure, graphic, table, or section heading. Clicking on the hyperlink jumps you to the reference. When you have finished reviewing the reference, click on the **Go to Previous View** button in the Adobe® Acrobat® Reader toolbar to return to your starting point.
Futura bold type	Indicates the names of menu bar options.
Italicized Futura type	Indicates the names of options on pull-down menus.
Futura type	Indicates the names of fields or windows.
Garamond bold type	Indicates the names of command buttons that execute an action.

Table 1. General conventions

Convention	Meaning
< >	Angle brackets indicate function and keyboard keys, such as **<Shift>**, **<Ctrl>**, **<C>**, and so on.
`Are you ready?`	All system messages and prompts appear in the `Courier` font as the system would display them.
`% dir *.*`	Bold Courier font indicates where the operator must type a response or command

Mouse conventions

The following conventions are used when describing mouse actions:

Table 2. Mouse conventions

Convention	Meaning
Left mouse button	This button refers to the primary or leftmost mouse button (unless you have changed the default configuration).
Right mouse button	This button refers the secondary or rightmost mouse button (unless you have changed the default configuration).
Point	This word means to move the mouse in such a way that the tip of the pointing arrow on the screen ends up resting at the desired location.
Click	Means to quickly press and release the left or right mouse button (as instructed in the procedure). Make sure you do not move the mouse pointer while clicking a mouse button.
Double-click	Means to press and release the same mouse button two times quickly
Drag	This word means to point the arrow and then hold down the left or right mouse button (as instructed in the procedure) as you move the mouse to a new location. When you have moved the mouse pointer to the desired location, you can release the mouse button.

Chapter 1 Model 6081RC overview

Chapter contents

Introduction 14
Product overview 14
Hardware overview 16
- LAN Ethernet port 18
- Packet switched Ethernet bus (PSB) 18
- Backplane Ethernet interfaces 18
- RS-232 control port 19
- Power system 19
- Central processing unit 19
- Temperature 19
- Altitude 19
- Humidity 19
- Physical dimensions 19
- Management services 20
- LED display 21

Introduction

The Model 6081RC Network Access Router (see figure 1) is a MIPS-based processor blade for the ForeFront Access Infrastructure System (AIS). With hardware and software features optimized for Layer-2/Layer-3 networking, the 6081RC enables the AIS to deliver IP as an access infrastructure element as well as support the delivery of advanced broadband IP services and applications.

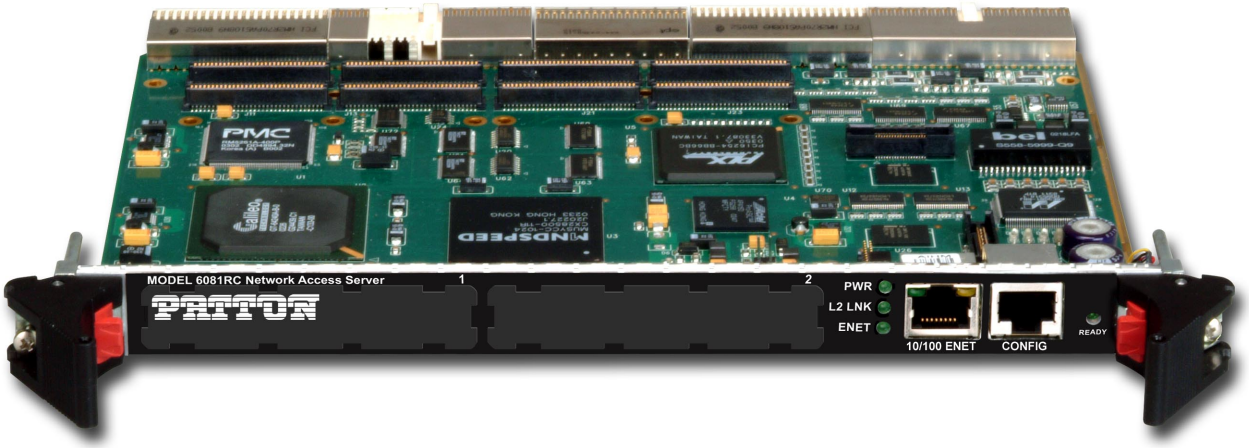


Figure 1. Model 6081RC EdgeRoute Network Access Router

When installed into the 2U, 4U, or 6U ForeFront chassis, the Model 6081RC adds IP routing and access services to installed interfaces, such as xDSL, T1/E1, and STM ports. With the addition of data termination packages, as well as select edge services packages (e.g. DNS), the Model 6081RC provides full-featured ipDSLAM functionality to any ForeFront system.

The Model 6081RC preserves legacy TDM services while providing Layer-2/Layer-3 services. TDM data communications can operate seamlessly within the same hardware, the same chassis, even over the same wired infrastructure.

Product overview

The Model 6081RC is a frame and service edge-routing resource that provides access-to-edge, packet-based services for IP termination; forwarding; and frame services within a ForeFront AIS chassis. Ideal for use by service providers, the Model 6081RC provides:

- Aggregation for customer DSL/T1/E1 to framed network services, including Ethernet bridging and VLAN v1 and v2
- IP routing and forwarding (including complete RIPV2 and OSPF)
- IP access services (including QoS class-based queuing, NAT, and firewall)

The Model 6081RC interfaces to ForeFront line cards via the TDM chassis. The 6081RC processes packets at 45k packets per second (pps). The main differences based on the processor chosen. With access to *all* 4,096 DS0s the 6081RC allows up to 2,048 discreet full-duplex data connections from a single card.

Network connections may come from any number of ForeFront interfaces. The 6018RC allows any resource card within ForeFront to deliver TDM *and* IP/packet services on a DS0-by-DS0, connection-by-connection basis.

The ForeFront system with the 6081RC allows:

- *Any* DSL or T1/E1 port to deliver IP access
- This access can be offered *simultaneously* with other TDM services
- This access can be on the same DSL or T1/E1 link as the same time

Leveraging ForeFront's any-to-any architecture packet services expands the scope of services from a single installed system. Providers can now use ForeFront for simultaneous TDM/leased-line and packet service delivery. The smart carrier today wishes to incorporate IP/L2/L3 services as an infrastructure element into their service offering. Based on the foundation of intelligent TDM switching and integrated DACsing, the Patton ForeFront architecture is highlighted by the following key features:

- Any DS0 level timeslot can be used for either TDM or IP Accesses. This is operator selectable and not limited by a module, external equipment, or backplane capabilities.
- Access to any DS0 is completely non-blocking. In other words, you are not limited to a specific data path/backplane, service selection based on the capabilities of a module, or it's location within a shelf.
- Delivery using Integrated wires through the use of the standard and integrated DACS. Now, both TDM and IP can be offered on the same DSL, E1, or STM/VC12 ports at the same time. For example, using the Patton 3086 IAD, you can deliver nx64kbps for TDM access and select the remaining bandwidth for Packet access. Both services can run at the same time over the same port and terminate at the customer premise in a single low-cost unit.
- Local network based and processing and termination. We continue legacy TDM services without disruption, but add value-added protocol internetworking to those TDM applications.

The 6081RC connects directly to all channels (4,096) on the H.110 bus and is agnostic to the line interface method. The current set of compatible ForeFront resources which interface to the 6081RC include:

- 3096RC G.SHDSL 16 port, 64-kbps–4.6 Mbps, 2-wire access
- 3196RC iDSL 16 port, 64/128/144-kbps, 2-wire access
- 2616RC T1/E1 DACs bulk DS0 cross-connecting
- 6511RC STM-1 (63 E1s, 84 T1s per connection)

Since the 6081RC can go into any of the available slots processing and routing/switching power can be increased by simply adding more cards to a system. The following tables indicates the number of 6081RCs that can placed into a single chassis:

Chassis	Card support	Aggregate packet processing
Model 6276 (2U)	Supports up to 4 6081RC	400K pps
Model 6476 (4U)	Supports up to 8 6081RC	800K pps
Model 6676 (6U)	Supports up to 17 6081RC	1.7M pps

The 6081RC's applications give life to the hardware features of the 6081RC. Details of the software applications are indicated in the section 6081RC IP Access Server Functionality.

- PPP Bridging and Routing
- VLAN Ethernet Support
- OSPF/RIPv1 and v2 and static routing
- SNMPv1,2,3
- RADIUS AAA Client
- HTTP/web for management
- Apache HTTP/WEB
- NTP Network Time
- Syslog

Additionally, new applications such as L2TP, IPSEC, and MPLS will be added in releases subsequent releases.

The HTTP WEB GUI provides for easy configuration, provisioning, and management. Full SNMP control of the device allows standardized OSS configuration and provisioning when used with an external FCAPS NMS.

Using SNMP management, the 6081RC is fully configured, managed and monitored via Patton's ForeSight EMS solutions. With ForeSight, a Graphical User Interface provides an intuitive, real-life representation of all installed ForeFront equipment and enables network managers to control and monitor device functions, port settings and receive device status information and statistics via SNMP. Features include management, a routable configuration utility, SNMP trap manager, device autoscan, automatic configuration and device firmware downloads and more. The user and NMS have full remote control for provisioning, alarms, accounting, and security.

Hardware overview

- 6U single-slot card
- MIPS64 CPU (400-MHz RM5261A)
- 128 Mbytes of RAM
- 32 Mbytes or 64 Mbytes of Flash memory
- Capacitor-backed real-time clock with two week's duration of standby power
- 16 kbytes of non-volatile data storage in EEPROM

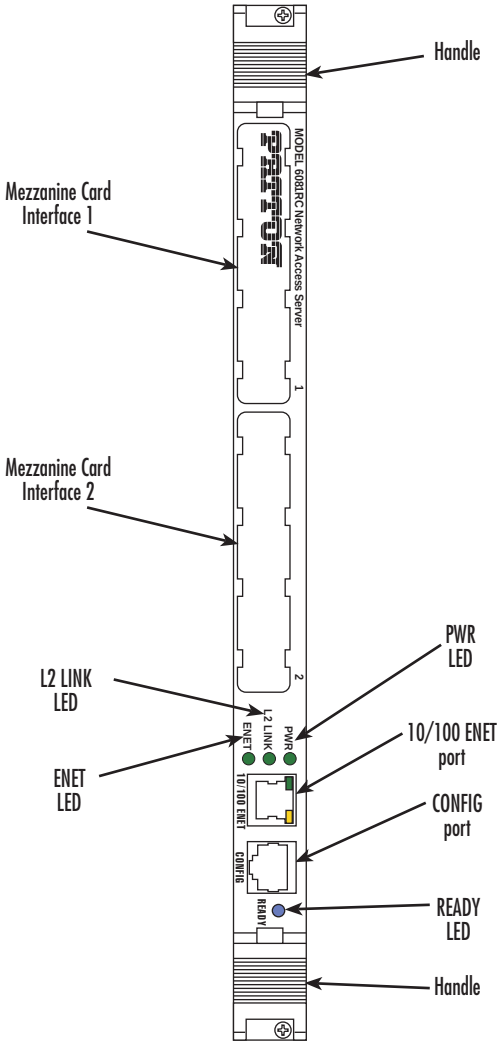


Figure 2. Model 6081RC front panel

- One front panel 10/100Mbps Ethernet port (see figure 2) with two LEDs
- One front-panel RS232 console port (see figure 2)
- Three front-panel LEDs (see figure 2)
- Two packet switch buss 10/100 Mbps Ethernet ports
- Optional full termination of TDM chassis bus into 1024-channel HDLC controller
- Hot-swap support

LAN Ethernet port

Front panel 10/100-Mbps Ethernet LAN port labeled *ENET (ETH0)* is presented on a RJ-45 connector with an auto-sensing/full-duplex 10Base-T or 100Base-T interface. Also included are:

- 100Base-TX half-/full-duplex operation (100 + 100)
- 10Base-T half-/full-duplex operation (10 + 10)
- Auto negotiation and fallback
- 10/100 Mbps link and status indicators on the RJ-45 connector
- Two LEDs per port (see figure 3): link/traffic LED (solid green when link is established; flashing green when the port has traffic) and 10/100 Mbps LED (solid yellow at 100 Mbps; off at 10 Mbps)

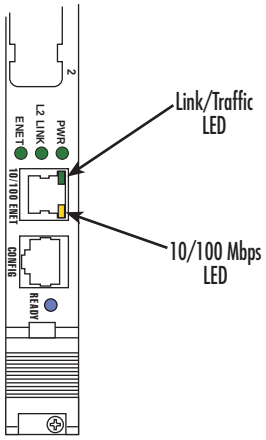


Figure 3. Model 6081RC Ethernet port LEDs

Packet switched Ethernet bus (PSB)

- Two internal Ethernet buses connecting over the mid-plane for intercard communication within the chassis (or chassis segments of the Model 6676)
- Hash-table-based address filtering for up to 8k MAC addresses, unicast and multicast
- Wire-speed DMA transfer of entire MAC frame to system memory

Backplane Ethernet interfaces

- Two internal Ethernet ports connecting to backplane for intercard communication
- Auto-sensing full/half-duplex 10Base-T/100Base-TX operation, IEEE 802.3 compliant
- Hash-table-based address filtering for up to 8k MAC addresses, unicast and multicast
- Wire-speed DMA transfer of entire MAC frame to system memory

- Two LEDs per port (see figure 3): link/traffic LED (solid green when link is established; flashing green when the port has traffic) and 10/100 Mbps LED (solid yellow at 100 Mbps; off at 10 Mbps)

Note When the Fast-Ethernet PMC module (part number PEC1/FENET/2/TX) is installed in PMC slot 2, you may redirect one or both internal Ethernet ports B and C to the front-panel RJ-45 connectors B and C (See section "Ethernet interface configuration" on page 40). Redirecting an Ethernet port to the front panel disables the backplane interface for that port.

RS-232 control port

The RS-232 port provides for initial configuration of the Model 6081RC's IP and gateway addresses. The RS-232 port supports:

- Asynchronous data rates of 19.2 kbps, 8 data bits, no parity, 1 stop bit.
- An RJ-45 connector with EIA-561 pinouts
- A management interface that supports VT-100 terminals
- Hardware flow control (RTS and CTS)

Power system

The Model 6081RC is powered internally by the ForeFront chassis power system.

Central processing unit

Model 6081RC CPU processing power and memory are listed in the following table:

Model	Processor	Memory	Throughput[a]
6081RC/400	RM5261A processor, 400MHz.	128Mb RAM, 32 Mb Flash	45 kpps

a. Packets per second routing without filtering and QoS

Temperature

32 to 104°F (0 to 40°C)

Altitude

Maximum operating altitude: 15,000 feet (4,752 meters)

Humidity

5 to 90% relative humidity (RH), non-condensing

Physical dimensions

- 1.75 inches (4.44 cm) height, standard 19-inch (48.26 cm) width, 12-inch (30.48 cm) depth
- Weight: 1.5 lbs (0.7 kg)

Management services

- Out-of-band RS-232 configuration port for management and control
- SNMP version 1,2,3 MIB II configuration management
- SYSLOG client
- Remote software upgrade via FTP
- Built-in HTTP server for complete configuration and control using a standard WWW browser

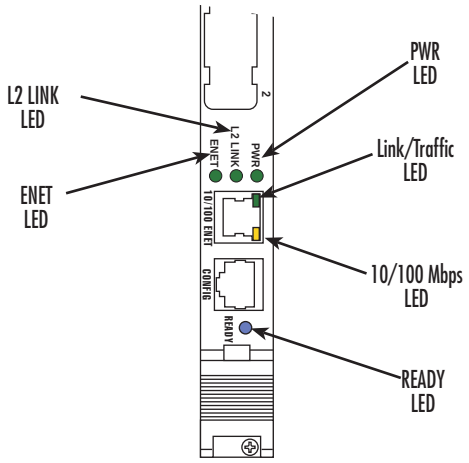


Figure 4. Model 6081RC LEDs

LED display

Front panel LEDs (see figure 4) display the status of the power system, layer-2 link, the Ethernet LAN port, power, and the alarms. The LEDs are described in table 3.

Table 3. LED definitions

LED	Color	Status	Meaning
PWR	Green	On solid	Power is being applied.
		Flashing	The 6081RC is in boot-up sequence.
		Off	No input power is being applied.
L2 LINK (Layer 2 Link)	Green	Flashing	The 6081RC is operating properly.
		Off	Link has not been established.
ENET	Green	On solid	Indicates at least one of three Ethernet ports is active
		Off	None of the Ethernet ports is active
Link/traffic (front panel ENET port)	Green	On solid	Link is established
		Flashing	The port has traffic.
		Off	Link has not been established.
10/100 Mbps (front panel ENET port)	Yellow	On solid	Port is operating at 100 Mbps
		Off	Port is operating at 10 Mbps
READY	Blue	On	Card ready for removal from ForeFront chassis.
		Off	Card not ready for removal from ForeFront chassis.

Chapter 2 Hardware installation

Chapter contents

Introduction 23
Unpacking the Model 6081RC 23
Installing the PMC Ethernet Access Module onto the 6081RC front blade 24
Model 6081RC blades installation 25
Cable installation 27
Connecting the Ethernet ports 27
Connecting the 10/100Base-T Ethernet port to an Ethernet switch or hub 28
Connecting the 10/100Base-T Ethernet port to an Ethernet-capable workstation or PC 28
Connecting the EIA-561 RS-232 configuration port (DCE configured) 29
Completing the hardware installation 29

Introduction

This chapter contains the following procedures for installing the Model 6081RC:

- "Unpacking the Model 6081RC"—lists the contents in the 6081RC shipping container
- "Model 6081RC blades installation"—describes installing the Network Access Router in a ForeFront chassis
- "Cable installation" on page 27—describes installing network interface and terminal cables
- "Completing the hardware installation" on page 29—describes testing the 6081RC hardware to verify that it is ready for software configuration

Unpacking the Model 6081RC

Inspect the shipping carton for external damage. Note any damage before removing the container contents. Report equipment damage to the shipping carrier immediately for claim purposes. Save all packing materials in case you need to return an item to the factory for servicing.

The Model 6081RC comes with the following items:

- The Model 6081RC rack card unit
- One RJ45-to-RJ45 cable for use with the console and Ethernet ports
- A DB9-RJ45 (EIA-561) adapter for connecting a PC's serial port to the 6081RC console port
- CD-ROM containing product literature, the *Model 6081RC EdgeRoute Network Access Router Getting Started Guide.*

Installing the PMC Ethernet Access Module onto the 6081RC front blade

You may purchase an optional PMC Ethernet Access Module for the Model 6081RC. The PMC Ethernet Access Module may be factory installed, or you may order it separately for installation in the field. The Model 6081RC has two PMC expansion slots, numbered 1 and 2 (see figure 5). The PMC Ethernet Access Module must only be installed in PMC slot 2, ***do not install it in PMC slot 1***.

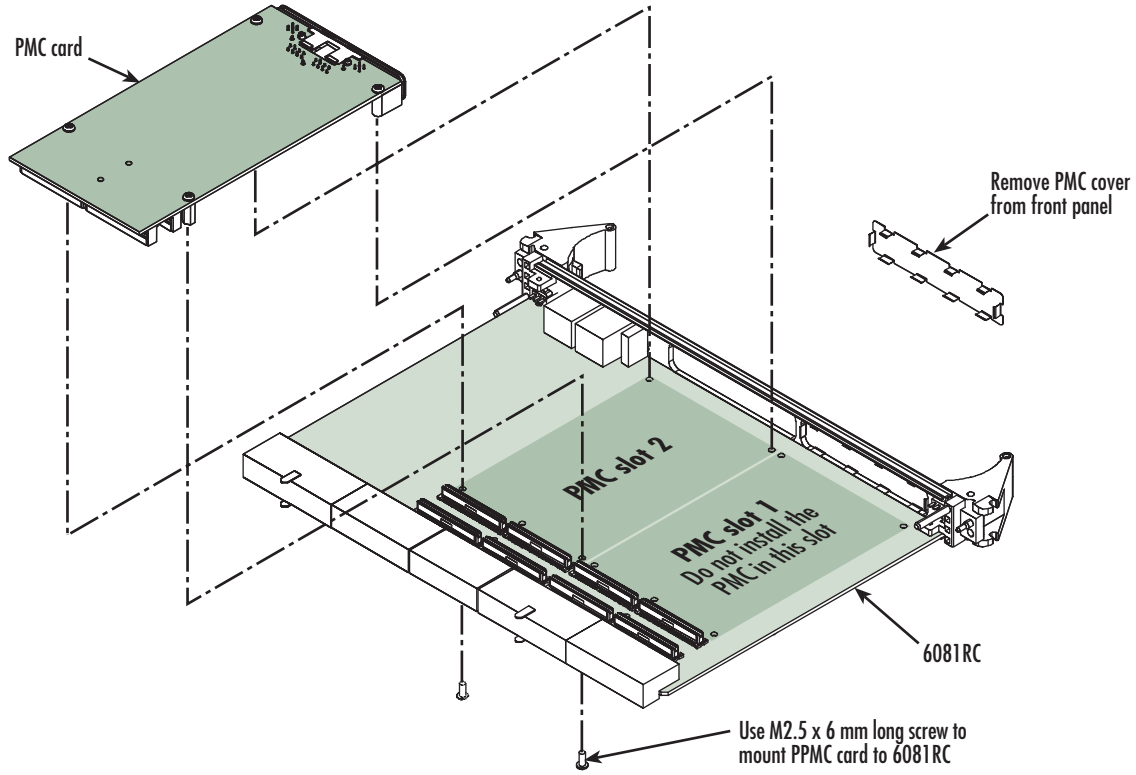


Figure 5. Installing the PMC card

To install the Ethernet Access Module in your Model 6081RC, do the following:

CAUTION

You must wear the anti-static strap to avoid electrostatic damage to the 6081RC or to the PMC Ethernet Access Module.

CAUTION

The 6081RC must not be installed in the chassis when installing the PMC Ethernet Access Module.

CAUTION

The PMC Ethernet Access Module must be installed in PMC slot 2. Do not install it in PMC slot 1.

1. Set the Model 6081RC on a flat anti-static surface with the circuitry facing upward.
2. Remove the PMC slot 2 protective cover from the Model 6081RC front panel (see figure 5 on page 24).
3. Insert the front panel of the PMC card into the cutout for PMC slot 2 on the front panel of the Model 6081RC.
4. Align the two connectors on the PMC card with the corresonding connectors on the Model 6081RC (see figure 5 on page 24).
5. Gently and firmly press down on the rear of the PMC card, so that the connectors mate and snap into place.
6. Install the 4 fastening screws as shown in figure 5 on page 24. Gently tighten the screws into place.

Model 6081RC blades installation

The Model 6081RC installs in a Patton ForeFront chassis. The 6081RC is hot-swappable so it is not necessary to power down the chassis before installing the blade.

WARNING

Do not work on the system or connect or disconnect cables during periods of lightning activity.

CAUTION

Ultimate disposal of this equipment must be handled according to all applicable national laws and regulations.

Note Verify that the rack chassis is properly grounded before installing the Model 6081RC blades. An adequate ground can be achieved by connecting a #10 AWG ground wire between the rack chassis grounding stud and one of the following ground sources:

- The building ground rod (generally located at the site's main service entrance)
- A sprinkler system pipe
- A cold-water pipe
- Building structural steel

1. If you have not done so already, remove the Model 6081RC from its shipping container.

   Note Be sure to wear the anti-static strap to prevent electrostatic damage to the blade.

   Note The location should be well ventilated. Do not block the rack chassis' cooling vents.

2. Insert the rear blade into the desired slot in the rack chassis. Make sure the blade is seated properly in the slot guides.

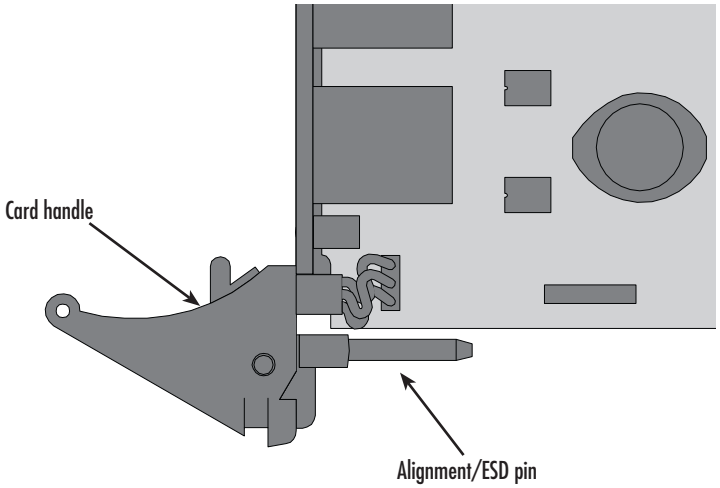


Figure 6. Alignment/ESD pin and card handle

3. Gently press the blade into the chassis until the alignment/ESD pin (see figure 6) engages the chassis. When the blade is fully seated, the red buttons in the handles click up automatically, thus locking the handle and activating the switch (closed position). The click of the button gives a visual and audible confirmation that the board is fully seated.

Cable installation

This section describes installing the network interface cables.

CAUTION

The interconnecting cables shall be acceptable for external use and shall be rated for the proper application with respect to voltage, current, anticipated temperature, flammability, and mechanical serviceability.

Connecting the Ethernet ports

The Model 6081RC comes with three Ethernet ports. One Ethernet port is presented on the front panel via an RJ-45 connector (figure 7), and two internal Ethernet ports that connect to the PICMG 2.16 backplane for intercard communication. All Ethernet ports will autosense the correct speed (10 or 100 Mbps) of the connection and automatically negotiate half or full-duplex operation. This section describes connecting the front panel Ethernet port on the Model 6081RC to an Ethernet LAN via an Ethernet hub, switch, or workstation.

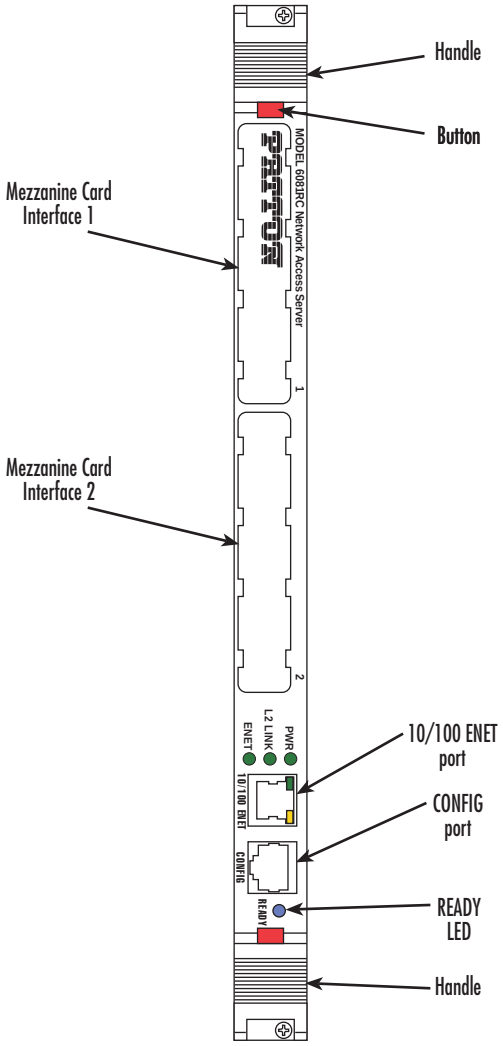


Figure 7. Model 6081RC network and configuration ports

Connecting the 10/100Base-T Ethernet port to an Ethernet switch or hub

The 10/100Base-T Ethernet port (see figure 7 on page 27) is designed to connect to an Ethernet switch or hub. The Ethernet RJ-45 pin and signal definitions for the Network Access Router or for a NIC card in a workstation/PC are shown in figure 8. Connect a straight-through CAT-5 cable (one wired as shown in figure 8) between the Model 6081RC and the hub/switch.

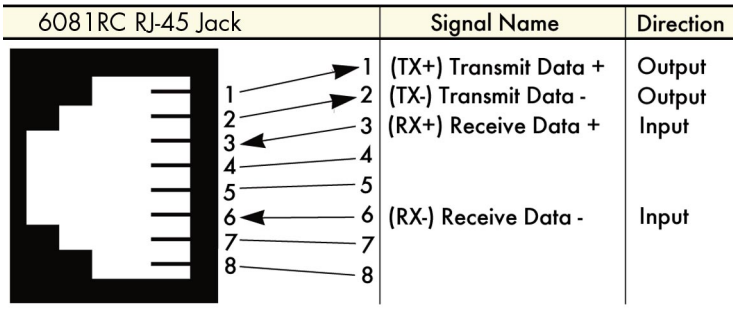


Figure 8. Ethernet RJ-45 pin and signal definitions for Model 6081RC

Connecting the 10/100Base-T Ethernet port to an Ethernet-capable workstation or PC

The 10/100Base-T Ethernet port can connect to a single Ethernet-capable workstation or PC by means of a cross over cable. Refer to figure 9 to assemble a cross-connect cable that will connect between the NIC Ethernet port in the workstation and the Network Access Router 10/100Base-T Ethernet port.

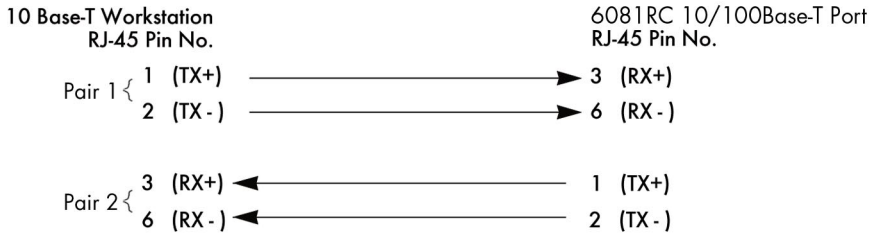


Figure 9. Cross-over RJ-45-to-RJ-45 Ethernet cable diagram

Connecting the EIA-561 RS-232 configuration port (DCE configured)

Install the supplied RJ-45-to-RJ-45 cable with the DB9-RJ45 adapter between the Model 6081RC RS-232 port (see figure 7 on page 27) and an open serial port on your computer. If you need to assemble your own cable, refer to the pinout diagram in figure 10.

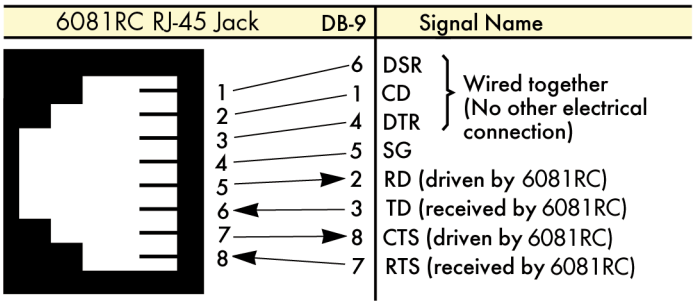


Figure 10. DB-9-to-RJ-45 cable diagram

Completing the hardware installation

This section verifies that the Model 6081RC hardware is operational to the point where you can begin configuring the software settings.

Power is delivered from the chassis backplane through the power connectors on the 6081RC blades. Upon insertion into the ForeFront chassis, the Model 6081RC immediately powers up and begins its boot cycle. During the boot cycle the following should occur:

1. The POWER LED illuminates, indicating normal power is being applied to the 6081RC.
2. The L2 LINK LED begins flashing, indicating the 6081RC is operating normally.

Hardware installation is now complete. To configure the 6081RC for operation, refer to Chapter 3, "Initial configuration of the Model 6081RC".

Chapter 3 Initial configuration of the Model 6081RC

Chapter contents

Introduction 31
Configuration prerequisites 31
Initial configuration through the RS-232 control port 31
Connecting the DB9-RJ45 adapter with the included cable 31
Setting up the HyperTerminal (or similar program) session 32
IP address modification 34
Web operation and configuration 35
PC configuration 36
Using a browser to complete Model 6081RC configuration 36
Displaying the 6081RC web administration pages 36

Introduction

This chapter contains the following procedures that describe configuring the Model 6081RC Network Access Router for operation:

- "Configuration prerequisites"—lists the items you need to have on hand before configuring the Model 6081RC.
- "Initial configuration through the RS-232 control port" on page 31—describes how to define the 6081RC's LAN IP address and netmask parameters.
- "Using a browser to complete Model 6081RC configuration" on page 36—describes how to define the remaining basic configuration parameters in order to bring your Model 6081RC on-line.

Configuration prerequisites

You will need the following to configure the 6081RC Network Access Router:

- A PC equipped with the following:
  - RS-232/V.24 serial port
  - VT-100 terminal program, e.g., HyperTerminal
  - Ethernet port
  - Web browser (e.g., Netscape Communicator or Microsoft Internet Explorer)
- You will need the following information to configure the Model 6081RC:
  - The IP address and subnet mask for the 6081RC's Ethernet port
  - The IP address of the default gateway

Initial configuration through the RS-232 control port

Initially you must configure the 6081RC's IP address and—in rare instances—change the netmask from the default settings.

Note Do *not* connect to the Ethernet port on the Model 6081RC at this time.

Connecting the DB9-RJ45 adapter with the included cable

Do the following:

1. Find the DB9-RJ45 adapter for your PC and RJ-45-to-RJ45 cable shipped with your Model 6081RC.
2. Connect the DB9-RJ45 adapter to your PC's RS-232 serial port.

3. Connect the RJ45-RJ45 cable between the adapter which you installed in step 1 and the *RS-232 Config* port on the front of the Model 6081RC (figure 11).

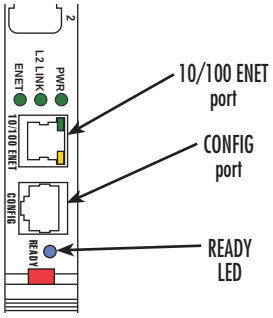


Figure 11. Model 6081RC interface ports

Setting up the HyperTerminal (or similar program) session

Do the following:

1. At your PC, find the file *HYPERTRM.EXE*. Open a HyperTerminal session by double-clicking on the file name.

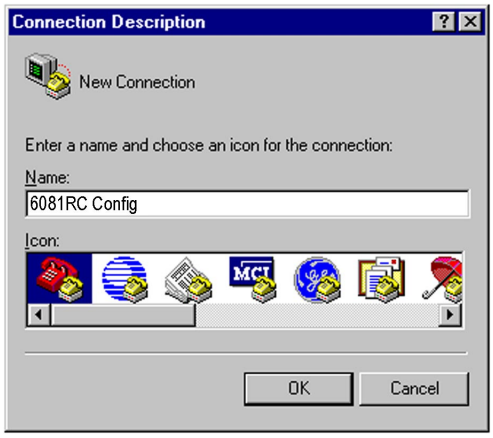


Figure 12. Connection Description window

2. Type a connection name (e.g., *6081RC Config*), select an icon, then click **OK** (figure 12).

Figure 13. Connect To window

3. On the *Connect To* window (figure 13), set *Connect using:* to one of the options named *Direct to ComX* (where the "X" refers to the number identifying the RS-232 serial port on the PC). In the following procedure, *Com1* will be the used as the port identifier.
4. Click **OK**.
5. The *COM1 Properties* window displays.
6. Configure your COM port settings as shown in figure 14, then click **OK**.

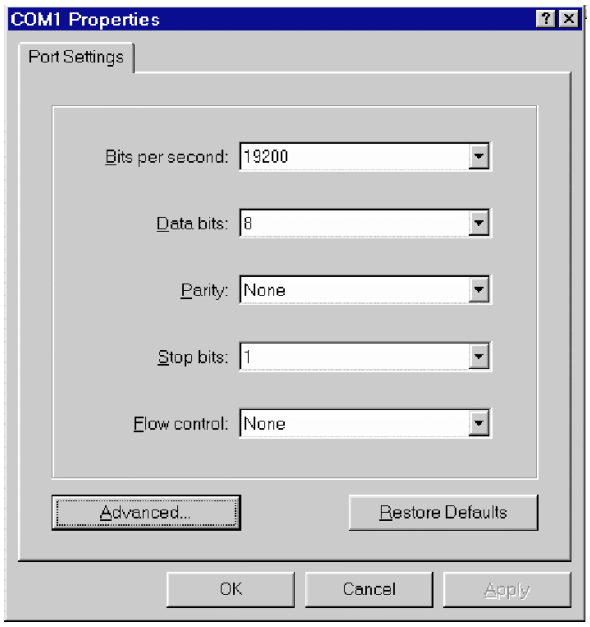


Figure 14. COM1 Properties window

7. Click on the **File** menu, then select *Properties*.

8. Configure the settings for *Function, arrow and ctrl keys act as to Terminal keys* as shown in figure 15, then click **OK**.

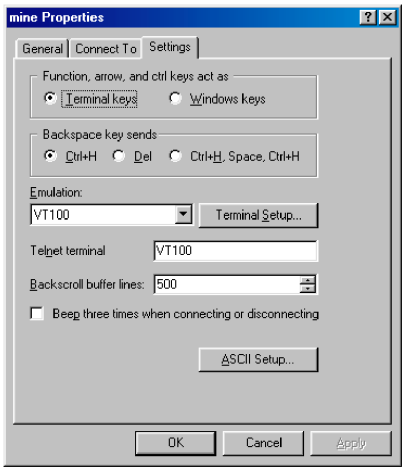


Figure 15. Terminal keys configuration

IP address modification

At turn on, boot up information will display on your Hyperterminal connection window, followed by a login request window.

1. At the prompt type **setup**, then press <enter> to access the 6081RC setup menu.

```
To perform initial system configuration, login using 'setup'.

6081 login: setup

6081 Configuration Menu:

    N - Configure network interfaces.
    D - Restore configuration to factory defaults.
    W - Save configuration to non-volatile storage.
    L - Logout

    R - Reboot
```

2. To change the 6081RC's Ethernet A default IP address of 192.168.200.98/24 to your selected IP address, select option *N,* then press **<enter>**. The 6081RC will display IP address and netmask for Ethernet interfaces.

```
6081 Network Interface Configuration

                                  Address         Netmask           Enable
                                  --------------- ---------------   ------
        A - Front Panel Ethernet  192.168.200.98  255.255.255.0     yes
        B - Rear Ethernet 1       0.0.0.0         0.0.0.0           no
        C - Rear Ethernet 2       0.0.0.0         0.0.0.0           no

        G - Default Gateway       10.10.1.1

        X - Exit Menu

>>>
```

3. To change the IP address for Ethernet 0 (A) enter option *A,* then press **<enter>**. At the prompt type the new IP address and netmask, and enable the interface.

```
Address [192.168.200.98]: 10.10.30.1
Netmask [255.255.255.0]: 255.255.0.0
Enable Interface [yes/no]: yes
```

The 6081RC will display the new IP address and netmask for interface A.

```
6081 Network Interface Configuration

                                  Address         Netmask         Enable
                                  --------------- --------------- ------
        A - Front Panel Ethernet  10.10.30.1      255.255.0.0     yes
        B - Rear Ethernet 1       0.0.0.0         0.0.0.0         no
        C - Rear Ethernet 2       0.0.0.0         0.0.0.0         no

        G - Default Gateway       10.10.1.1

        X - Exit Menu
```

4. The IP address has now been successfully changed. Full configuration of the 6081RC can now be done via the web based configuration menus.

Web operation and configuration

Now that the IP address has been configured for your application, you can complete the configuration using any standard web browser.

PC configuration

Note In order to connect the PC to the Ethernet LAN to communicate with the Model 6081RC, the PC's IP address should be on the same subnet as the 6081RC Ethernet 0 interface.

Connect a straight-through Ethernet cable between the PC's Ethernet port and an Ethernet hub or switch.

This completes the initial configuration of the Model 6081RC. The next steps in configuration will be done using your Web browser connected via Ethernet to the 6081RC.

Using a browser to complete Model 6081RC configuration

This section describes the following procedures:

- Displaying the 6081RC home page (see section "Displaying the 6081RC web administration pages" on page 36)
- Configuring the IP default gateway (see "Configuring the default gateway" on page 42)

Displaying the 6081RC web administration pages

Do the following:

1. Connect your PCs Ethernet connection to the Ethernet LAN.
2. Connect the 6081RC's front panel (10/100 Ethernet connection to the Ethernet LAN)
3. At your PC, open a Web browser session. In your browser's URL/address field type the IP address of the Model 6081RC (for example, if the Model 6081RC's IP address is 123.124.221.10, you would type *123.124.221.10* in the browser's URL/address field). If you do not have an IP address in your 6081RC, refer to "Initial configuration through the RS-232 control port" on page 31.
4. A login prompt will appear. In the username field type superuser then press **<Tab>** to move the cursor to the *Password* field. In the password field type **superuser** then press **<Enter>**.

5. The *6081RC Configuration Menu* home page will appear (see figure 16).

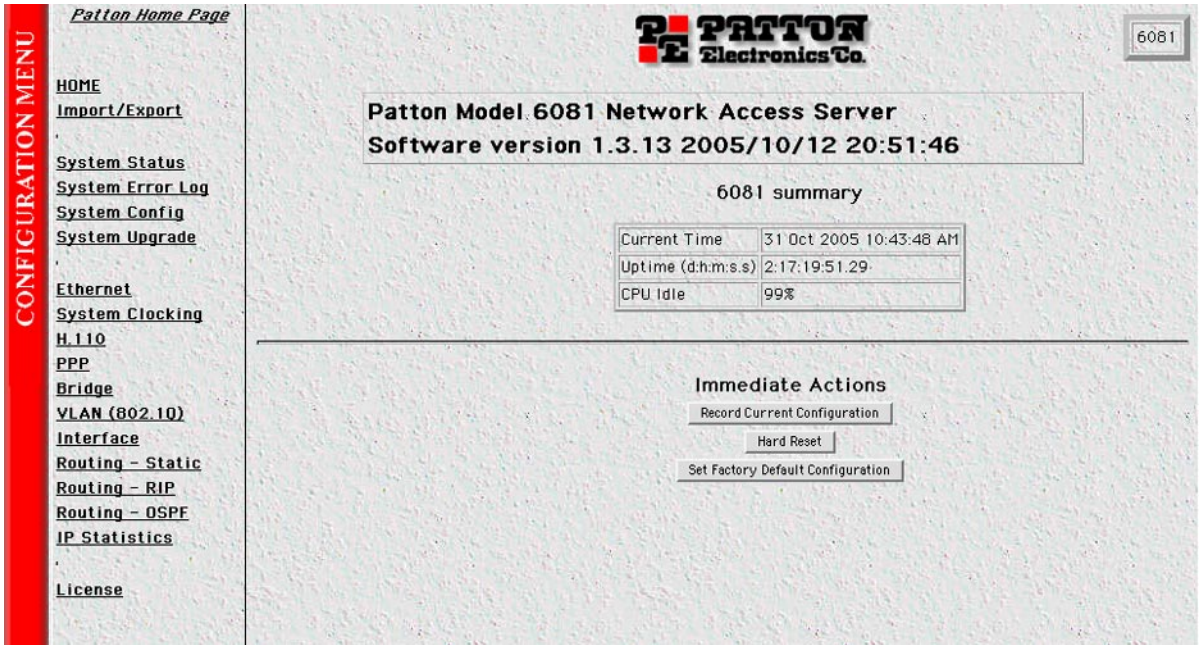


Figure 16. 6081RC Configuration Menu home page

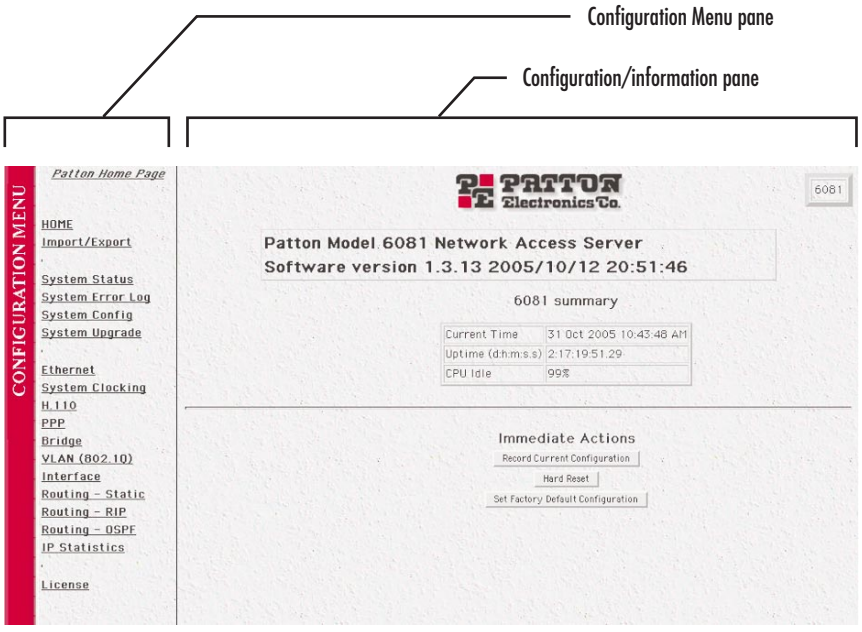


Figure 17. HOME page window panes

The HOME window is divided into two panes: the Configuration Menu pane and the Configuration/information pane (see figure 17). The Configuration Menu contains the links to the various Model 6081RC subsystems, while in the Configuration/information pane; you can view status and other information or make

changes to the system configuration. Unlike the Configuration Menu pane, which appears the same no matter which subsystem page you may select, the Configuration/information pane contents will change as you move from one subsystem page to another.

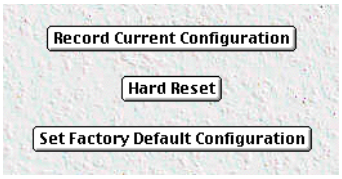


Figure 18. Immediate Actions buttons

From the Home page, the following actions can be performed:

- **Record Current Configuration**—clicking on this button (see figure 18) saves the current configuration from volatile DRAM memory to FLASH memory. Once the configuration is saved into FLASH memory, the configuration will not be lost even if the power is cycled on the 6081RC. Initially, changes made to the 6081RC configuration are stored in volatile DRAM, enabling the user to set the box up with a working configuration before committing it to storage in FLASH. When you select **Record Current Configuration**, the 6081RC stores your changes to FLASH memory.

  Note If you want to save the configuration changes that you have made, you must click on **Record Current Configuration**, otherwise all configuration changes will be lost if the power to the Model 6081RC is turned off.

- **Hard Reset**—this button (see figure 18 on page 38) causes the Model 6081RC to perform a cold restart. When you select **Hard Reset**, the Network Access Router confirms that you want to execute this command. Then, the Network Access Router will disconnect all current sessions, re-initialize the interfaces, and re-load configuration parameters from FLASH.
- **Set Factory Default Configuration**—this button (see figure 18 on page 38) clears out the configuration in FLASH and loads the factory default parameters into FLASH memory. The factory default settings will not execute on the Model 6081RC until it is re-booted by doing a Hard Reset.

  Note **Set Factory Default Configuration** (figure 18 on page 38) will delete any routing information, the Model 6081RC's Ethernet IP address, and any other site-specific settings made for your particular installation. You will have to re-enter the Model 6081RC's Ethernet IP address and netmask using the *CONFIG* port before using the HTTP/HTML Management pages.

Chapter 4 Configuring Ethernet ports

Chapter contents

Introduction 40
Ethernet interface configuration 40
Optional Fast-Ethernet PMC Module for the 6081RC Front Module 40
IP address configuration 42

Introduction

The model 6081RC comes equipped with three 10/100Base-T Ethernet ports—one externally accessible and two connected to the PICMG 2.16 backplane (with options for PMC Ethernet cards to route backplane interfaces to the front panel).

This chapter describes:

- Configuring the Ethernet interfaces (see section "Ethernet interface configuration" for details)
- Configuring IP addresses for the Ethernet interfaces (see section "IP address configuration" on page 42 for details)

Ethernet interface configuration

The Model 6081RC EdgeRoute Module provides three Ethernet ports, A, B and C. The EdgeRoute presents Ethernet port A on a front panel RJ-45 connector. Ethernet ports B and C are presented on the Model 6081's rear connector which connects to the packet switched bus (PSB) Ethernet bus within the chassis mid-plane. When the optional Fast-Ethernet Transition Module (rear-card, part number 6081TM/FENET/2/TX) is installed in the chassis behind the Model 6081, Ethernet ports B and C will also be presented on the rear-panel RJ-45 ports. However, conflicts can occur if traffic is routed to an Ethernet port from both the midplane bus and a rear-panel connector simultaneously.

Optional Fast-Ethernet PMC Module for the 6081RC Front Module

Your EdgeRoute module may be shipped with a Fast-Ethernet PMC Module (part number PEC1/FENET/2/TX) factory installed in PMC slot 2. You may also purchase the Fast-Ethernet PMC Module separately for installation in the field (see section "Installing the PMC Ethernet Access Module onto the 6081RC front blade" on page 24 for the field-installation procedure).

The Fast-Ethernet PMC Module provides two front-panel RJ-45 connectors that can present the two internal Ethernet ports. When the Fast-Ethernet PMC is installed, you may configure how the Model 6081 presents Ethernet Ports B and C. When configuring Ethernet ports B and C, for each port you must select one of the following options:

- **Backplane**—The EdgeRoute directs the internal Ethernet port simultaneously to both:
  - The Ethernet bus within the chassi mid-plane (PSB) and
  - The rear-panel RJ-45 connectors on the rear transition module (if it is installed).

> **Note** A ForeFront chassis containing a 6081RC with a rear transition module and a 6511RC Matrix Switch card will have traffic conflict on Ethernet ports A and B. Therefore, you must use the Fast-Ethernet PMC module on the 6081RC for access to Ethernet ports A and B, not the rear transition module.

- **PMC**—The EdgeRoute directs the internal Ethernet port to the front-panel RJ-45 connector residing on the Fast-Ethernet PMC module.

  Note In this configuration, connection to the mid-plane connector is disabled. The internal Ethernet port cannot reach the Ethernet interfaces on the mid-plane or the rear card.

  If no Fast-Ethernet PMC module is installed, then you must select *Backplane*.

Do the following to configure the 6081RC Ethernet interfaces:

1. Click on the *Ethernet* link in the Configuration Menu pane (see figure 17 on page 37) to display the *Physical Ethernet Ports* page (see figure 19) which is divided into *Status* and *Configuration* sections:
   - The *Status* section gives a quick overview of the current condition of the Ethernet ports, including IP addresses, link state, speed, etc.
   - The *Configuration* section allows configuration of the Ethernet port to front panel or backplane connections (a standard 6081RC is configured with Ethernet A on the front panel, and Ethernet B and C connected to the ForeFront chassis backplane). The *Mode (Speed/Duplex)* column enables port configuration for 10/100Base-T and half/full duplex operation.

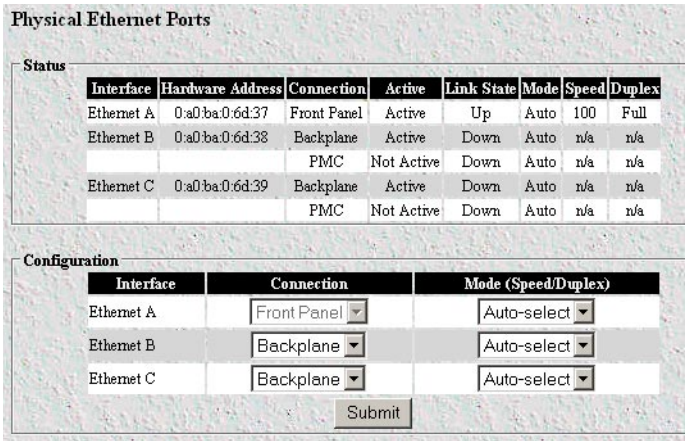


Figure 19. Physical Ethernet Ports page

2. Select the desired connection (*Backplane* or *PMC*) from the *Connection* menu for interface Ethernet B or Ethernet C (Ethernet A, because it is always connected to the front panel, cannot be changed).

   Note The PMC feature is not currently implemented.

3. Select the desired 10/100Base-T speed and half/full duplex configuration from the *Mode (Speed/Duplex)* menu.
4. Click the **Submit** button to save changes.

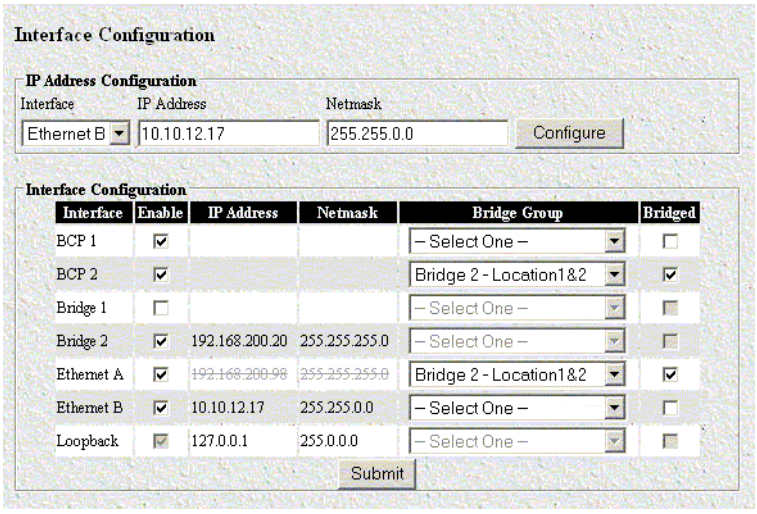


Figure 20. Interface Configuration page

IP address configuration

To add or change IP addresses for the Ethernet ports, do the following:

1. Click on the *Interfaces* link in the Configuration Menu pane (see figure 17 on page 37) to display the *Interface Configuration* page (see figure 20).
2. In the *IP Address Configuration* section of the *Interface Configuration* page, select the Ethernet interface requiring IP address configuration from the *Interface* drop-down menu.
3. Type the new IP address into the *IP Address* text box.
4. Type the new netmask into the *Netmask* text box.
5. Click the **Configure** button.

Chapter 5 H.110 port configuration

Chapter contents

Introduction 44
Defining H.110 channels 45
Defining H.110 ports, timeslots, and direction 46

Introduction

The Model 6081RC card routes/bridges data from H.110 and Ethernet ports. The 6081RC connect to the ForeFront chassis H.110 bus via mating midplane connectors (see figure 21).

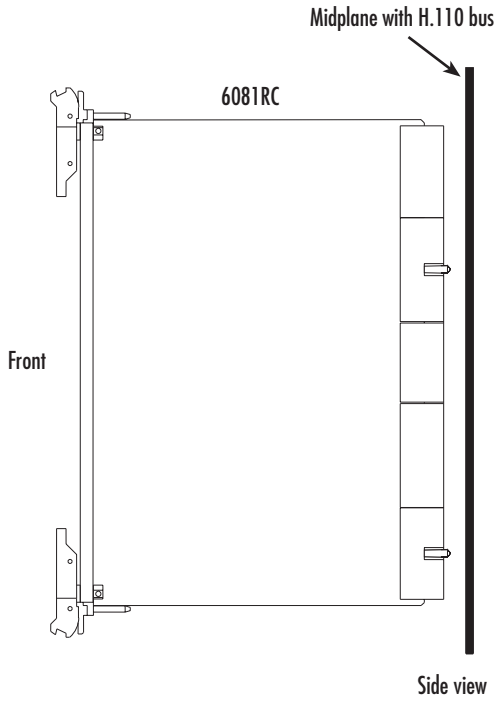


Figure 21. Diagram of Model 6081RC and mid-plane

There are 32 H.110 ports available on the ForeFront chassis H.110 bus, Each of the function cards (i.e., 6081RC, 3096RC, 6511RC, etc.) have access to all 32 ports on the bus.

Characteristics of the H.110 bus:

- The H.110 bus is partitioned into 32 ports.
- Each H.110 port can handle up to 128 timeslots, each timeslot is 64 kbps.
- H.110 timeslots are unidirectional, for a full duplex link timeslots need to be defined for each direction of transmission.
- H.110 port numbers between two cards must match.
- Direction of transmission between two cards must complement each other.

Figure 22 shows an H.110 bus connection between a 6081RC and a 3096RC. Two maps are necessary for a full duplex link; both maps must have the same number of timeslots in each direction. In addition, the 6081RC H.110 port should connect to a corresponding 3096RC H.110 port. Similarly, the H.110 directions between the 6081RC and the 3096RC maps should complement each other, for example timeslots in a "to H.110" port on the 6081RC, should go to timeslots in a "from H.110" port on the 3096RC.

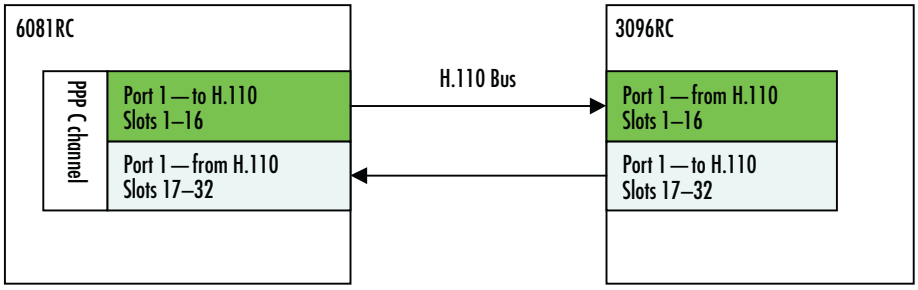


Figure 22. H.110 port correspondence and direction

Defining H.110 channels

From the standpoint of the 6081RC, H.110 ports and timeslot are assigned to PPP channels, many H.110 port may be assigned to a channel.

To configure H.110 channels, do the following:

1. Click on the H.110 link in the Configuration Menu pane (see figure 17 on page 37) to display the H.*110 Channel Configuration* page (see figure 23).

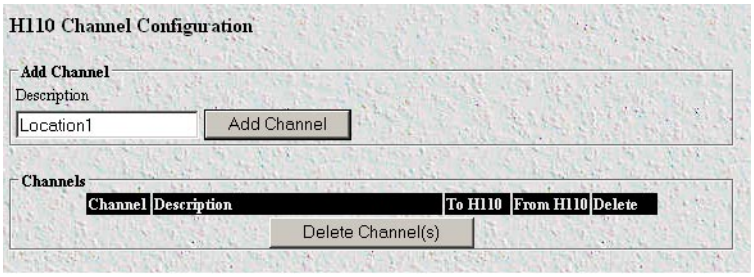


Figure 23. H110 Channel Configuration page

2. Type a description for the channel (in figure 23, the description would be *Location1*). This description will be associated with a PPP channel defined later in this procedure).
3. Click on the **Add Channel** button to create the new channel.

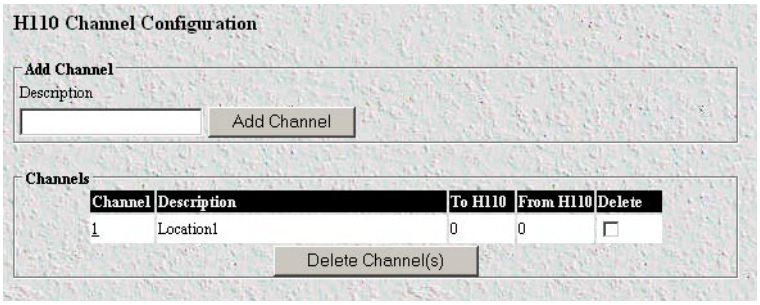


Figure 24. H110 Channel Configuration page showing new channel

4. Click on the channel number hyperlink in the *Channel* column (in figure 24, you would click on channel *1*) to refresh the page and cause information about the newly created channel to appear. Channels will be numbered (starting with 1) in the order they are entered.

> **Note** If you want to delete a channel configuration from the listing, click the *Delete* check box for the channel you want removed, then click the **Delete Channel(s)** button.

Defining H.110 ports, timeslots, and direction

5. The click on the channel number hyperlink in the *H.110 Channel Configuration* page to go to the *H.110 Settings* channel timeslot mapping page (see figure 25). The page displays the channel number, description, and places to add a timeslot map. This page provides several buttons for navigating through stored bridge configuration:

   – The **Refresh Page** button forces the 6081RC to display changes made since the previous refresh cycle

   – The **First Channel** button displays the configuration for the first channel in the *H110 Channel Configuration* page listing of channels (see figure 25).

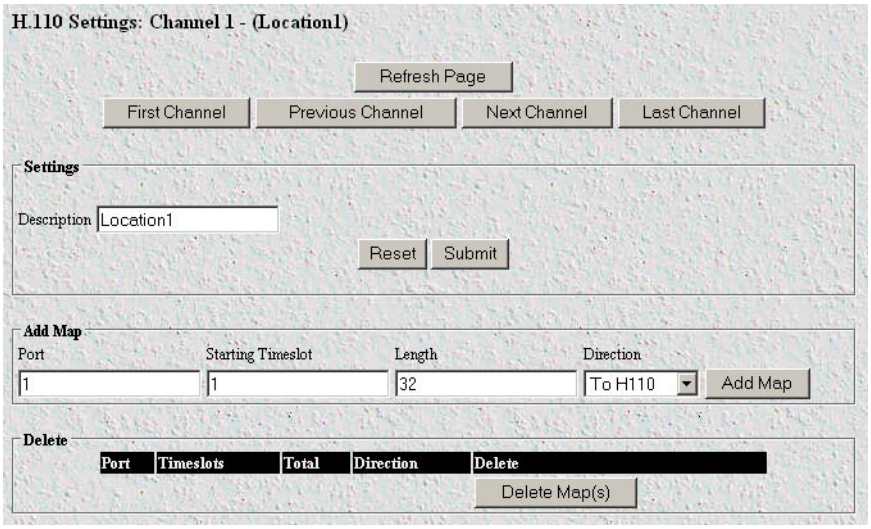


Figure 25. Channel timeslot mapping page

– The **Previous Channel** button displays the configuration for the channel previous to the one currently displayed

– The **Next Channel** button displays the configuration for the channel following the one currently displayed

– The **Last Channel** button displays the configuration for the last channel in the *H110 Channel Configuration* page listing of channel (see figure 25).

– The **Reset** button cancels changes made to a channel configuration.

– The **Submit** button saves changes made to a channel configuration.

Enter configuration parameters for a channel as follows:

1. Enter a port number (H.110 bus port numbers range from 1 to 32) in the *Port* text box.
2. Enter the *Starting Timeslot*—each H.110 port can handle up to 128 slots (for example, if timeslots 1–16 will be used, enter *1* in this text box).
3. Enter the length of the channel in number of timeslots (for example, if the range of timeslots is from 1–32, enter *32* timeslots in this text box).
4. Select *to H.110* from the *Direction* pop-up menu. Each link in the H.110 bus should be duplex, define the direction of transmission "to H.110" or "from H.110".
5. Click the **Submit** button to save the changes.
6. Click the **Add Map** button to display the second map for *Location1*. This will be the map that will connect port 1 in the 6081RC to the "From H.110" direction.
7. Enter *1* in the *Port* text box (port 1).

> **Note** Any other available port (from 1-32) could be selected as long as it matches a 3096RC port.

8. Enter the *Starting Timeslot*—for example if using timeslots 17–32, enter *17* in this text box).
9. Enter the length in number of timeslots in the *Length* text box.
10. Select *From H.110* from the *Direction* pop-up menu.
11. Click the **Submit** to save changes.

> **Note** If you want to delete a map configuration from the listing, click the *Delete* check box for the map you want removed, then click the **Delete Map(s)** button.

Once both maps for a channel have been entered, the *H.110 Settings page* will display the map information as shown in figure 26.

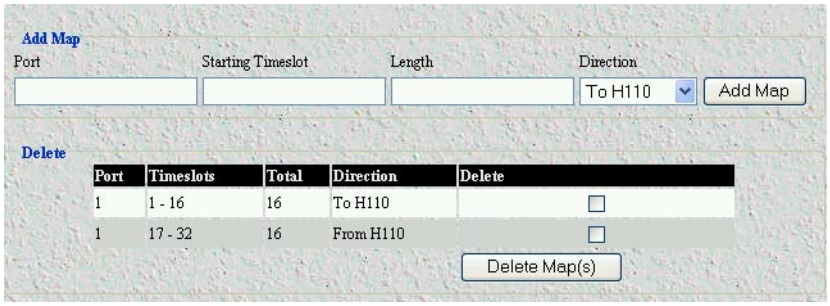


Figure 26. H.110 Settings page showing map information for new channel

Chapter 6 PPP configuration

Chapter contents

Introduction 50
Bridged PPP configuration 50
Creating a bridge group 50
PPP channel configuration 53
Interface Configuration 55

Introduction

In the 6081RC context, the H.110 ports act as WAN ports running bridged or routed point-to-point protocol (PPP) connections to remote devices. For example, when the 6081RC connects to a Patton Model 3096RC via the H.110 bus, the 6081RC will terminate bridged or routed PPP sessions originated at G.SHDSL customer premise equipment such as Patton's models 3201 or 3086, or PPP/G.SHDSL compliant third-party CPEs. Traffic is directed to and from the H.110 bus by any ForeFront function card in unidirectional nx64kbps timeslots.

The basic building blocks of the 6081RC are PPP channels. PPP channels can be bridged or routed. When a 6081RC PPP channel operates in bridge mode, data arriving on an H.110 port from remote devices is forwarded—at the layer 2 level—to the assigned interface (Ethernet or another H.110). When a 6081RC PPP channel is operating in routed mode, data arriving on the H.10 port(s) is routed—at the layer 3 level—to the corresponding interface based on the destination IP address of the arriving packet.

Bridged PPP configuration

Bridged PPP connections forward data based on Ethernet frames destination addresses. Remote CPEs encapsulate Ethernet frames in PPP/BCP packets, and send them over the link to a 6081RC. PPP packets arriving at the 6081RC are un-encapsulated and the Ethernet frame is forwarded to an assigned Ethernet port.

To configure a link for Bridge PPP, do the following:

1. Define an H.110 channel (see section "Defining H.110 channels" on page 45 for details).
2. Create a bridge group (see section "Creating a bridge group").
3. Configure PPP parameters for the channel (see section "PPP channel configuration" on page 53).
4. Attach the Bridge/PPP to an Ethernet interface (see section "Interface Configuration" on page 55).

Creating a bridge group

Bridge groups are virtual modules that bridge traffic to and from the physical ports attached to the 6081RC (H.110 and Ethernet ports, for example). In a scenario as the one below, IP traffic arriving from the remote DSL links through a 3096RC and the H.110 ports in PPP/BCP encapsulation, is bridged (PPP/BCP encapsulation is terminated) and Ethernet packets sent to the Ethernet port transparently.

```
ETH0-----Bridge Group 2 (BCP2)---- -----H.110 channel 1---3096RC----DSL-----3201
```

Do the following to configure bridge groups:

1. Click the *Bridge* link in the Configuration Menu pane (see figure 17 on page 37) to display the *Bridge Configuration* page (see figure 27). The 6081RC automatically creates the default bridge *Bridge 1* for your use or you can create one or more bridges.

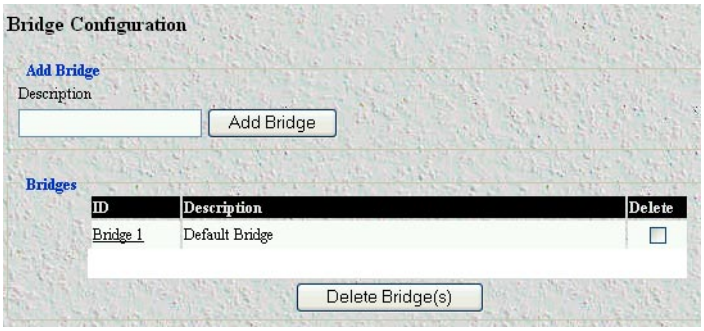


Figure 27. Bridge Configuration page

2. To create a new bridge that will link H.110 channels and the front panel Ethernet port, type the name of the bridge group using any alphanumeric character (*Bridge 2* in this example).
3. Click the **Add Bridge** button (see figure 27), to refresh the page, displaying the new bridge as shown in figure 28.

Note If you want to delete a bridge configuration from the listing, click the *Delete* check box for the bridge you want removed, then click the **Delete Bridge(s)** button.

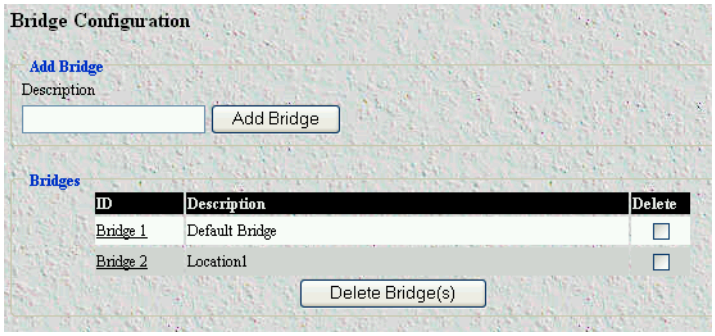


Figure 28. Bridge Configuration page showing new bridge

4. Now that the bridge group has been created, click on *Bridge 2* group ID hyperlink, this action will take you to the *Bridge 2 Configuration* page (see figure 29). This page provides several buttons for navigating through stored bridge configuration:
   - The **Refresh Page** button forces the 6081RC to display changes made since the previous refresh cycle
   - The **First Bridge** button displays the configuration for the first bridge in the *Bridge Configuration* page listing of bridges (see figure 28).
   - The **Previous Bridge** button displays the configuration for the bridge previous to the one currently displayed
   - The **Next Bridge** button displays the configuration for the bridge following the one currently displayed
   - The **Last Bridge** button displays the configuration for the last bridge in the *Bridge Configuration* page listing of bridges (see figure 28)
   - The **Reset** button cancels changes made to a bridge configuration.
   - The **Submit** button saves changes made to a bridge configuration.

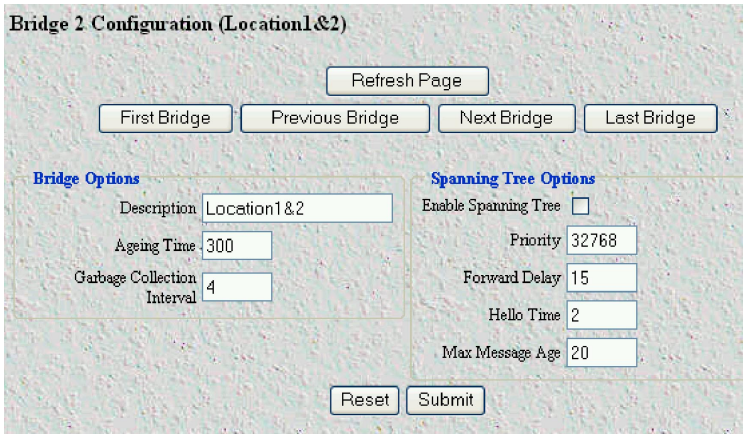


Figure 29. Bridge 2 Configuration page

5. Type a short description for Bridge 2 in the *Description* text box.
6. Aging time is the number of seconds a MAC-address will be held in the forwarding database after receiving a packet from this MAC address. The entries in the forwarding database are periodically timed out to ensure they won't stay around forever. If desired, type a value (in seconds) for the forwarding table aging time in the *Aging Time* box. The default value for this setting 300 seconds (5 minutes).
7. The Model 6081RC periodically checks the forwarding database for timed-out entries which are then deleted. The *Garbage Collection Interval* is the time (in seconds) that between each checks of the forwarding database.
8. Spanning tree is a link management protocol that provides path redundancy while preventing undesirable loops in the network. For a Layer 2 Ethernet or Token Ring network to function properly, only one active path must exist between two stations. Spanning-tree operation is transparent to end stations, which cannot detect whether they are connected to a single LAN segment or a switched LAN of multiple segments.

If you will not be enabling Spanning Tree options, go to step 9. Otherwise, click the *Enable Spanning Tree* box to activate *Spanning Tree Options*. The following options are available for configuration:

– **Priority:** The switch with the highest bridge priority (the lowest numerical priority value) is elected as the spanning-tree root switch, which is the logical center of the spanning-tree topology in a switched network. If all switches are configured with the default priority (32768), the switch with the lowest MAC address in the Layer 2 network becomes the root switch. Under some circumstances, traffic patterns may require that a different switch be assigned as the root switch than that which was chosen by default. Increasing the priority by typing a number in the Priority box that is less than the default 32768 value forces the switch to become the root switch.

– **Forward Delay:** This value is the time a port will remain in the listening and learning states before entering the forwarding state.

– **Hello Time:** The amount of time a port will remain in the listening and learning states before entering the forwarding state.

– **Max Message Age:** The length of time the switch will store protocol information received on a port.

9. Once all options have been entered, click the **Submit** button to save changes.

PPP channel configuration

The PPP channel configuration page allows assignment of bridged or routed sessions to H.110 channels as well as definition of PPP link parameters such as MRU, retry times, authentication, etc.

1. Click on the PPP link in the Configuration Menu pane (see figure 17 on page 37) to display the *PPP Configuration* page (see figure 30).

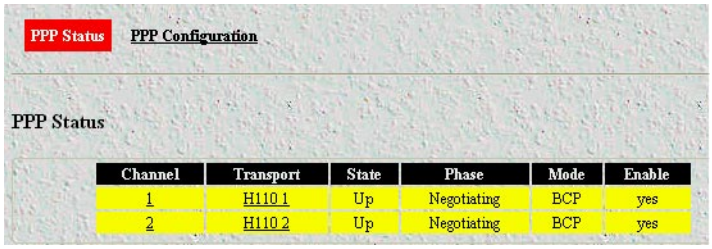


Figure 30. PPP Configuration page

2. Click on one of the hyperlinks in the Channel Column to display the *PPP Options* page for the selected channel. The *PPP Options* page lists the H.110 channel connections previously defined during H.110 channel configuration. This page provides several buttons for navigating through stored channel configuration:
   - The **Refresh Page** button forces the 6081RC to display changes made since the previous refresh cycle
   - The **First Port** button displays the configuration for the first port in the *H.110 Channel Configuration* page listing of channels (see figure 28).
   - The **Previous Port** button displays the configuration for the port previous to the one currently displayed
   - The **Next Port** button displays the configuration for the port following the one currently displayed
   - The **Last Port** button displays the configuration for the last port in the *H.110 Channel Configuration* page listing of channels (see figure 28)
   - The **Reset** button cancels changes made to a port configuration.
   - The **Submit** button saves changes made to a port configuration.

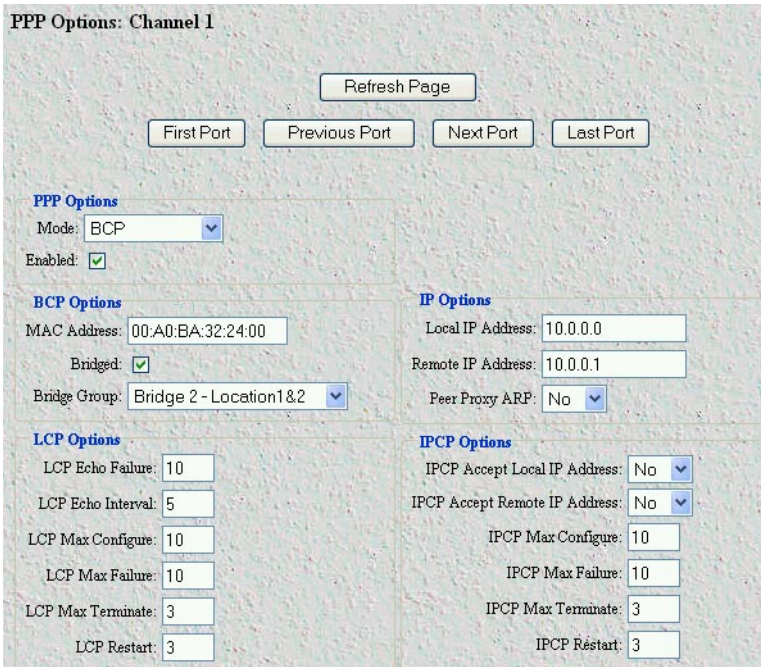


Figure 31. PPP Options page

3. Under the heading *PPP Options*, select one of the following network-control protocols (NCP) from the *Mode* menu:
   - **BCP** (bridge control protocol)
   - **IPCP** (Internet protocol control protocol)

Note Since this section is about configuring for bridged PPP, you would select the BCP option.

4. Click on the *Enable* button below the *Mode* menu to enable the NCP.
5. Under *BCP Options*, select the bridge group that the PPP channel will be attached to (for this example select *Bridge 2*) and check the *Bridged* box located just above the drop-down menu.
6. Configure LCP options as needed or accept the default settings. *Do not configure IP and IPCP options.*
7. Click on the **Submit** button to save changes.
8. Repeat the PPP channel configuration steps 1 through 7 for other channels as needed. Attach the PPP channel also to Bridge 2 or any other defined bridges.

   Once all parameters have been configured, the *PPP Status* page should display the information shown in figure 32.

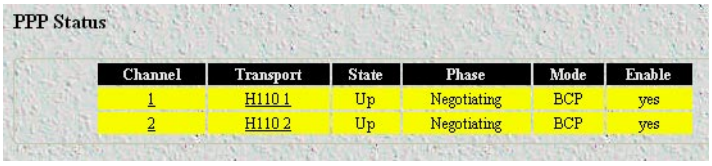


Figure 32. PPP Status page

At this point the 6081RC will start negotiating PPP/BCP connections with a remote peer. The Status window will turn yellow, indicating that negotiation is in progress.

9. Attach a defined bridge to an Ethernet port, so that traffic bridged from the remote CPEs is forwarded to the LAN attached to the 6081RC front panel Ethernet port or Ethernet ports on the backplane.

Note Bridge 2 can be attached to any physical interface including backplane Ethernet ports or other H.110 ports.

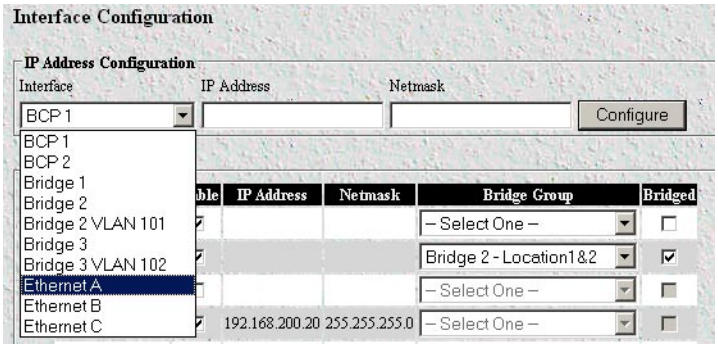


Figure 33. Interface Configuration page showing Interface menu contents

Interface Configuration

The *Interface Configuration* page (see figure 33) displays all interfaces (physical and logical) previously defined. In this example, PPP interfaces *BCP 1* and *BCP 2*, and corresponding bridges *Bridge 1* and *Bridge 2*, *Ethernet A* (6081RC front panel Ethernet interface), and a *Loopback* interface (default) are shown.

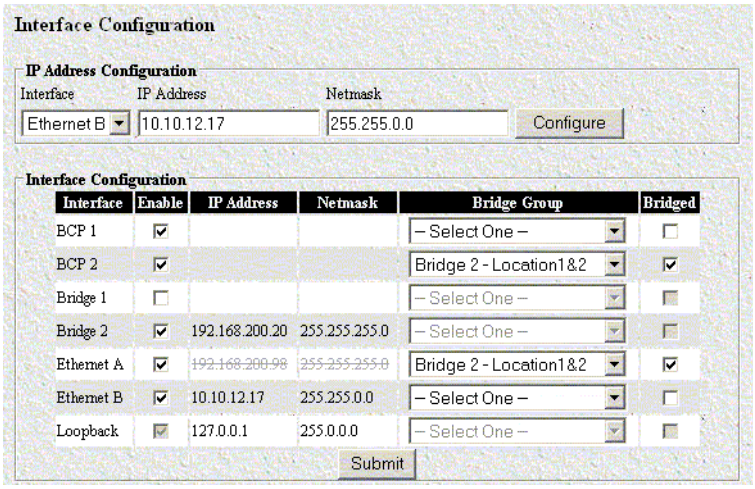


Figure 34. Interface Configuration page

To activate a PPP/BCP connection between the remote CPEs (*Location1&2*) and the 6081RC bridge, do the following:

1. Click the check boxes in the *Enable* column to add a check to the *BCP 1*, *BCP 2*, and *Bridge 2*) entries in the *Interface* column (see figure 34).

   Note Although we are not using BCP 1 to bridge data, the 6081RC needs to see this default PPP module enabled in order to activate the rest of the sessions.

2. In the *BCP 2* row (see figure 34), use the drop down menu under the *Bridge Group* column to select the *Bridge 2 - Location1&2*" option. Under the Bridged column, place a checkmark on the box corresponding to BCP2.
3. Click on the **Submit** button to save changes.

At this time, a PPP/BCP connection between the 6081RC and the remote CPEs may have been established (check this by clicking on the PPP main menu option), each PPP connection will be displayed in color code, the color green meaning that a connection has been established. However, there is not yet a connection between the PPP/BCP modules and the Ethernet port (that is, the bridge module does not have a path to the Ethernet port and therefore no bridged data can be sent to the a LAN).

To activate a connection between the bridge module and the front panel Ethernet interface (*Ethernet A*), do the following:

1. In the *Ethernet A* row (see figure 34), click to add a checkmark on the box under the *Enabled* column.
2. In the *IP Address Configuration* section of the *Interface Configuration* page (see figure 35), select *Bridge 1* from the *Interface* menu.

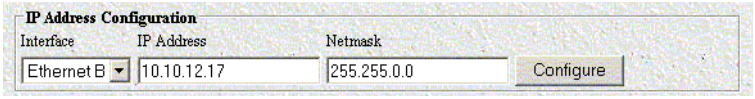


Figure 35. IP Address Configuration section of the Interface Configuration page

3. Type an *IP Address* of **192.168.200.20** and a *Netmask* of **255.255.255.0**.
4. In the *Ethernet A* row, under the *Bridge Group* column, select *Bridge 2 – Location1&2* from the menu, then click to add a checkmark to the box under the *Bridged* column.
5. Click the **Submit** button to save changes.

Note The 6081RC management web server can only be accessed via Bridge 2 IP address 192.168.100.20. It may take a several minutes for the card to respond to management commands after this change.

Note If the 6081RC is equipped with more than one external Ethernet port, the card can be managed from a non-bridged Ethernet port.

Chapter 7 VLAN configuration

Chapter contents

Introduction 59
Attaching a VLAN ID to an Ethernet interface 59
Attaching a bridge interface to a VLAN module 60

Introduction

The 6081RC supports vLAN (802.1Q) connections between remote users and a central location. To create a VLAN connection for bridged PPP connections, each PPP connection is attached to a bridge connected to a separate virtual Ethernet interface. Finally, each virtual interface is attached to a physical Ethernet port as shown in figure 36).

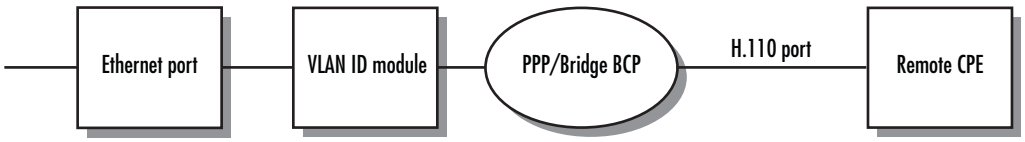


Figure 36. VLAN connection diagram

Packets arriving from the remote CPE will be tagged with VLAN information and sent to the Ethernet port. VLAN packets received from the LAN by the Ethernet port of the 6081RC and corresponding to the remote CPE, will be stripped of VLAN information and passed to the bridge module for transmission to the remote CPE.

To create VLAN connections, do the following:

1. Define an H.110 channel (see section "Defining H.110 channels" on page 45 for details).
2. Create a bridge group (see section "Creating a bridge group" on page 50).
3. Configure PPP channel parameters (see section "PPP channel configuration" on page 53).
4. Attach a VLAN ID to an Ethernet interface (see section "Attaching a VLAN ID to an Ethernet interface").
5. Attach the bridge/PPP to the VLAN module (see section "Attaching a bridge interface to a VLAN module" on page 60).

Attaching a VLAN ID to an Ethernet interface

Once a bridge group and PPP channel has been configured, do the following:

1. Click the *VLAN(8021Q)* link in the Configuration Menu pane (see figure 17 on page 37) to display the *VLAN (802.1Q) Configuration* page.

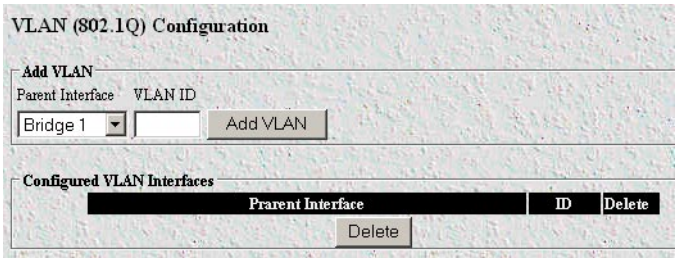


Figure 37. VLAN (802.1Q) Configuration page

2. In the *Add VLAN* section (see figure 37), select the interface that will process VLAN packets from the *Parent Interface* menu.

3. In the *VLAN ID* text box, type the desired number for this VLAN (up to 4096 with no reserved VLAN numbers).
4. Click the **Add VLAN** button.

Configured VLANs are displayed as shown in figure 38.

Figure 38. Configured VLAN Interfaces section of VLAN (802.1Q) Configuration page

Attaching a bridge interface to a VLAN module

Once the desired VLAN has been created, it is necessary to attach it to a bridge group as follows:

1. Click the *Interface* link in the Configuration Menu pane (see figure 17 on page 37) to display the *Interface* page (see figure 39).

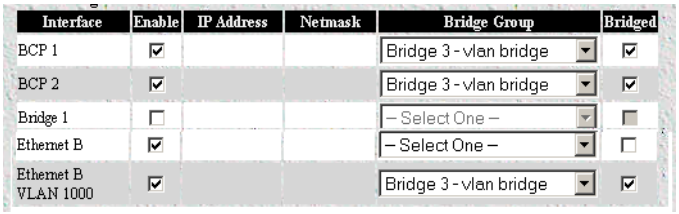


Figure 39. Interface page

2. Locate the Ethernet port that has the VLAN ID created in section "Attaching a VLAN ID to an Ethernet interface" on page 59 and click to place a checkmark on the box in the *Enabled* column. Select the desired bridge group from the menu in *Bridge Group* column (this bridge group should correspond to the remote CPE for which a VLAN is required), then click to place a checkmark on the box in the *Bridged* column.

Chapter 8 Configuring for bridged Ethernet applications

Chapter contents

Introduction 62
Bridged Ethernet operation 62
Basic assumptions 63
Defaults settings 63
CPE configuration 63
Initiating bridged Ethernet data communications 64
Configuring the 6081RC for bridging application 64
H.110 channel configuration 65
Defining H.110 channels 65
Configuring channel parameters 66
Bridge group configuration 68
Defining a bridge group 69
Configuring bridge group parameters 70
PPP channel configuration 70
Interface configuration 72

Introduction

The 6081RC can be configured for bridged Ethernet operation to work in combination with the Model 3096RC G.SHDSL TDM concentrator and the Patton Model 3201 G.SHDSL Modems as shown in figure 40. All 3096RC-to-3201 G.SHDSL links operate at a data rate of 1024 kbps, which offers a possible G.SHDSL transmission distance of 21,000 feet (6.5 kilometers) over twisted-pair 24 AWG (0.5 mm) copper wire.

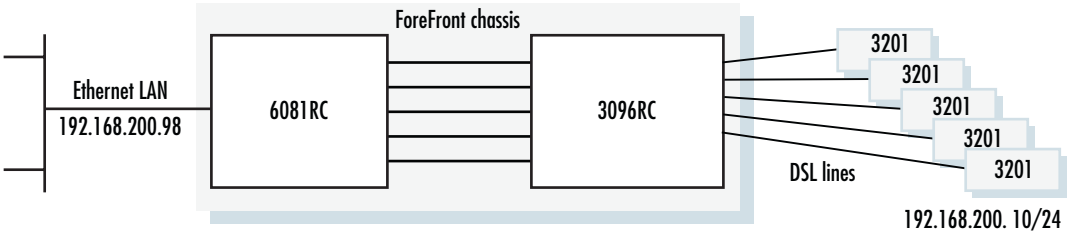


Figure 40. Bridged Ethernet operation diagram

This chapter describes:

- The features and functions of the bridged Ethernet configuration
- The factory-default parameter settings for the 6081RC
- Procedures for using the 6081RC's management interface to modify the factory default parameter values.

Note For more information on configuring the Model 3096RC and Model 3201, refer to the user documentation that came with those products.

Bridged Ethernet operation

In bridged Ethernet applications, the 6081RC functions as an Ethernet hub for interconnecting G.SHDSL access lines and an Ethernet LAN. Functioning as a hub, the 6081RC delivers data traffic to and from all interfaces (H.110 ports and up to three Ethernet LAN interfaces) by means of Ethernet bridging at the data link layer (layer 2 of the Open Systems Interconnection (OSI) model). Ethernet data at customer sites is encapsulated using the PPP/BCP protocol and sent over the DSL link to the 3096RC T-DACS. The Model 3096RC, operating at the physical layer, terminates the DSL connection and maps arriving DS0s to the ForeFront chassis H.110 bus. The 6081RC takes DS0 groups from the H.110 bus corresponding to individual DSL users and connects at the PPP/BCP level. The 6081RC strips the PPP/BCP encapsulation and forwards user data to the Ethernet port. Conversely, the 6081RC uses point-to-point protocol (PPP) for data delivery across the G.SHDSL links, by encapsulating each BCP datagram in a PPP frame.

In general, network engineers may find the Ethernet bridging configuration (see figure 40) useful for any data communication system requiring long-range connections between remote devices and an Ethernet LAN at a central location. As a more specific example, a bridged Ethernet solution could be used when implementing a real-world application such as an ISP for residential or business users. In such a scenario, access to Internet, email, or other networking applications would be connected via G.SHDSL lines to a 3096RC and to the 6081RC via a H.110 bus, which would then provide bridged communications to the central ISP LAN.

Basic assumptions

The bridged Ethernet network described in section "Bridged Ethernet operation" on page 62 is based on the following basic assumptions:

- Concerning the Ethernet interface:
  - You will connect a management workstation (such as a PC) to the 6081RC front panel Ethernet interface.
  - You will use the management workstation on the front panel Ethernet interface to configure the 6081RC using a web browser.
- Your workstation must reside within the same IP subnetwork as the 6081RC Ethernet interface in order to connect to the 6081RC management interface via the factory-default IP address, which is 198.168.200.98. In other words, the first three octets of your workstation's IP address must be 198.168.200.
- Once the 6081RC has been configured for operation, you may wish to connect the front Ethernet port to the LAN. Doing so offers the following advantages:
  - Remote management—You can log in to the 6081RC's management interface remotely using any workstation connected to the LAN and standard http browser.
  - Multiple operators—Two or more operators can manage the 6081RC, at the same time or at different times, using multiple workstations on the LAN.
- Before moving the Ethernet Port to the LAN, you must first assign an IP address that has the same network number as the LAN. For further instructions, see section "IP address configuration" on page 42.

Defaults settings

The bridged Ethernet configuration described in section ""Basic assumptions" operates using the 6081RC's factory default values for all configurable parameters. The 6081RC's factory default parameter values are described below:

- Ethernet Interface A— By factory default the IP address assigned to Ethernet Interface A is 192.168.200.98/24 (The designation /24 indicates the IP address has a netmask of 255.255.255.0).
- Ethernet Interface B — By factory default Ethernet Interface B is not assigned an IP address. Because the interface is intended to handle bridged traffic only, no IP address is needed.
- Ethernet Interface C— By factory default Ethernet Interface B is not assigned an IP address.

CPE configuration

The Patton Model 3201 Router Modems used in the Bridged Ethernet network in section "Bridged Ethernet operation" on page 62 are factory-configured in customer premise (CP) mode—as opposed to central office (CO) mode. If any Model 3201 used in this network has been changed to CO mode, you must re-configure the device for CP mode.

Note For information on configuring the Model 3201, refer to the Model 3201 Getting Started Guide or Administrator's Reference Guide that came with the device.

Initiating bridged Ethernet data communications

Once you have made the connections shown in figure 40 on page 62, you need only power up the 6081RC and the connected Model 3201 CPE devices for the bridged Ethernet network to begin operation and start carrying data traffic. The rest of this chapter describes the procedures for modifying the 6081RC's factory default configuration, should you desire to do so.

Configuring the 6081RC for bridging application

In this application the system will be configured as follows:

- Patton Models 3201 at the customer premises running at 1 Mbps (with 16 64-kbps slots). The 3201s will be configured for PPPoH bridging (PPP over HDLC).

  Note Refer to the Model 3201 Administrator's Reference Guide that came with the device for configuration information.

- A Model 3096RC at the concentration point connecting to the 3201 CPEs, and cross connecting each 1 Mbps link (16 timeslots) from CPEs to the H.110 bus.

  Note Refer to the Model 3096RC Administrator's Reference Guide that came with the device for configuration information.

- A 6081RC configured for PPP bridging, taking traffic from H.110 ports (passed by the 3096RC) 1-Mbps links in each direction. Bridged traffic is passed to the 6081RC front panel for access to local network services (e-mail, Internet, FTP, etc).

  Note The 6081RC Ethernet interface and remote CPEs must be in the same IP subnet.

Model 6081RC configuration takes place in the following sequence:

1. H.110 channel configuration (see section "H.110 channel configuration"):
   – Adding a channel (see section "Defining H.110 channels" on page 65)
   – Setting port, timeslot and H.110 direction (see section "Configuring channel parameters" on page 66)
2. Bridge group configuration (see section "Bridge group configuration" on page 68):
   – Adding a bridge group (see section "Defining a bridge group" on page 69)
   – Configuring bridge group settings (see section "Configuring bridge group parameters" on page 70)
3. PPP channel configuration (see section "PPP channel configuration" on page 70):
4. Interface configuration (see section "" on page 72)

H.110 channel configuration

The Model 6081RC card routes/bridges data from H.110 and Ethernet ports. There are a total of 32 H.110 ports available in the H.110 bus. Each H.110 port can handle up to 128 64-kbps timeslots.

In the 6081RC context, the H.110 ports act as WAN ports connecting to remote and local devices. For instance, defined H.110 ports on the 6081RC will connect at the physical level to other function cards in the same chassis such as the 3096RC, 3196RC, 6511RC, 3125RC, or another 6081RC.

When connecting to a Patton Model 3096RC, the 6081RC will most likely be terminating bridged or routed PPP sessions originated at G.SHDSL customer premise equipment such as Patton's models 3201 or 3086, or PPP/G.SHDSL-compliant third-party CPEs.

Traffic is directed to and from the H.110 bus by any ForeFront function card in unidirectional nx64 kbps timeslots, so in order to have a full duplex link across the H.110 bus, two streams have to be defined for the same H.110 channel. The PPP configuration pages define H.110 connections as channels. There could be multiple channels defined within an H.110 port, a PPP session is attached to each channel.

Defining H.110 channels

Do the following:

1. Click on the *H.110* link in the Configuration Menu pane (see figure 17 on page 37) to display the H.*110 Channel Configuration* page (see figure 41).

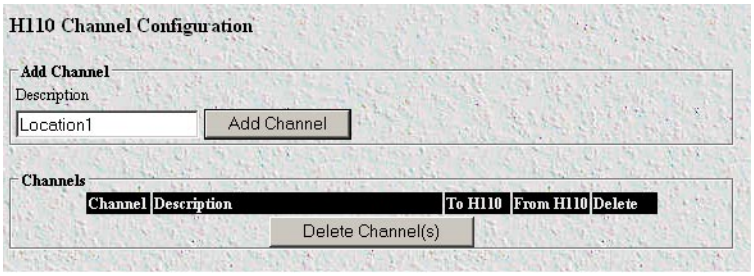


Figure 41. H110 Channel Configuration page

2. Type a short definition of the channel in the *Description* text box (see figure 41)—this name will be associated to a PPP channel defined in subsequent steps. In this example, *Location1* is used for the channel description.

3. Click the **Add Channel** button to create the channel. The page will refresh and display information for the channel just created (see figure 42). Channels will be numbered sequentially, starting with 1, in the order they are entered.

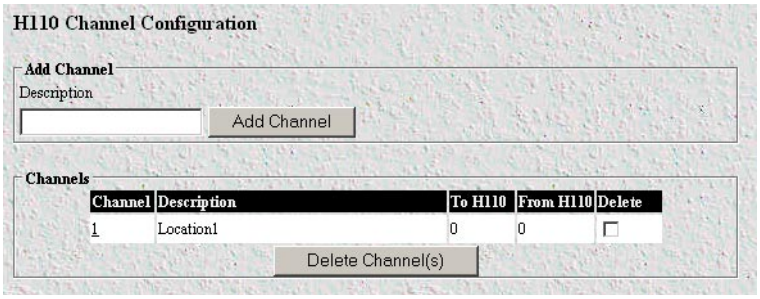


Figure 42. H110 Channel Configuration page showing new channel

4. The channel number on the left becomes a hyperlink, click on the channel number to display the channel timeslot mapping screen (see figure 43). The *H.110 Settings* page displays channel number, description, and fields for adding a timeslot map.

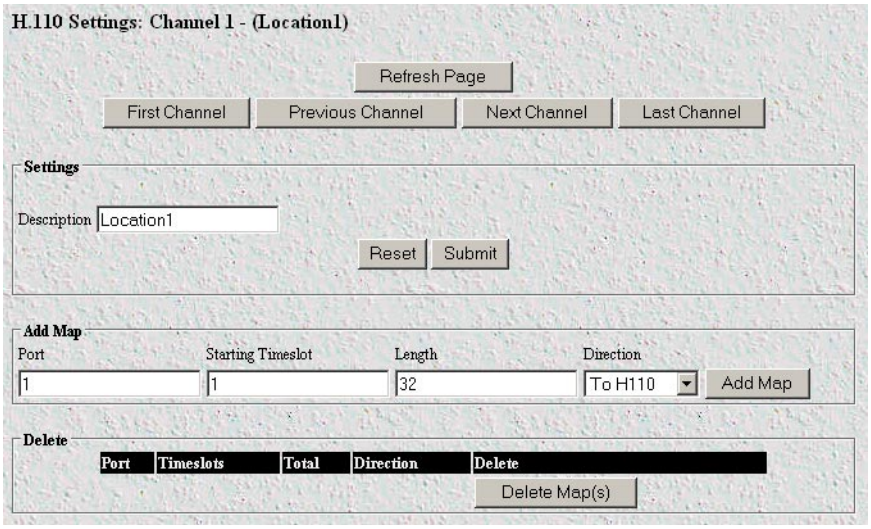


Figure 43. Channel timeslot mapping page

Configuring channel parameters

Enter configuration parameters for channel 1 (Location1) as follows:

1. Enter a port number in *Port* text box. H.110 bus port numbers range from 1 to 32. Enter port number **1** for this example.
2. Enter a starting timeslot number in the *Starting Timeslot* text box. Each H.110 port can handle up to 128 slots. In this example, timeslots 1–16 will be used, so type a **1** in this field.

3. Enter the length of the channel (in number of timeslots) in the *Length* text box. For example, if the range of timeslots was from 1–32, you would enter 32 timeslots in this field. In this example enter **16** for a length of 16 timeslots.
4. Select *To H.110* from the *Direction* menu. Since each link in the H.110 bus should be duplex, define the direction of transmission as "to H.110" or "from H.110".
5. Click the **Submit** button to save changes.

Note Two maps are necessary for each channel; both maps must have the same number of timeslots in each direction (see figure 44). In addition, the 6081RC H.110 port should connect to a corresponding 3096RC H.110 port. Similarly, the H.110 directions between the 6081RC and the 3096RC maps should complement each other (for example timeslots in a "to H.110" port for the 6081RC, should go to timeslots in a "from H.110" port for the 3096RC).

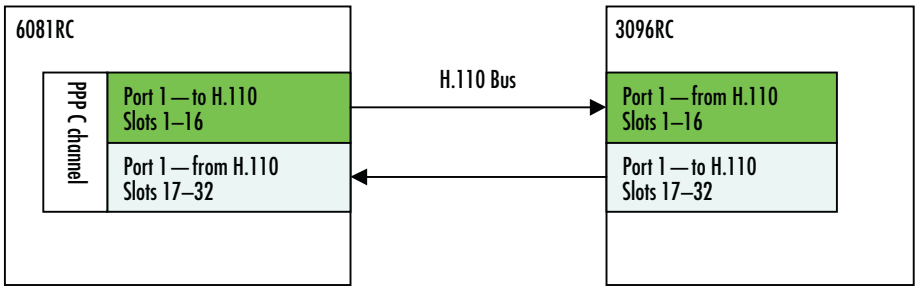


Figure 44. H.110 port correspondence and direction

6. Click the **Add Map** button to create the second map for *Location1*. This map will connect port 1 in the 6081RC to the *From H.110* direction.
7. Enter **1** in the *Port* text box.

Note Any other available port (from 1 to 32) could have been selected as long as it matched a 3096RC port.

8. Enter **17** in the *Starting Timeslot* text box. You must use timeslots 17–32 as timeslots 1–16 for port 1 have already been used for the *To H.110* direction.
9. Enter **16** in the *Length* text box.
10. Select *From H.110* from the *Direction* menu.
11. Click the **Submit** button to save changes.

Now that both maps have been entered, the *H.110 Settings* page will display the map information as shown in figure 45.

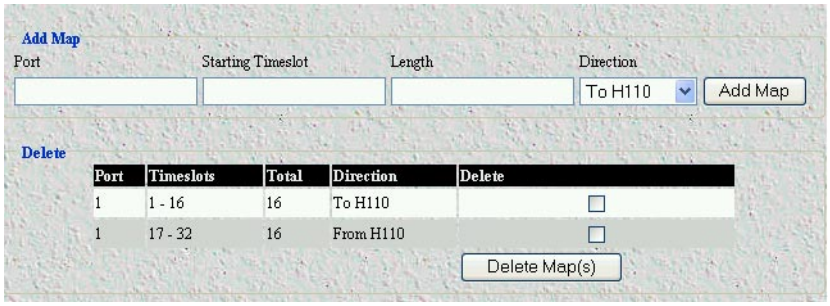


Figure 45. H.110 Settings page showing map information for new channel

The first H.110 channel connecting the 6081RC to a 3096RC has been created. As we are linking two remote CPEs to the 6081RC via the 3096RC in this application, a second H.110 channel must be created as follows:

1. Click on the *H.110 link* in the Configuration Menu pane (see figure 17 on page 37) to display the H.*110 Channel Configuration* page (see figure 41).
2. In the *Description* text box, type **location 2**.
3. Click the **Add Channel** button.
4. Repeat steps 1 through 11 (substituting port 2 for port 1) to configure Location2.

The page will refresh and display the following information for channels 1 and 2 (see figure 46).

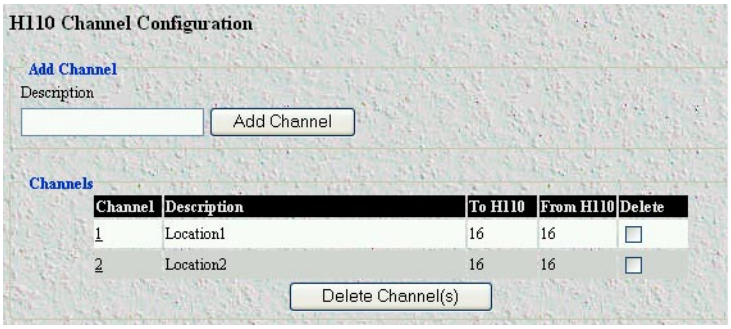


Figure 46. H110 Channel Configuration page showing new channel

Bridge group configuration

Bridge Groups are virtual modules that bridge traffic to and from the physical ports attached to the 6081RC (in this example H.110 and Ethernet ports). This section describes an application where IP traffic arriving from the remote DSL links through the 3096RC and the H.110 ports in PPP/BCP encapsulation, is bridged (PPP/BCP encapsulation is terminated) and Ethernet packets sent to the Ethernet port transparently.

```
ETH0----Bridge Group 1 (BCP)--- ----H.110 channel 1---3096RC---DSL----3201(BCP)---
```

Defining a bridge group

Do the following to configure bridge groups:

1. Click on the *Bridge* link in the Configuration Menu pane (see figure 17 on page 37) to display the *Bridge Configuration* page (see figure 47). The 6081RC creates a default bride, *Bridge 1*. You can use Bridge 1 or create one or more bridges. In this example a new bridge will be created.

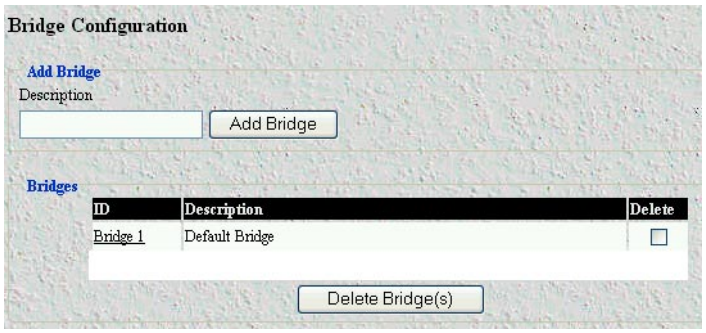


Figure 47. Bridge Configuration page

2. Type a short definition of the bridge group in the *Description* text box (see figure 47). In this example example enter *Bridge 2*. The bridge group will link H.110 channel 1 and 2 and the front panel Ethernet port.
3. Click the **Add Bridge** button. The page will refresh and display the information shown in figure 48.

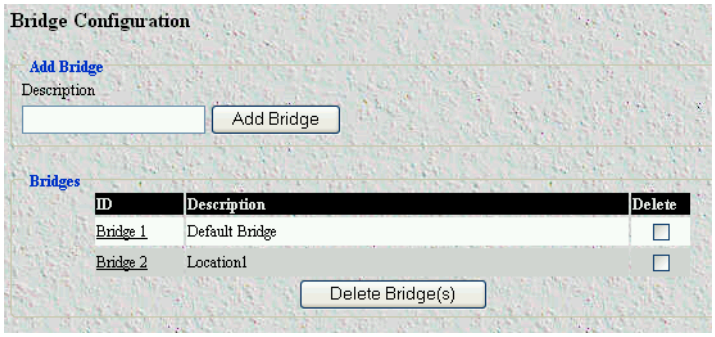


Figure 48. Bridge Configuration page showing new bridge

Configuring bridge group parameters

Now that the bridge group is created, do the following to configure the bridge group:

1. Click on the *Bridge 2* group hyperlink under the *ID* column in the *Bridges* section of the *Bridge Configuration* page (see figure 48 on page 69) to display the *Bridge 2 Configuration* page (see figure 49).

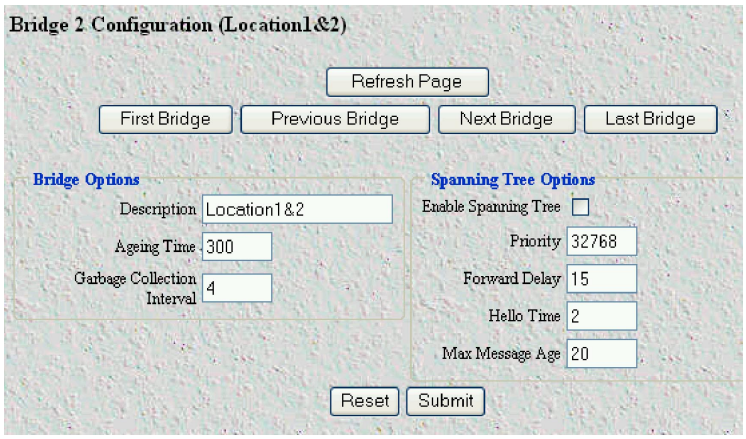


Figure 49. Bridge 2 Configuration page

2. Type a short description for Bridge 2 in the *Description* text box (see figure 49). For this example, type **Location1&2**. Do not change the default values for *Aging Time* and *Garbage Collection*, and do not enable the Spanning Tree options.
3. Click the **Submit** button to activate the configuration.

PPP channel configuration

The PPP channel configuration page is where you can assign bridge groups to H.110 channels, and define such PPP link parameters as MRU, retry times, authentication, etc.

1. Click on the *PPP* link in the Configuration Menu pane (see figure 17 on page 37) to display the *PPP Configuration* page (see figure 50).

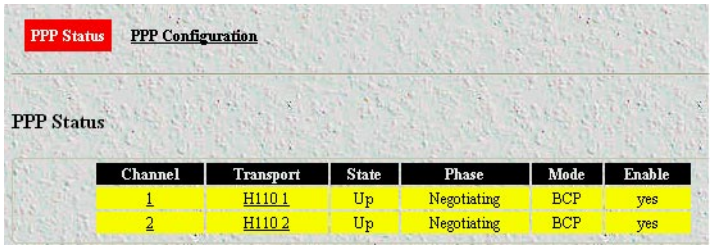


Figure 50. PPP Configuration page

2. The *PPP Configuration* page lists the H.110 channel connections previously defined during H.110 channel configuration. Click the Channel 1 hyperlink to display the *PPP Options: Channel 1* page (see figure 51).

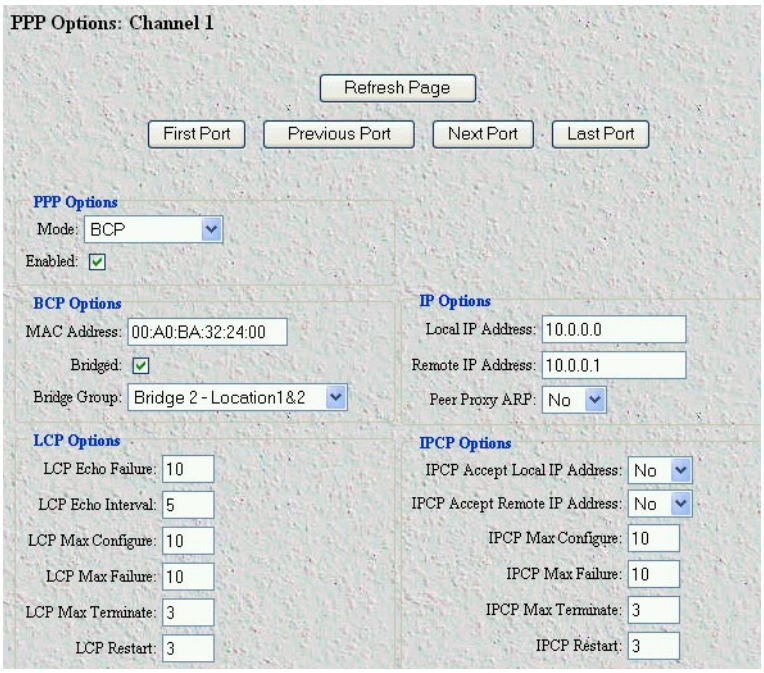


Figure 51. PPP Options page

3. In the *PPP Options* section, select *BCP* (bridge control protocol) or *IPCP* (Internet protocol control protocol from the *Mode* menu. For this example, choose *BCP.*
4. Click to add a checkmark to the *Enabled* box.
5. In the *BCP Options* section, select the bridge group that the PPP channel will be attached to from the *Bridge Group* menu. For this example, select *Bridge 2*
6. Click to add a checkmark to the *Bridged* box. Do not change the default settings for LCP, IP and IPCP
7. Click the **Submit** button to save changes.
8. Repeat steps 1 through 7 to configure channel 2 for PPP. The page will refresh and display the information shown in figure 52.

   At this point the 6081RC will start negotiating PPP/BCP connections with the remote CPE. The *Status* window will turn yellow to indicate that negotiation is in progress.

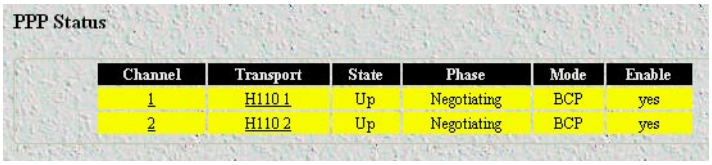


Figure 52. PPP Status page

The following section describes attaching Bridge 2 to the Ethernet port so traffic bridged from the remote CPEs is forwarded to the LAN connected to the 6081RC front panel Ethernet port.

Note Bridge 2 can be attached to any physical interface including back-plane Ethernet ports or other H.110 ports.

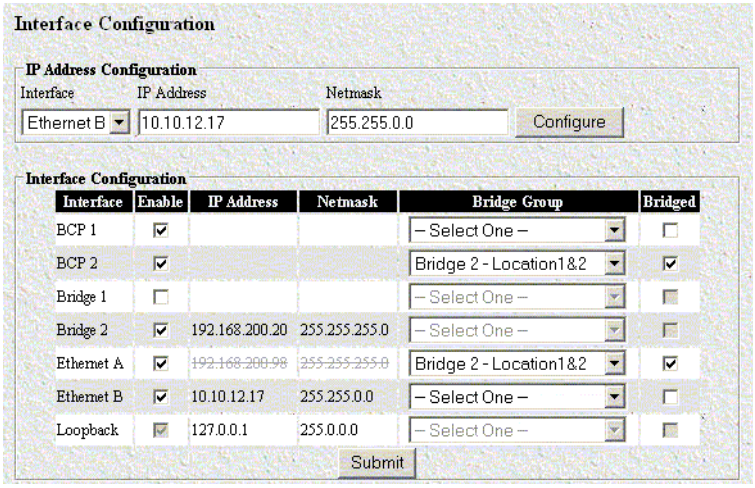


Figure 53. Interface Configuration page

Interface configuration

The Interface Configuration page displays all interfaces (physical and logical) previously defined. In this example, PPP interfaces *BCP 1* and *BCP 2*, and corresponding bridges *Bridge 1* and *Bridge 2*, *Ethernet A* (6081RC front panel Ethernet interface), and a *Loopback* interface (default) are shown.

Note BCP and bridge interfaces are only shown on this page after all steps in H.110 channel configuration, Bridge Group configuration, and PPP channel configuration have been completed.

To activate a PPP/BCP connection between the remote CPEs (*Location1&2*) and the 6081RC bridge, do the following:

1. Click the check boxes in the *Enable* column to add a check to the *BCP 1*, *BCP 2*, and *Bridge 2*) entries in the *Interface* column (see figure 53).

   Note Although we are not using BCP 1 to bridge data, the 6081RC needs to see this default PPP module enabled in order to activate the rest of the sessions.

2. In the *BCP 2* row (see figure 53), use the drop down menu under the *Bridge Group* column to select the *Bridge 2 - Location1&2*" option. Under the Bridged column, place a checkmark on the box corresponding to BCP2.
3. Click on the **Submit** button to save changes.

At this time, a PPP/BCP connection between the 6081RC and the remote CPEs may have been established (check this by clicking on the PPP main menu option), each PPP connection will be displayed in color code, green means a connection has been established. However, there is no connection between the PPP/BCP modules and the Ethernet port (that is, the bridge module does not have a path to the Ethernet port and therefore no bridged data can be sent to the a LAN).

At this time, a PPP/BCP connection between the 6081RC and the remote CPEs may have been established (check this by clicking on the PPP main menu option), each PPP connection will be displayed in color code, the color green meaning that a connection has been established. However, there is not yet a connection between the PPP/BCP modules and the Ethernet port (that is, the bridge module does not have a path to the Ethernet port and therefore no bridged data can be sent to the a LAN).

To activate a connection between the bridge module and the front panel Ethernet interface (*Ethernet A*), do the following:

1. In the *Ethernet A* row (see figure 53), click to add a checkmark on the box under the *Enabled* column.
2. In the *IP Address Configuration* section of the *Interface Configuration* page (see figure 54), select *Bridge 1* from the *Interface* menu.

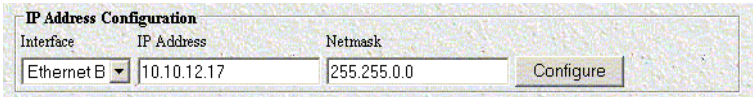


Figure 54. IP Address Configuration section of the Interface Configuration page

3. Type an *IP Address* of **192.168.200.20** and a *Netmask* of **255.255.255.0**.
4. In the *Ethernet A* row, under the *Bridge Group* column, select *Bridge 2 – Location1&2* from the menu, then click to add a checkmark to the box under the *Bridged* column.
5. Click the **Submit** button to save changes.

Note The 6081RC management web server can only be accessed via Bridge 2 IP address 192.168.100.20. It may take a several minutes for the card to respond to management commands after this change.

Note If the 6081RC is equipped with more than one external Ethernet port, the card can be managed from a non-bridged Ethernet port.

Chapter 9 Operation and shutdown

Chapter contents

Introduction 75
Activating the Model 6081RC 75
De-activating the Model 6081RC 75

Introduction

This chapter describes how to start up and power down the Model 6081RC.

Activating the Model 6081RC

The Model 6081RC is activated by completing the procedures in Chapter 2, "Hardware installation" and Chapter 3, "Initial configuration of the Model 6081RC". To activate the 6081RC, please follow the procedures in those chapters.

The Model 6081RC is designed for unattended operation. Once the Model 6081RC has been installed and configured, no further operator action is required under normal conditions.

De-activating the Model 6081RC

Perform the following procedure to deactivate the Model 6081RC.

> **Note** Be sure to wear an anti-static strap to prevent electrostatic damage to the blade.

1. Unlock the handles on the front of the 6081RC by pressing the red button on each handle. The button immediately activates the switch (turning it to an open position), while the button itself remains depressed. Remove the blade by pushing the handles outwards.
2. Remove the Model 6081RC from the rack chassis. Place the blade on an anti-static surface.

Chapter 10 **Troubleshooting and maintenance**

Chapter contents

Introduction 77
Fault analysis 78
Periodic maintenance 78
Calibration 78
Maintenance 79
Replacing the Model 6081RC 79
Exporting the current Model 6081RC configuration 79
Removing the defective Model 6081RC 81
Installing the replacement Model 6081RC 82
Importing a saved configuration 82
Completing the installation 82

Introduction

This chapter describes troubleshooting and fault analysis that can be performed by the operator. If you require more help, refer to Chapter 11, "Contacting Patton for assistance". Refer to table 4 for a list of common symptoms and suggested remedies.

Note The following information assumes that there is only one failure involving the Model 6081RC and that if you perform the corrective action listed, it will solve the problem. If you are unable to correct a failure, refer to Chapter 11, "Contacting Patton for assistance".

Note When removing the 6081RC from the chassis, follow the procedures cited in "De-activating the Model 6081RC" on page 75.

Note When re-inserting the 6081RC into the chassis, please follow the procedures cited in "Model 6081RC blades installation" on page 25.

Table 4. Symptoms

Problem	Corrective Action
PWR LED (green) is extinguished	To verify that power is being supplied to the Model 6081RC via the CPCI chassis power bus: verify that at least one chassis power supply module is installed in the chassis and functioning normally.
PWR LED (green) is flashing	The 6081RC has detected a power failure on a power bus. There may be a problem with the CPCI chassis power system which feeds the Model 6081RC such as a failed power supply module in the chassis. The Model 6081RC will function normally with one power supply. Inspect the power supplies in the CPCI chassis to identify and replace the failed power supply module. If no failed power supply is found, or if the POWER LED continues flashing, contact Patton Technical Support to determine if the Network Access Router should be replaced.
ENET LED (green) is extinguished	• A valid Ethernet link has not been detected. Verify that the Model 6081RC is connected by means of an Ethernet cable to an Ethernet hub, switch, or workstation and that both ends of the cable are plugged in. • Verify that the hub, switch, or workstation is powered on. • Verify that the correct cable is being used—either a straight through or cross-over cable depending on whether you are connecting to a workstation (PC), hub, or switch. • Replace the Ethernet cable. If the problem still exists, contact Patton Technical Support to determine if the Network Access Router should be replaced.

Fault analysis

The following procedures outline steps you should follow when troubleshooting a Model 6081RC malfunction.

1. If possible, talk to the person who filed the trouble complaint and determine the operational symptoms. Record the symptoms on the appropriate trouble report form (include the front panel LED indications).
2. Refer to table 5 for LED definitions and compare the recorded results from the trouble report against those in the table, then refer to the section recommended in the table for the maintenance procedure that will repair the malfunction.

Table 5. LED definitions

LED	Location	Color	Status	Meaning
PWR	Front panel	Green	On solid	Power is being applied. No action recommended.
			Flashing	The 6081RC has detected a power failure on a power bus. There may be a problem with the CPCI power supply system such as a failed power supply module in the chassis. The Model 6081RC will function normally with one power supply. Inspect the power supplies in the CPCI chassis to identify and replace the failed power supply module. If the POWER LED continues flashing when all chassis power supplies are functional, contact Patton Technical Support to determine if the Network Access Router should be replaced.
			Off	No input power is being applied. Verify that at least one chassis power supply module is installed in the chassis and functioning normally.
ENET	Front panel	Green	On solid	Link status is nominal for the Ethernet port. No action recommended.
			Off	• A valid link has not been detected. • Verify that an Ethernet cable is plugged into the hub, switch, or workstation and the Ethernet port of the Model 6081RC. • Verify that the hub, switch, or workstation is powered on. • Verify that the correct straight-through or cross-over cable is being used, depending on whether you are connecting to a workstation (PC), hub, or switch. • Replace the cable. If the problem still exists, contact Patton Technical Support to determine if the Network Access Router should be replaced.
READY	Front panel	Blue	On	Card ready for removal from cPCI chassis.
			Off	Card not ready for removal from cPCI chassis. Do not remove card from chassis.

Periodic maintenance

Consult the rack chassis user manual for information on preventative maintenance (such as cleaning the chassis air cooling vents and filters to remove accumulated dust).

Calibration

The Model 6081RC requires no calibration.

Maintenance

This section describes replacing the Model 6081RC.

Replacing the Model 6081RC

If you isolate a problem to the a Model 6081RC component, the entire Model 6081RC must be replaced as follows.

Exporting the current Model 6081RC configuration

The 6081RC Network Access Router provides Import/Export functions. These functions enable you to back up *(export)* and restore *(import)* your Network Access Router's configuration parameters against possible failure. Should your Network Access Router ever need replacing, a previously saved copy of your *(exported)* configuration file can quickly be loaded *(imported)* into a replacement Model 6081RC.

Note Import/Export functions require superuser access privileges.

Note The parameters that will be exported are the power-up settings as they are stored in flash memory and may not be the current operating parameters. To ensure that you export the most current parameters, go to HOME, then under Immediate Actions, click on the **Record Current Configuration** button.

1. If you already have an exported backup copy of your current configuration, go to "Removing the defective Model 6081RC" on page 81. Otherwise, go to step 2.
2. On the Configuration Menu pane, click the *Import/Export* hyperlink to display the **Import/Export** page (see figure 55).

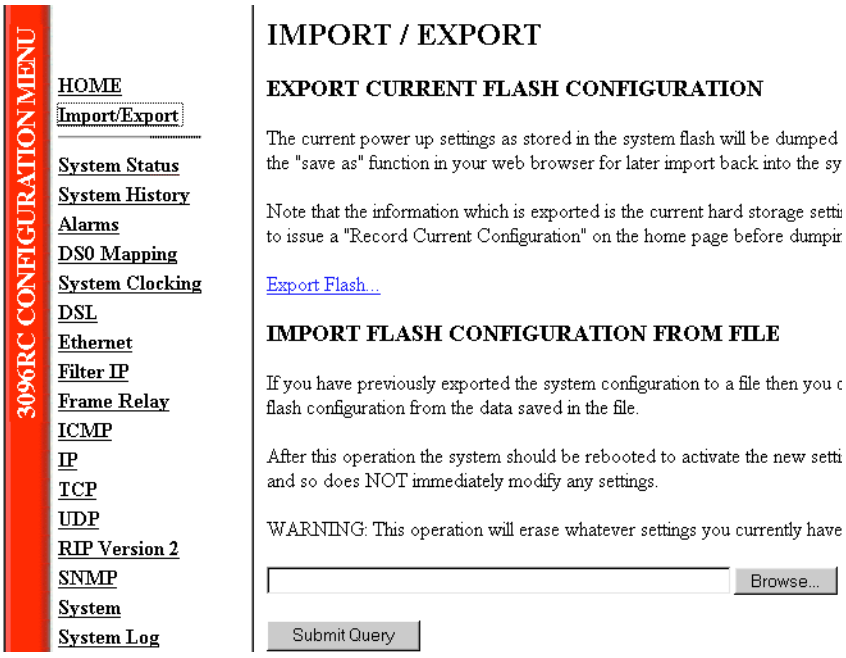


Figure 55. Import & Export Configuration page

3. To make a back-up copy of the configuration file currently stored in your Network Access Router's flash memory:

– On the Import/Export page (figure 55 on page 79) click the *Export Flash...* hyperlink. The Network Access Router will get the configuration file currently stored in your Network Access Router's flash memory and display it in your browser (figure 56)

Figure 56. Example Network Access Router flash memory configuration file displayed in a browser

– To save the displayed data as a text file, use your browser's **Save** function (see figure 57). Using Netscape or Internet Explorer, for example.

- Click the **File** menu.
- Click **Save As**. A dialog box will appear. Use the dialog to save the data displayed on your browser (your Network Access Router configuration parameters) to a text file.
- Select the folder in which you want to store the file,
- Type a file name.
- Click **Save**.

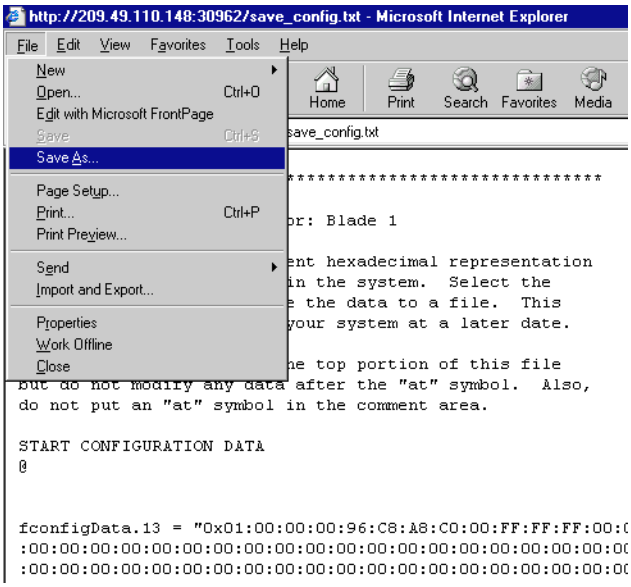


Figure 57. Saving the access server flash memory configuration data as a text file

Removing the defective Model 6081RC

1. Remove the replacement Model 6081RC from its shipping container and place it near the chassis in which the malfunctioning Model 6081RC is located.

   Note The Model 6081RC Network Access Router blades are hot-swappable, so it is not necessary to deactivate the rack chassis before replacing a blade.

2. Disconnect and label the following cables from the malfunctioning Model 6081RC:

   – The RS-232 CONFIG cable

   – The 10/100 Ethernet cable

3. Unlock the handles by pressing the red button on each handle. The button immediately activates the switch (turning it to an open position), while the button itself remains depressed. The blade can then be removed.

4. Remove the malfunctioning Model 6081RC by pushing the handles outwards, pulling the card gently but firmly from its slot in the chassis. Place the removed card in the container the replacement Model 6081RC came in so you can return the defective Model 6081RC for repair.

Installing the replacement Model 6081RC

1. Insert the replacement Model 6081RC into the rack chassis.
2. Insert the rear blade into the desired slot in the rack chassis. Make sure the blade is seated properly in the slot guides.
3. Gently press the blade into the chassis until the alignment/ESD pin engages the chassis. When the blade is fully seated, the red buttons in the handles click up automatically, thus locking the handle and activating the switch (closed position). The click of the button gives a visual and audible confirmation that the board is fully seated.
4. Connect the following cables to the Model 6081RC:
   - The RS-232 CONFIG cable
   - The 10/100 ETHERNET cable
5. Verify that the green *PWR* LED is lit.

Importing a saved configuration

Before importing a saved configuration, you must define the Model 6081RC's IP address and netmask. These parameters are defined via the Model 6081RC RS-232 CONFIG port on the Model 6081RC.

1. Refer to Chapter 3, "Initial configuration of the Model 6081RC" and follow the procedures contained in section "Initial configuration through the RS-232 control port" on page 31.
2. To import a saved configuration, connect your Web browser to the Administration Pages, then click on *Import/Export* under the Configuration Menu to display the **Import/Export** page (figure 55 on page 79).
3. To import a configuration file into the Model 6081RC, type the complete path and filename for the configuration file you wish to load or click on the **Browse…** button to select the desired file, then click the **Submit Query** button.

   Upon successfully importing the file, the Model 6081RC will display *Configuration Load Complete*, indicating that the new operating parameters have been loaded into flash memory.
4. On the Configuration Menu, click the *HOME* hyperlink, then click the **Hard Reset** button under *Immediate Actions*.

> **Note** ***Do not*** select **Record Current Configuration** after importing configuration parameters.

Completing the installation

This section verifies that the Model 6081RC is fully operational.

1. Verify that the green *PWR* LED is lit. If the *PWR* LED is flashing green, refer to Chapter 5, "Troubleshooting and maintenance".

2. Verify that the green Ethernet LED is either flashing (indicating link status is nominal for the front Ethernet port) or on solid (indicating that link status is nominal for at least one of the Ethernet backplane connections).

The Model 6081RC is operational.

Chapter 11 Contacting Patton for assistance

Chapter contents

Introduction 85
Contact information 85
Warranty Service and Returned Merchandise Authorizations (RMAs) 85
Warranty coverage 85
Out-of-warranty service 85
Returns for credit 85
Return for credit policy 86
RMA numbers 86
Shipping instructions 86

Introduction

This chapter contains the following information:

- "Contact information"—describes how to contact Patton technical support for assistance.
- "Warranty Service and Returned Merchandise Authorizations (RMAs)"—contains information about the RAS warranty and obtaining a return merchandise authorization (RMA).

Contact information

Patton Electronics offers a wide array of free technical services. If you have questions about any of our other products we recommend you begin your search for answers by using our technical knowledge base. Here, we have gathered together many of the more commonly asked questions and compiled them into a searchable database to help you quickly solve your problems.

- Online support—available at **www.patton.com**.
- E-mail support—e-mail sent to **support@patton.com** will be answered within 1 business day
- Telephone support—standard telephone support is available Monday through Friday, from 8:00 A.M. to 5:00 P.M. EST (8:00 to 17:00 UTC-5), Monday through Friday by calling **+1 (301) 975-1007**

Warranty Service and Returned Merchandise Authorizations (RMAs)

Patton Electronics is an ISO-9001 certified manufacturer and our products are carefully tested before shipment. All of our products are backed by a comprehensive warranty program.

Note If you purchased your equipment from a Patton Electronics reseller, ask your reseller how you should proceed with warranty service. It is often more convenient for you to work with your local reseller to obtain a replacement. Patton services our products no matter how you acquired them.

Warranty coverage

Our products are under warranty to be free from defects, and we will, at our option, repair or replace the product should it fail within one year from the first date of shipment. Our warranty is limited to defects in workmanship or materials, and does not cover customer damage, lightning or power surge damage, abuse, or unauthorized modification.

Out-of-warranty service

Patton services what we sell, no matter how you acquired it, including malfunctioning products that are no longer under warranty. Our products have a flat fee for repairs. Units damaged by lightning or elephants may require replacement.

Returns for credit

Customer satisfaction is important to us, therefore any product may be returned with authorization within 30 days from the shipment date for a full credit of the purchase price. If you have ordered the wrong equipment or you are dissatisfied in any way, please contact us to request an RMA number to accept your return. Patton is not responsible for equipment returned without a Return Authorization.

Return for credit policy

- Less than 30 days: No Charge. Your credit will be issued upon receipt and inspection of the equipment.
- 30 to 120 days: We will add a 20% restocking charge (crediting your account with 80% of the purchase price).
- Over 120 days: Products will be accepted for repairs only.

RMA numbers

RMA numbers are required for all product returns. You can obtain an RMA by doing one of the following:

- Completing a request on the RMA Request page in the *Support* section at **www.patton.com**
- By calling **+1 (301) 975-1000** and speaking to a Technical Support Engineer
- By sending an e-mail to **returns@patton.com**

All returned units must have the RMA number clearly visible on the outside of the shipping container. Please use the original packing material that the device came in or pack the unit securely to avoid damage during shipping.

Shipping instructions

The RMA number should be clearly visible on the address label. Our shipping address is as follows:

Patton Electronics Company
RMA#: xxxx
7622 Rickenbacker Dr.
Gaithersburg, MD 20879-4773 USA

Patton will ship the equipment back to you in the same manner you ship it to us. Patton will pay the return shipping costs.

Appendix A **Compliance information**

Chapter contents

Compliance 88
Radio and TV interference 88
CE notice (Declaration of Conformity) 88

Compliance

The Model 6081RC EdgeRoute Network Access Server has achieved the following approvals and certifications:

- RTTE Directive (CE Mark)
  - EMC Directive 89/336/EEC
  - Low Voltage Directive 73/23/EEC (EN 60950)
- EMC
  - FCC Part 15, Subpart B, Class A

Radio and TV interference

The IPLink router generates and uses radio frequency energy, and if not installed and used properly-that is, in strict accordance with the manufacturer's instructions-may cause interference to radio and television reception. The IPLink router have been tested and found to comply with the limits for a Class A computing device in accordance with specifications in Subpart B of Part 15 of FCC rules, which are designed to provide reasonable protection from such interference in a commercial installation. However, there is no guarantee that interference will not occur in a particular installation. If the IPLink router does cause interference to radio or television reception, which can be determined by disconnecting the unit, the user is encouraged to try to correct the interference by one or more of the following measures: moving the computing equipment away from the receiver, re-orienting the receiving antenna and/or plugging the receiving equipment into a different AC outlet (such that the computing equipment and receiver are on different branches).

Disconnect all power before servicing.

The IPLink router contains no user serviceable parts.

The mains outlet that is utilized to power the equipment must be within 1 foot (3 meters) of the device and shall be easily accessible.

CE notice (Declaration of Conformity)

This equipment conforms to the requirements of Council Directive 1999/5/EC on the approximation of the laws of the member states relating to Radio and Telecommunication Terminal Equipment and the mutual recognition of their conformity.

The safety advice in the documentation accompanying this product shall be obeyed. The conformity to the above directive is indicated by the **CE** sign on the device.