



NEC

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ISSUE 1

NEAX IPS

INTERNET PROTOCOL SERVER

In-Skin Router Installation Guide

JUNE, 2005

NEC Corporation

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PAGE No.	ISSUE No.								PAGE No.	ISSUE No.							
	1	2	3	4	5	6	7	8		1	2	3	4	5	6	7	8
i	1								35	1							
ii	1								36	1							
iii	1								37	1							
iv	1								38	1							
1	1								39	1							
2	1								40	1							
3	1								41	1							
4	1								42	1							
5	1								43	1							
6	1								44	1							
7	1								45	1							
8	1								46	1							
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32	1								70	1							
33	1								71	1							
34	1								72	1							
ISSUE 1				ISSUE 2				ISSUE 3				ISSUE 4					
DATE	JUNE, 2005			DATE				DATE				DATE					
ISSUE 5				ISSUE 6				ISSUE 7				ISSUE 8					
DATE				DATE				DATE				DATE					
NEAX IPS In-Skin Router Installation Guide												Revision Sheet 1/3					
NWA-008869-001																	

PAGE No.	ISSUE No.								PAGE No.	ISSUE No.							
	1	2	3	4	5	6	7	8		1	2	3	4	5	6	7	8
73	1								111	1							
74	1								112	1							
75	1								113	1							
76	1								114	1							
77	1								115	1							
78	1								116	1							
79	1								117	1							
80	1								118	1							
81	1								119	1							
82	1								120	1							
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84	1								122	1							
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86	1								124	1							
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104	1								142	1							
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106	1								144	1							
107	1								145	1							
108	1								146	1							
109	1								147	1							
110	1								148	1							
ISSUE 1				ISSUE 2				ISSUE 3				ISSUE 4					
DATE	JUNE, 2005			DATE				DATE				DATE					
ISSUE 5				ISSUE 6				ISSUE 7				ISSUE 8					
DATE				DATE				DATE				DATE					
NEAX IPS In-Skin Router Installation Guide																	
														Revision Sheet 2/3			
NWA-008869-001																	

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NEAX IPS In-Skin Router Installation Guide

TABLE OF CONTENTS

INTRODUCTION	1
PURPOSE	1
OUTLINE OF THIS MANUAL	1
TERMS IN THIS MANUAL	3
PBX System Designation	3
Terminal Name	3
REFERENCE MANUAL	4
CHAPTER 1 GENERAL INFORMATION	5
SYSTEM OUTLINE	6
Main Feature of In-Skin Router	6
IPv6/IPv4 Tunneling	7
Broadband Service Support	8
Network Connection	9
CARD NAME AND FUNCTION	10
SYSTEM CONDITIONS	11
Ethernet Connection	11
Digital Private Line Connection	11
Local Console Connection	11
CHAPTER 2 INSTALLATION	13
PRECAUTIONS	14
Static Electricity Guard	14
REQUIRED EQUIPMENT	17
INSTALLATION PROCEDURE	19
Switch Settings of MP Card	21
Switch Settings of PN-RTA Card	33
Switch Settings of PZ-M649 Card	36
Switch Settings of PZ-M650 Card	39
Switch Settings of PN-24DTA-C Card	42
Switch Settings of PN-30DTC-C Card	48
Locations of Lamps and Connectors of PZ-M623 Card	53
Mounting PZ-M649 Card/PZ-M650 Card/PZ-M623 Card	54
Mounting PN-RTA Card	55
LAN Cable Connection of PN-RTA Card	57
Cable Connection of PZ-M649 Card	58
Cable Connection of PZ-M650 Card	63

TABLE OF CONTENTS

LAN Cable Connection of PZ-M623 Card	68
Connecting Local Console to PN-RTA Card	69
CHAPTER 3 BASIC OPERATIONS AND VARIOUS EXPLANATIONS	71
COMMAND ENTRY	72
Commands	72
Error message that may be displayed during command entry	72
KEY OPERATIONS AND SCREEN DISPLAYS	73
Moving the cursor	73
Editing characters on the command line	73
Calling previously entered commands	74
Getting assistance in command entry	75
Entering an abbreviation of a command	76
Help functions	76
Screen displays	77
Notes on command entry	77
MODES	78
Mode configuration	78
Changing the In-Skin Router between operation and config modes	79
Changing the In-Skin Router between different config modes	80
From operation mode to login authentication (logout)	80
LOGIN AND USER RIGHTS	81
User rights	81
Registering users and setting user rights	81
Changing passwords	82
Erasing users	83
Login	83
Use of modes by more than one user	84
SETTING DATA AND PROGRAM FILES	85
Setting data and programs	85
Locations used to store setting data and the program	86
Startup config and running config	87
Startup sequence	87
CHAPTER 4 INITIALIZATION	91
INITIALIZATION PROCEDURE	92
TURNING ON THE POWER	93
REGISTERING USERS AND SETTING PASSWORDS	94
SETTING THE DATE AND TIME	96
SETTING DEVICE NAMES	97
SAVING RUNNING CONFIG	98

TABLE OF CONTENTS

RESTARTING THE IN-SKIN ROUTER WITH A COMMAND AND LOGGING IN	99
TURNING OFF THE POWER TO TERMINATE THE IN-SKIN ROUTER	100
SETTING UP THE LAN PORTS FOR SUITABLE COMMUNICATION MODES	101
Setup method	101
SETTING UP THE WAN PRIVATE LINE (T1)	104
Setting line attributes for a T1 Line	104
Shutting down and restarting the interface for the settings to take effect	105
Saving setting data	105
Checking the status of interface	105
SETTING UP THE WAN PRIVATE LINE (E1)	106
Setting line attributes for an E1 Line	106
Shutting down and restarting the interface for the settings to take effect	107
Saving setting data	107
Checking the status of interface	107
SETUP FOR A REMOTE CONSOLE	108
Setting an IP address and validating the interface	109
Checking the settings	110
Starting up the telnet server	111
Checking the communication state	112
Saving setting data	114
CHAPTER 5 EXAMPLES OF SETUP ON NETWORKS	115
ROUTING SETUP EXAMPLES (IPv4)	116
Setting a static route	117
Setting RIP and RIPv2	118
Checking the communication state	119
ROUTING SETUP EXAMPLES (IPv6)	120
Enabling automatic address setting	121
Setting a static route	121
Setting RIPng	122
Checking the communication state	123
PPPoE SETUP EXAMPLE	124
Setup procedure	125
Shutting down a PPPoE connection	126
DIGITAL PRIVATE LINE NETWORK EXAMPLE (T1)	127
Setup procedure	128
DIGITAL PRIVATE LINE NETWORK EXAMPLE (E1)	130
Setup procedure	131
CHAPTER 6 MANAGEMENT AND MAINTENANCE	135
TFTP SETUP FOR FILE MANAGEMENT	136

TABLE OF CONTENTS

CONFIG MANAGEMENT	137
Saving with the write memory command	137
Config management with text files	138
UPGRADING THE PROGRAM	139
Upgrading procedure	140
MANAGEMENT WITH SNMP	144
Setup procedure	145
SETTING UP EVENT INFORMATION COLLECTION	148
Displaying event information on a console	149
Transferring event information to a syslog server	150
TELNET SECURITY	151
RESTARTING THE IN-SKIN ROUTER DURING OPERATION	152
Restarting by turning the power switch OFF and back ON	152
Restarting with the reload command	152
Restarting with the restart command	153
SUPER RESET	154
Procedure for performing a super reset	154
CHAPTER 7 TROUBLESHOOTING	157
IF THE LOCAL CONSOLE CANNOT BE USED	158
IF A REMOTE CONSOLE CANNOT BE USED	159
IF COMMUNICATION IS IMPOSSIBLE	160
If communication with a specific network is impossible	160
If communication is sometimes possible and sometimes impossible	160
If no communication is possible	160
IF THE IN-SKIN ROUTER DOES NOT START	161
If the ALARM lamp on the PN-RTA card is lit	161
If none of the lamps on the PN-RTA card is lit	161
If the boot monitor mode screen is displayed	161
COLLECTING FAULT INFORMATION	164
IF YOU WANT TO ERASE CONFIG	165
If you want to restore the settings of running config to those of startup config	165
If you want to erase all settings of config	165
IF SELF-DIAGNOSIS DOES NOT TERMINATES NORMALLY	166
APPENDIX SPECIFICATIONS	A1
SPECIFICATIONS	A2

INTRODUCTION

PURPOSE

This manual explains the system description, the hardware installation, each settings and operation, information for management and maintenance, and specifications for the In-Skin Router of the NEAX 2000 IPS INTERNET PROTOCOL SERVER.

OUTLINE OF THIS MANUAL

This manual consists of seven chapters and one appendix. The following paragraphs summarize Chapters 1 through 7 and appendix.

CHAPTER 1 GENERAL INFORMATION

This chapter explains the system outline, card name and function, and system conditions for In-Skin Router.

CHAPTER 2 INSTALLATION

This chapter explains the required equipment and the hardware installation procedure to provide In-Skin Router.

CHAPTER 3 BASIC OPERATIONS AND VARIOUS EXPLANATIONS

This chapter explains the each key function that is used by the console, each of mode, login and user rights, and the program configuration.

CHAPTER 4 INITIALIZATION

This chapter explains the basic setup operations that you must perform initially. Also explains the required setup for connecting a remote console.

CHAPTER 5 EXAMPLES OF SETUP ON NETWORKS

This chapter explains examples of setup for routing on IPv4 and IPv6 networks.

CHAPTER 6 MANAGEMENT AND MAINTENANCE

This chapter explains the information for maintenance and management, including file management, program upgrading, and event information collection procedures.

CHAPTER 7 TROUBLESHOOTING

This chapter explains the information that you may find helpful if an unexpected error occurs.

APPENDIX SPECIFICATIONS

This appendix explains specifications related to the In-Skin Router.

TERMS IN THIS MANUAL

PBX System Designation

PBX system is designated as “PBX” or “system” usually.

When we must draw a clear line between the PBX system, they are designated as follows.

2000 IPS : NEAX 2000 IPS INTERNET PROTOCOL SERVER

IPS^{DMR} : NEAX IPS^{DMR} INTERNET PROTOCOL SERVER^{DMR}

IPS^{DM} : NEAX IPS^{DM} INTERNET PROTOCOL SERVER^{DM}

Terminal Name

The following IP terminals are designated as “D^{term}IP” usually, unless we need to mention the type of terminal in particular.

D^{term}IP (IP Adapter Type) **[For North America Only]**

D^{term}IP (IP Bundled Type)

D^{term}IP INASET

D^{term}SP20

D^{term}SP30

NOTE 1: *D^{term}75 (Series E)/D^{term}85 (Series i) terminal can be used as the IP terminal by attaching the IP Adapter (IP Enabled D^{term}). This terminal provides users with all features currently available in D^{term}IP.*

NOTE 2: *In regard to China market, we have not released NEAX 2000 IPS INTERNET PROTOCOL SERVER but NEAX 2000 is released.*

REFERENCE MANUAL

During installation, refer also to the manuals below:

System Manual:

Contains the system description, hardware installation procedure and programming procedure for the NEAX 2000 IPS System.

Installation Procedure Manual:

Contains the installation procedure for the PBX system.

CHAPTER 1

GENERAL INFORMATION

This chapter explains the system outline, card name and function, and system conditions for the In-Skin Router.

SYSTEM OUTLINE	6
CARD NAME AND FUNCTION	10
SYSTEM CONDITIONS	11

SYSTEM OUTLINE

The In-Skin Router is an IPv6 high-speed access router that can be accommodated in NEAX 2000 IPS. With its full security functions, it allows you to create reliable, high-speed and high-quality networks.

Main Feature of In-Skin Router

High-speed transfer capability

With a high-speed software platform equipped, the In-Skin Router offers the transfer capability that can accommodate the traffic of the information that are on the increase in the network.

IPv6 support

The In-Skin Router supports standard IPv6 functions, accommodating IPv4 and IPv6 dual stacks. It also supports tunneling functions such as IPv6 over IPv4 and IPv4 over IPv6, making it easy for you to shift to an IPv6 network while taking advantage of your existing IPv4 network.

Broadband support

With the PPPoE protocol equipped, the router allows you to use broadband services such as ADSL and FTTH.

Full security functions

The In-Skin Router provides IPsec functions, allowing you to create a VPN over the Internet (PZ-M649 card/PZ-M650 card/PZ-M623 card is required).

Dynamic filtering functions, the router protects the internal network from illegal access and attack from the outside.

Backup Power

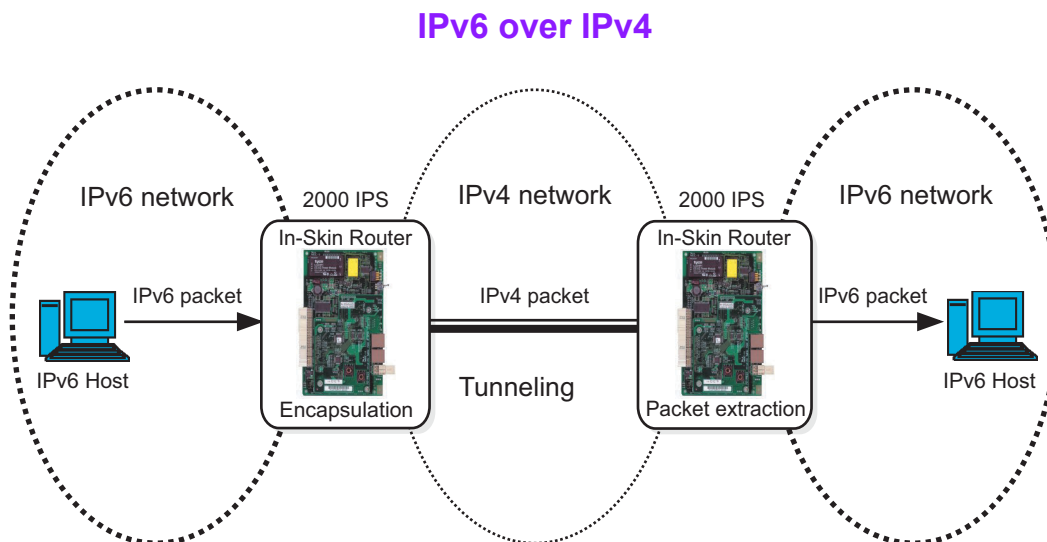
The battery of NEAX 2000 IPS is available as the backup power of In-Skin Router, in case of power failure etc. The backup power for In-Skin Router is not required.

IPv6/IPv4 Tunneling

Tunneling is the function that the information of a protocol is encapsulated into the packet of an another protocol and transferred. Tunneling makes it possible to transfer data between networks having different protocols. A maximum of eight tunnels are available, of which one is an automatic tunnel, and reserved. Many of the present networks are created with IPv4 and, therefore, IPv6 networks will be separated by IPv4 networks. If you want to shift to an IPv6 network in a stepwise manner, you can set a tunnel for the communication between hosts.

An In-Skin Router encapsulates an IPv6 packet into a IPv4 datagram to send the encapsulated packet over the IPv4 network. Upon receiving the encapsulated packet, another In-Skin Router extracts the IPv6 packet from the IPv4 packet and sends it to an IPv6 host.

By using an existing IPv4 network, you can shift smoothly to an IPv6 network.

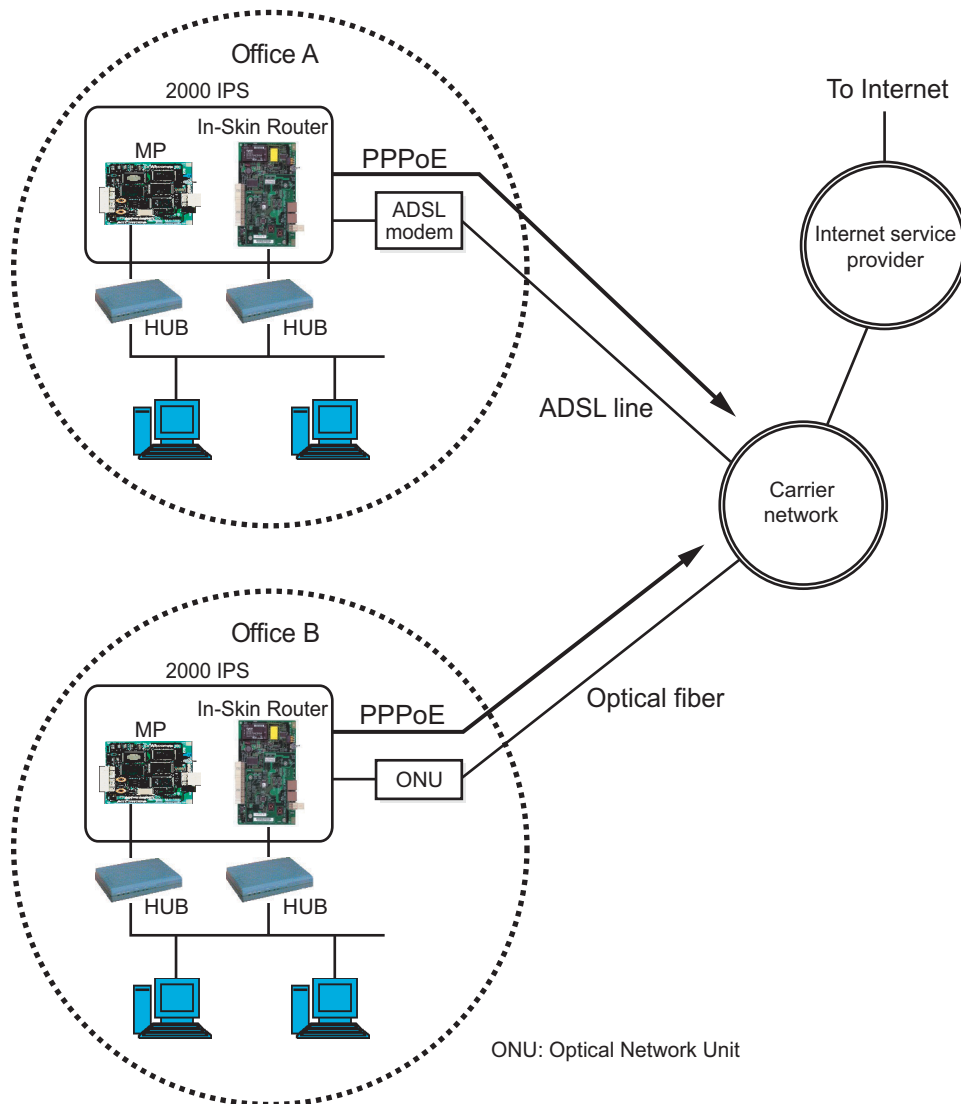


Broadband Service Support

With the PPPoE protocol equipped, this device allows you to connect to carriers that employ the PPPoE protocol for connection to broadband services such as ADSL and FTTH.

* Different carriers provide different services. You must check the details of services beforehand.

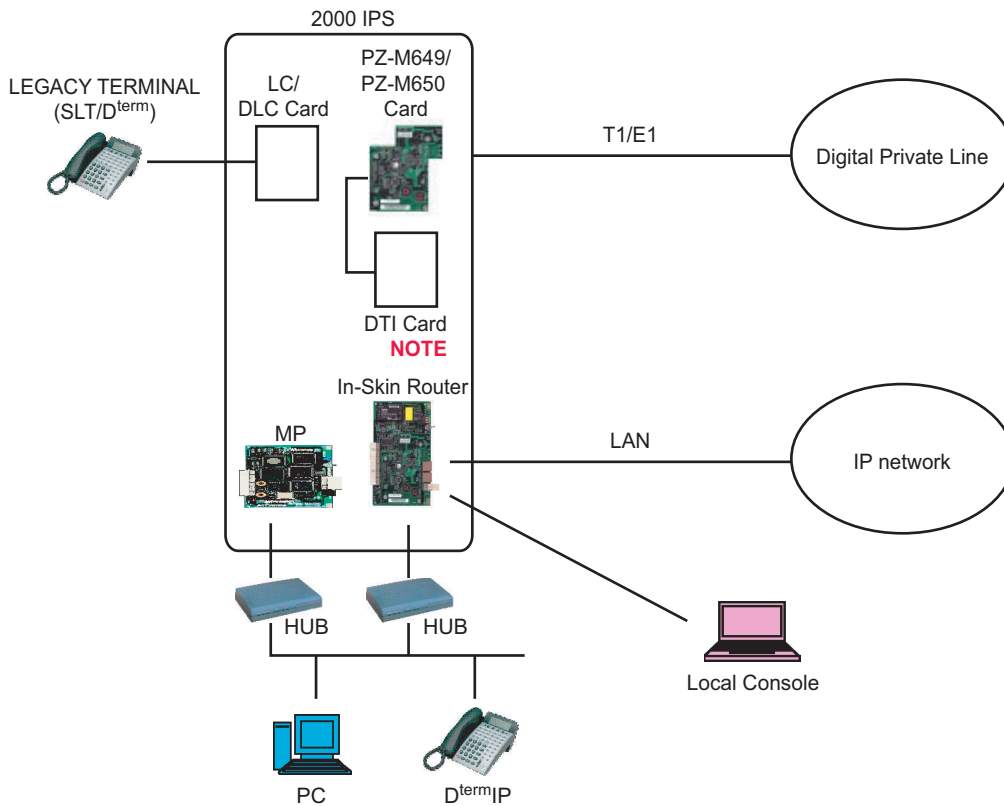
Broadband Service Support



Network Connection

The In-Skin Router enables the connection with IP network and Digital Private Line (PZ-M649/PZ-M650 card is required).

Network Connection



NOTE: When originating a call from legacy terminal (single line telephone/D^{term}) to a digital private network (T1) via PZ-M649 card, PN-24DTA-C (DTI) card is required.
When originating a call from legacy terminal (single line telephone/D^{term}) to a digital private network (E1) via PZ-M650 card, PN-30DTC-C (DTI) card is required.

CARD NAME AND FUNCTION

The table below shows the circuit card name and function for In-Skin Router.

In-Skin Router Card Name and Function

CARD NAME	FUNCTIONAL NAME	FUNCTION
PN-RTA	RTA	In-Skin Router Card 10/100BASE-TX: 1, 10BASE-T: 1, RS-232C (D-sub 9pin) Maximum 8 cards per PIM
PZ-M649	DTI	T1 Digital Trunk Interface (1.5 Mbps) Card Mounted on PN-RTA Card Provided a built-in CSU.
PZ-M650	DTI	E1 Digital Trunk Interface (2 Mbps) Card Mounted on PN-RTA Card Provided a built-in CSU.
PZ-M623	ETHER	Ether Control Card Mounted on PN-RTA Card 10BASE-T: 1

SYSTEM CONDITIONS

Ethernet Connection

For the LAN Ports of In-Skin Router, straight or cross cable (UTP or STP) is required. Prepare the cable according to the equipment to be connected with the In-Skin Router, such as HUB, ADSL modem or PC.

Digital Private Line Connection

PZ-M649 card is required for connection with the digital private line (T1).

PZ-M650 card is required for connection with the digital private line (E1).

Local Console Connection

In-Skin Router is equipped with a console port. By connecting the local console (such as PC) to the console port, you can perform basic setup of In-Skin Router from the local console.

As the connecting cable, the MAT cable (MAT CA-P/MAT CA-R/MAT CA-T) is required.

The local console requires a communication software conforming to VT-100. The communication software should be set as follows.

Item	Setting
Communication rate	9600 bps
Data length	8 bits
Parity	None
No. of stop bits	1 bit
Flow control	None

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CHAPTER 2

INSTALLATION

This chapter explains the required equipment and the hardware installation procedure to provide the In-Skin Router.

PRECAUTIONS	14
REQUIRED EQUIPMENT	17
INSTALLATION PROCEDURE	19

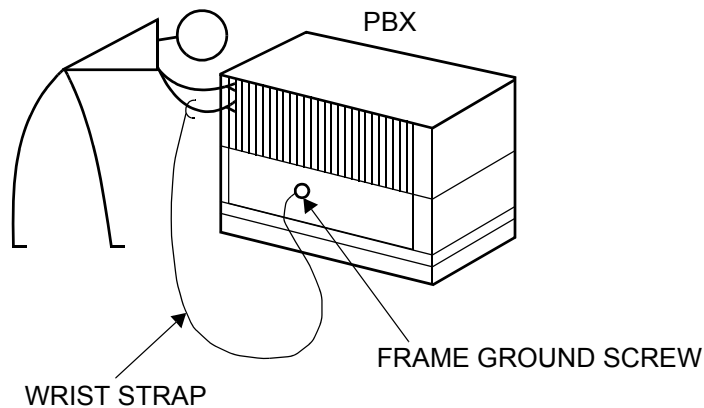
PRECAUTIONS

Static Electricity Guard

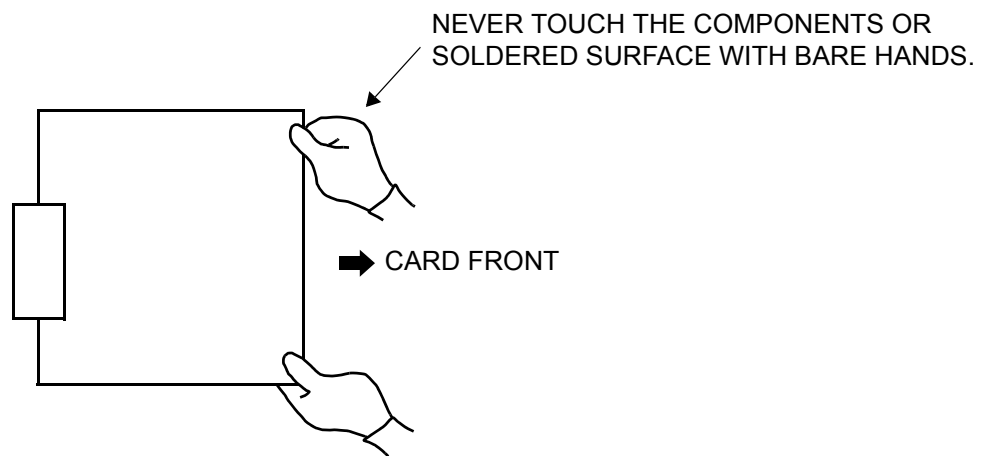
You must wear a grounded wrist strap to protect circuit cards from static electricity.

Static Electricity Guard

- WHEN PLUGGING/UNPLUGGING A CIRCUIT CARD



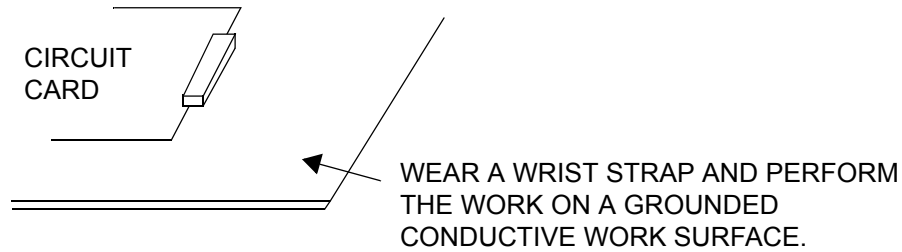
- WHEN HOLDING A CIRCUIT CARD



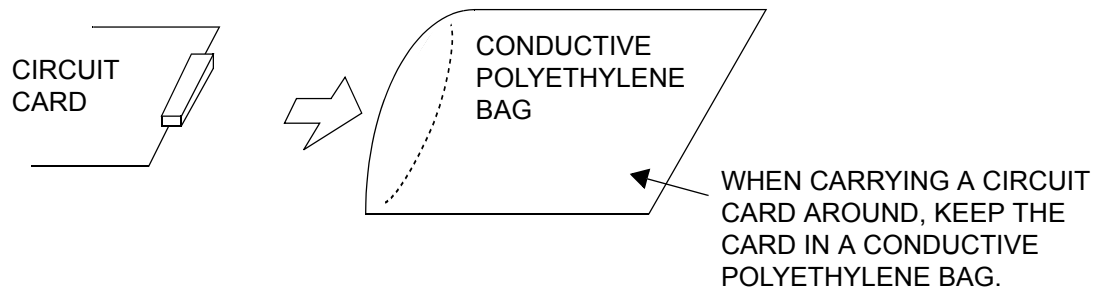
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Static Electricity Guard

- WHEN MAKING A SWITCH SETTING ON A CIRCUIT CARD



- WHEN CARRYING A CIRCUIT CARD

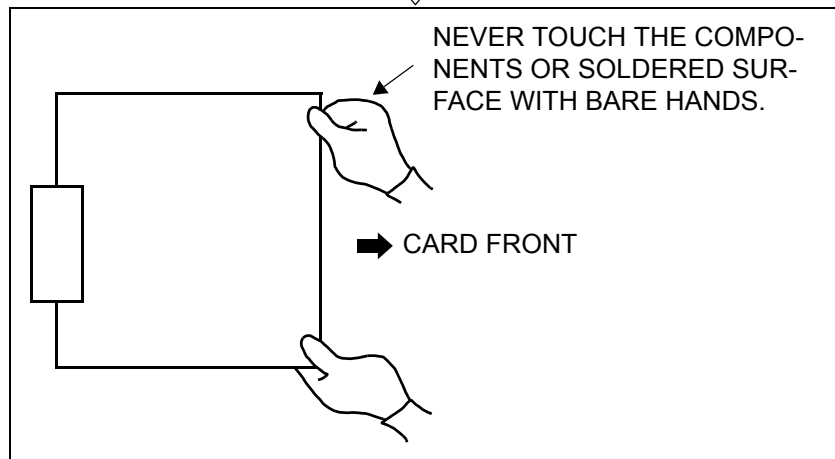
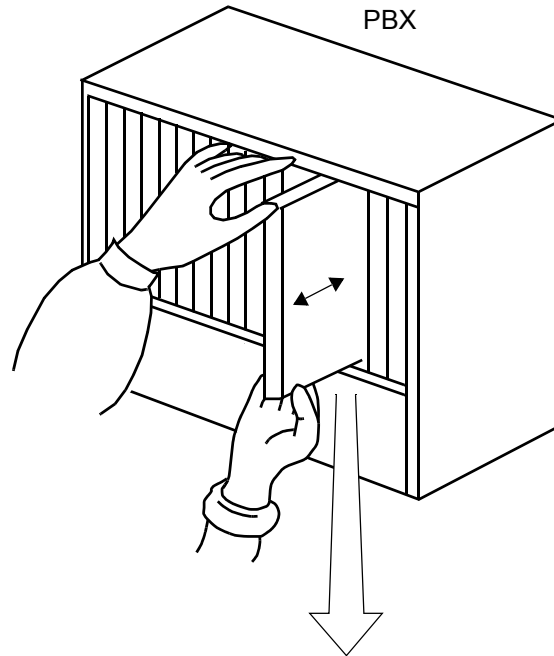


The mark shown below is attached to the sheet for the work in which circuit cards are handled. When engaging in such work, the installer must be careful not to cause damage by static electricity.



CAUTION

You must hold the edge of a circuit card when plugging or unplugging the circuit card. If you touch another area, you may be exposed to hazard voltages.



REQUIRED EQUIPMENT

This table shows the equipment required when providing the In-Skin Router.

Required Equipment for In-Skin Router

EQUIPMENT	DESCRIPTION	QUANTITY	REMARKS
PN-RTA (RTA)	In-Skin Router Card	1-8	Maximum 8/PIM
PZ-M649 (DTI)	T1 Digital Trunk Interface (1.5 Mbps) Card	1-8	Mounted on PN-RTA Card NOTE
PZ-M650 (DTI)	E1 Digital Trunk Interface (2 Mbps) Card	1-8	Mounted on PN-RTA Card NOTE
PZ-M623 (ETHER)	Ether Control (10BASE-T) Card	1-8	Mounted on PN-RTA Card
PC*	Local Console	1	
MAT CA-P or MAT CA-R or MAT CA-T	MAT cable with 25 pin D-SUB connector (4 m [158 inch]) MAT cable with 25 pin D-SUB connector (2 m [79 inch]) MAT cable with 9 pin D-SUB connector (2 m [79 inch])	1	Cable between the In-Skin Router and local console.
HUB*		As required	
<ul style="list-style-type: none"> • 10BASE-T cable (TIA/EIA category3 or larger)* • 100BASE-TX cable (TIA/EIA category5)* 	10BASE-T/100BASE-TX cable	As required	Cable between PN-RTA/PZ-M623 and IP network Cable length: Maximum 100 m (328 ft.)
T1 Network cable*	Twisted pair cable with RJ-48C connector	As required	Cable between PZ-M649 and Digital Private Line (T1) Cable length: Maximum 200 m (655 ft.) for DSX-1 Maximum 1758 m (5764 ft.) for DS-1
E1 Network cable*	Twisted pair cable with RJ-48C connector	As required	Cable between PZ-M650 and Digital Private Line (E1) Cable length: Maximum 400 m (1310 ft.)

*: Prepared by customers

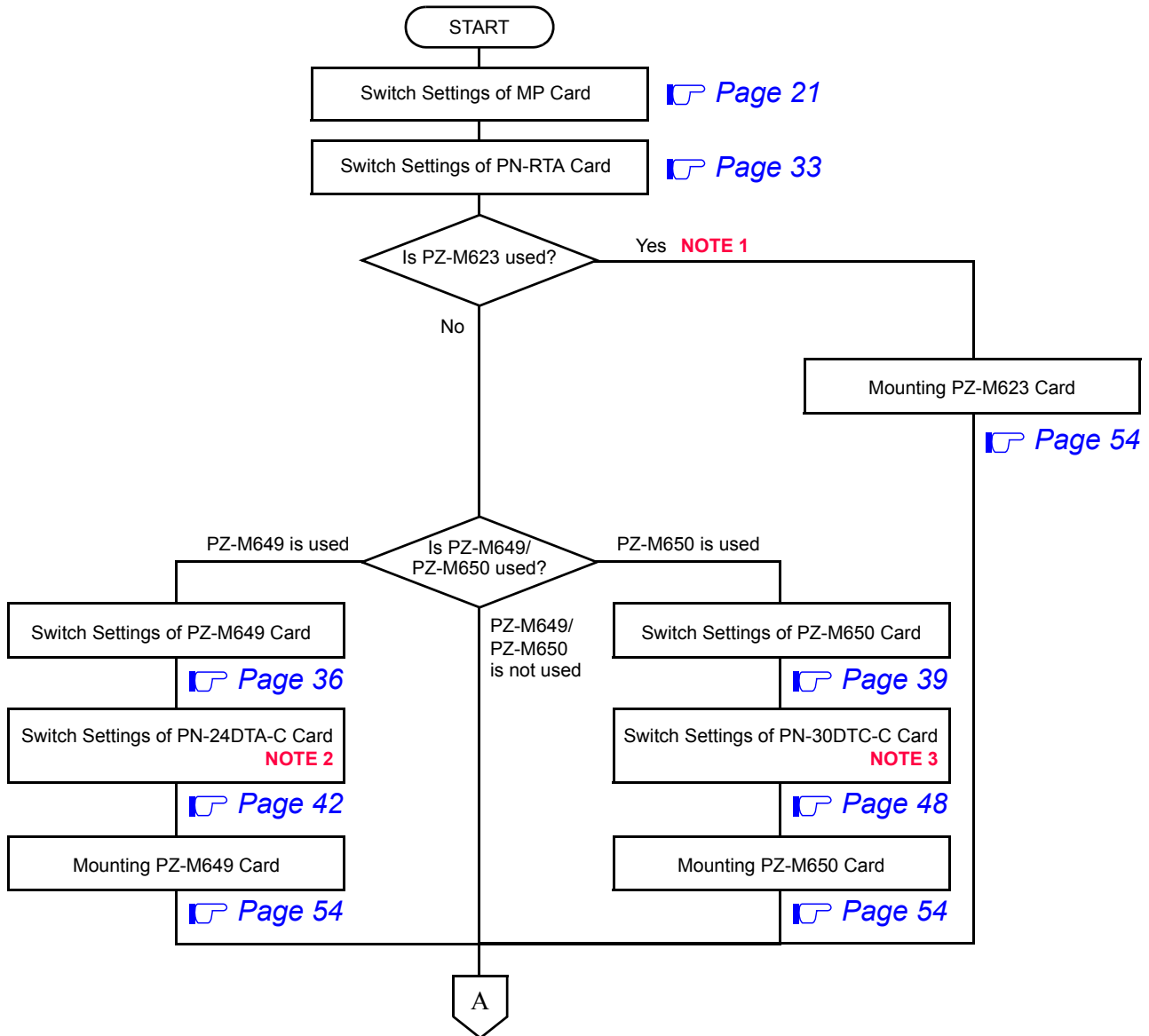
NOTE: *When originating a call from legacy terminal (single line telephone/D^{term}) to a digital private network (T1) via PZ-M649 card, PN-24DTA-C (DTI) card is required.*
When originating a call from legacy terminal (single line telephone/D^{term}) to a digital private network (E1) via PZ-M650 card, PN-30DTC-C (DTI) card is required.

INSTALLATION PROCEDURE

Install the In-Skin Router according to the procedure below.

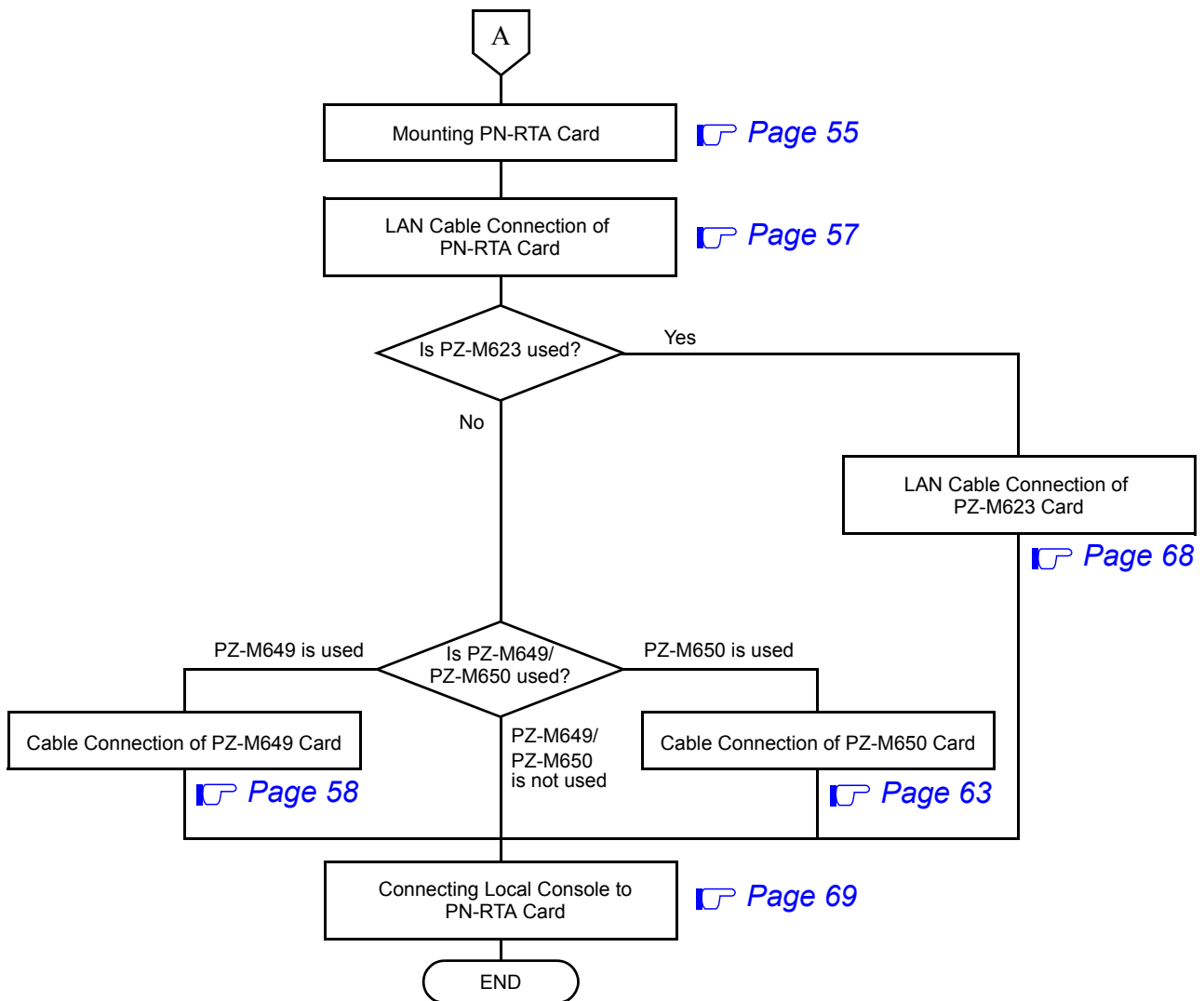
For the other NEAX 2000 IPS equipment, refer to the Installation Procedure Manual.

Installation Procedure



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Installation Procedure



NOTE 1: *PZ-M623 card has no switches.*

Check the lamp indications and location of connectors with reference to Locations of Lamps and Connectors of PZ-M623 Card. [Page 53](#)

NOTE 2: *This procedure is required when originating a call from legacy terminal (single line telephone/ D^{term}) to a digital private network (T1) via PZ-M649 card.*

NOTE 3: *This procedure is required when originating a call from legacy terminal (single line telephone/ D^{term}) to a digital private network (E1) via PZ-M650 card.*

Switch Settings of MP Card

PN-CP24-A/PN-CP24-B



NOTE 1: When you input the external clock signals using PZ-M649 card, set the switches as follows.

SW4-3: OFF SW4-4: OFF

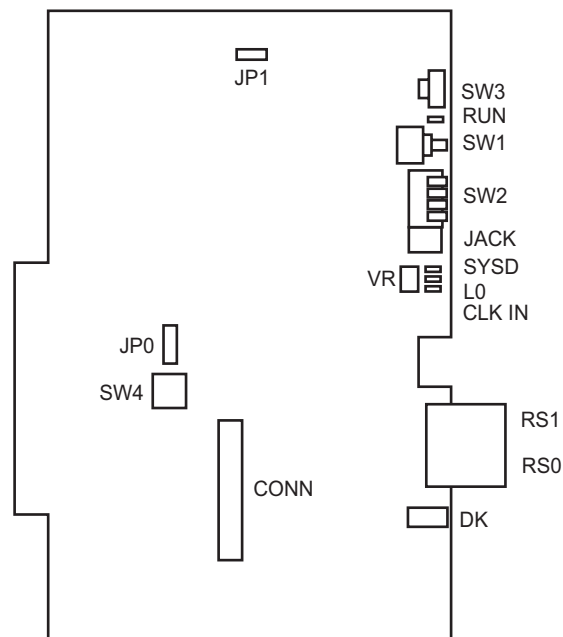
However, when PN-24DTA card/PN-24CCT card/PN-24PRT card mounted in PIM0, you do not need to set the switches of MP card.

NOTE 2: When you input the external clock signals using PZ-M650 card, set the switches as follows.

SW4-3: OFF SW4-4: ON

However, when PN-30DTC card/PN-2BRT card/PN-4BRT card/PN-30CCT card mounted in PIM0, you do not need to set the switches of MP card.

Locations of Lamps, Switches, and Connectors



CONN: To CONN connector on PZ-M606-A (ETHER)


Lamp Indications

LAMP NAME	COLOR	FUNCTION
RUN	Green	Flash (120 IPM): On Line Flash (slowly) : Off Line OFF or ON : This card is not operating. Lights momentarily when initializing this card.
SYSD	Red	Flashes while writing the system data for backup to the Flash Memory. Lights while copying the system data from the Flash Memory to the SDRAM.
L0	Green	Flashes while copying the MP program from the Flash Memory to the SDRAM.
CLK IN	Green	Remains lit while receiving clock signals to the PLO.

Switch Settings

CAUTION

When the operating power is being supplied to this circuit card, **do not plug/unplug this circuit card into/from its mounting slot.**

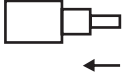
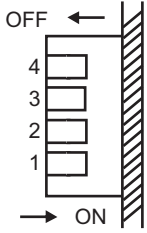
SWITCH NAME	SWITCH NUMBER	SETTING POSITION	FUNCTION	CHECK
SW3 (Rotary SW) 	0-F	0	On Line (Call processing is in progress)	
		2	Off Line (Call processing is stopped) • I/O port: As per CM40 Y=08	
		3	Off Line (Call processing is stopped) • I/O port: 9600 bps (Fixed)	
		5 NOTE 2	Off Line (Call processing is stopped) • I/O port: 9600 bps	
		6 NOTE 2	Off Line (Call processing is stopped) • I/O port: 19200 bps	
		7 NOTE 2	Off Line (Call processing is stopped) • I/O port: 38400 bps	
		8 NOTE 2	Off Line (Call processing is stopped) • I/O port: 57600 bps	
		B	For clearing the office data	
		C	For setting the resident system program	
		1, 4, 9 A, D-F	Not used	

NOTE 1



NOTE 1: Set the groove on the switch to the desired position.

NOTE 2: Only when executing "MP Program Download" using MATWorX, set the SW3 to 5-8.





Continued on next page



SWITCH NAME	SWITCH NUMBER	SETTING POSITION	FUNCTION	CHECK														
SW1 (Push SW) 			For initializing CPU															
SW2 (Piano SW) 	1	ON	A-law (Australia)															
		OFF	μ-law (North America)															
	2, 3	Selection of PLO0 input (Phase Locked Oscillator)																
		• For clock receiver office:																
<table border="1"> <thead> <tr> <th>SW2-2</th> <th>SW2-3</th> <th>FUNCTION</th> </tr> </thead> <tbody> <tr> <td>OFF</td> <td>OFF</td> <td>1.5 MHz clock [For PN-24DTA/PN-24CCT/ PN-24PRT/PZ-M649]</td> </tr> <tr> <td>ON</td> <td>OFF</td> <td>192 kHz clock [For PN-BRTA]</td> </tr> <tr> <td>OFF</td> <td>ON</td> <td>2 MHz clock [For PN-30DTC/PN-2BRT/ PN-4BRT/PN-30CCT/PN-30PRT/ PZ-M650]</td> </tr> <tr> <td>ON</td> <td>ON</td> <td>Not used</td> </tr> </tbody> </table>		SW2-2	SW2-3	FUNCTION	OFF	OFF	1.5 MHz clock [For PN-24DTA/PN-24CCT/ PN-24PRT/PZ-M649]	ON	OFF	192 kHz clock [For PN-BRTA]	OFF	ON	2 MHz clock [For PN-30DTC/PN-2BRT/ PN-4BRT/PN-30CCT/PN-30PRT/ PZ-M650]	ON	ON	Not used		
SW2-2		SW2-3	FUNCTION															
OFF	OFF	1.5 MHz clock [For PN-24DTA/PN-24CCT/ PN-24PRT/PZ-M649]																
ON	OFF	192 kHz clock [For PN-BRTA]																
OFF	ON	2 MHz clock [For PN-30DTC/PN-2BRT/ PN-4BRT/PN-30CCT/PN-30PRT/ PZ-M650]																
ON	ON	Not used																
• For clock source office: <u>SW2-2</u> <u>SW2-3</u> OFF OFF																		
4	ON	When using RS1 port for built-in MODEM																
	OFF	When using RS1 port for RS-232C																

Continued on next page

SWITCH NAME	SWITCH NUMBER	SETTING POSITION	FUNCTION	CHECK															
SW4 (Dip SW) 	1	<input type="checkbox"/> OFF	Not used																
	2	<input type="checkbox"/> OFF	Not used																
	3, 4	Selection of PLO1 input (Phase Locked Oscillator)																	
		• For clock receiver office:																	
		<table border="1"> <thead> <tr> <th>SW4-3</th> <th>SW4-4</th> <th>FUNCTION</th> </tr> </thead> <tbody> <tr> <td>OFF</td> <td>OFF</td> <td>1.5 MHz clock [For PN-24DTA/PN-24CCT/ PN-24PRT/PZ-M649]</td> </tr> <tr> <td>ON</td> <td>OFF</td> <td>192 kHz clock [For PN-BRTA]</td> </tr> <tr> <td>OFF</td> <td>ON</td> <td>2 MHz clock [For PN-30DTC/PN-2BRT/ PN-4BRT/PN-30CCT/PN-30PRT/ PZ-M650]</td> </tr> <tr> <td>ON</td> <td>ON</td> <td>Not used</td> </tr> </tbody> </table>		SW4-3	SW4-4	FUNCTION	OFF	OFF	1.5 MHz clock [For PN-24DTA/PN-24CCT/ PN-24PRT/PZ-M649]	ON	OFF	192 kHz clock [For PN-BRTA]	OFF	ON	2 MHz clock [For PN-30DTC/PN-2BRT/ PN-4BRT/PN-30CCT/PN-30PRT/ PZ-M650]	ON	ON	Not used	
SW4-3		SW4-4	FUNCTION																
OFF	OFF	1.5 MHz clock [For PN-24DTA/PN-24CCT/ PN-24PRT/PZ-M649]																	
ON	OFF	192 kHz clock [For PN-BRTA]																	
OFF	ON	2 MHz clock [For PN-30DTC/PN-2BRT/ PN-4BRT/PN-30CCT/PN-30PRT/ PZ-M650]																	
ON	ON	Not used																	
• For clock source office:																			
<table style="margin-left: auto; margin-right: auto;"> <tr> <td style="text-align: center;"><u>SW4-3</u></td> <td style="text-align: center;"><u>SW4-4</u></td> </tr> <tr> <td style="text-align: center;">OFF</td> <td style="text-align: center;">OFF</td> </tr> </table>		<u>SW4-3</u>	<u>SW4-4</u>	OFF	OFF														
<u>SW4-3</u>	<u>SW4-4</u>																		
OFF	OFF																		
VR (Rotary SW)	/	/	Variable Resistor for External Hold Tone Source (0-20 kΩ: Clockwise)																
DK (Connector) 	02	Ground detection																	
	01	Ground sending																	

Continued on next page

SWITCH NAME	SWITCH NUMBER	SETTING POSITION	FUNCTION	CHECK
JP0 (Jumper pin) 	/		For normal operation (Battery backup ON)	
		DOWN	Not used (Battery backup OFF)	
JP1 (Jumper pin) 	/	RIGHT	For using external hold tone source	
			For using internal hold tone source	

The figure in the SWITCH NAME column and the position of  in the SETTING POSITION column indicate the standard setting of the switch. When the switch is not set as shown by the figure and , the setting of the switch varies with the system concerned.

PN-CP27-A

Locations of Lamps, Switches, and Connectors



NOTE 1: When you input the external clock signals using PZ-M649 card, set the switches as follows.

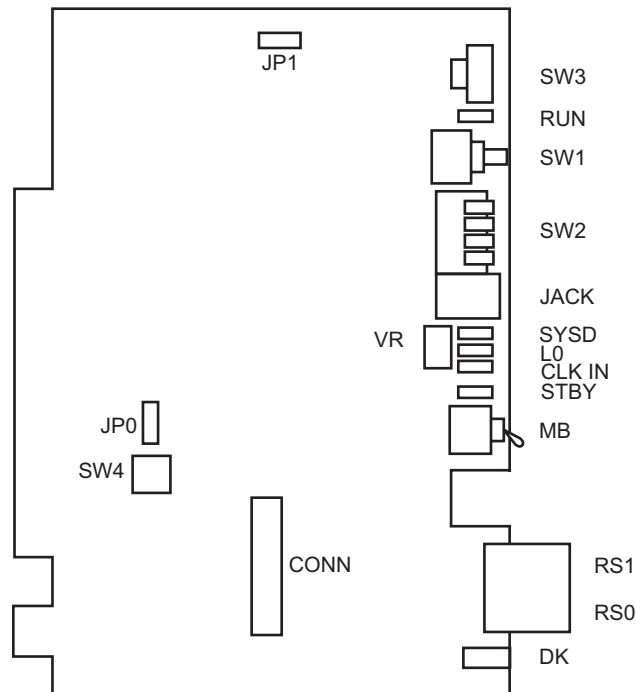
SW4-3: OFF SW4-4: OFF

However, when PN-24DTA card/PN-24CCT card/PN-24PRT card mounted in PIM0, you do not need to set the switches of MP card.

NOTE 2: When you input the external clock signals using PZ-M650 card, set the switches as follows.

SW4-3: OFF SW4-4: ON

However, when PN-30DTC card/PN-2BRT card/PN-4BRT card/PN-30CCT card mounted in PIM0, you do not need to set the switches of MP card.



CONN: To CONN connector on PZ-M606-A (ETHER)


Lamp Indications

LAMP NAME	COLOR	FUNCTION
RUN	Green	Flash (120 IPM): On Line Flash (slowly) : Off Line OFF or ON : This card is not operating. Lights momentarily when initializing this card.
SYSD	Red	Flashes while writing the system data for backup to the Flash Memory. Lights while copying the system data from the Flash Memory to the SDRAM.
L0	Green	Flashes while copying the MP program from the Flash Memory to the SDRAM.
CLK IN	Green	Remains lit while receiving clock signals to the PLO.
STBY	Red	Remains lit while this card is a stand by mode.

Switch Settings

CAUTION

When the operating power is being supplied to this circuit card, **do not plug/unplug this circuit card into/from its mounting slot.**

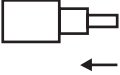
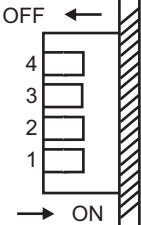
SWITCH NAME	SWITCH NUMBER	SETTING POSITION	FUNCTION	CHECK
SW3 (Rotary SW) 	0-F	0	On Line (Call processing is in progress)	
		2	Off Line (Call processing is stopped) • I/O port: As per CM40 Y=08	
		3	Off Line (Call processing is stopped) • I/O port: 9600 bps (Fixed)	
		5 NOTE 2	Off Line (Call processing is stopped) • I/O port: 9600 bps	
		6 NOTE 2	Off Line (Call processing is stopped) • I/O port: 19200 bps	
		7 NOTE 2	Off Line (Call processing is stopped) • I/O port: 38400 bps	
		8 NOTE 2	Off Line (Call processing is stopped) • I/O port: 57600 bps	
		B	For clearing the office data	
		C	For setting the resident system program	
		1, 4, 9 A, D-F	Not used	

NOTE 1

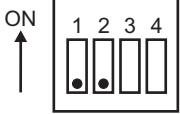

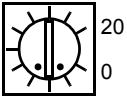
NOTE 1: Set the groove on the switch to the desired position.

NOTE 2: Only when executing "MP Program Download" using MATWorX, set the SW3 to 5-8.

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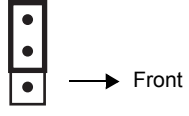

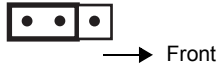

SWITCH NAME	SWITCH NUMBER	SETTING POSITION	FUNCTION	CHECK														
SW1 (Push SW) 			For initializing CPU															
SW2 (Piano SW) 	1	ON	A-law (Australia)															
		OFF	μ-law (North America)															
	2, 3	Selection of PLO0 input (Phase Locked Oscillator)																
		• For clock receiver office:																
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SW2-2		SW2-3	FUNCTION															
OFF	OFF	1.5 MHz clock [For PN-24DTA/PN-24CCT/ PN-24PRT/PZ-M649]																
ON	OFF	192 kHz clock [For PN-BRTA]																
OFF	ON	2 MHz clock [For PN-30DTC/PN-2BRT/ PN-4BRT/PN-30CCT/PN-30PRT/ PZ-M650]																
ON	ON	Not used																
• For clock source office: <u>SW2-2</u> <u>SW2-3</u> OFF OFF																		
4	ON	When using RS1 port for built-in MODEM																
	OFF	When using RS1 port for RS-232C																



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SWITCH NAME	SWITCH NUMBER	SETTING POSITION	FUNCTION	CHECK	
SW4 (Dip SW) 	1	<input type="checkbox"/>	Not used		
	2	<input type="checkbox"/>	Not used		
	3, 4	Selection of PLO1 input (Phase Locked Oscillator) <ul style="list-style-type: none"> For clock receiver office: 			
		SW4-3	SW4-4	FUNCTION	
		OFF	OFF	1.5 MHz clock [For PN-24DTA/PN-24CCT/ PN-24PRT/PZ-M649]	
ON		OFF	192 kHz clock [For PN-BRTA]		
OFF	ON	2 MHz clock [For PN-30DTC/PN-2BRT/ PN-4BRT/PN-30CCT/PN-30PRT/ PZ-M650]			
ON	ON	Not used			
		<ul style="list-style-type: none"> For clock source office: <p style="text-align: center;"><u>SW4-3</u> <u>SW4-4</u> OFF OFF</p>			
MB (Toggle SW)  NOTE3	/	UP	For make-busy		
		<input type="checkbox"/>	For normal operation		
VR (Rotary SW) 	/	/	Variable Resistor for External Hold Tone Source (0-20 kΩ: Clockwise)		

NOTE 3: When the power is on, flip the MB switch to ON (UP position) before plugging/unplugging the circuit card.

Continued on next page

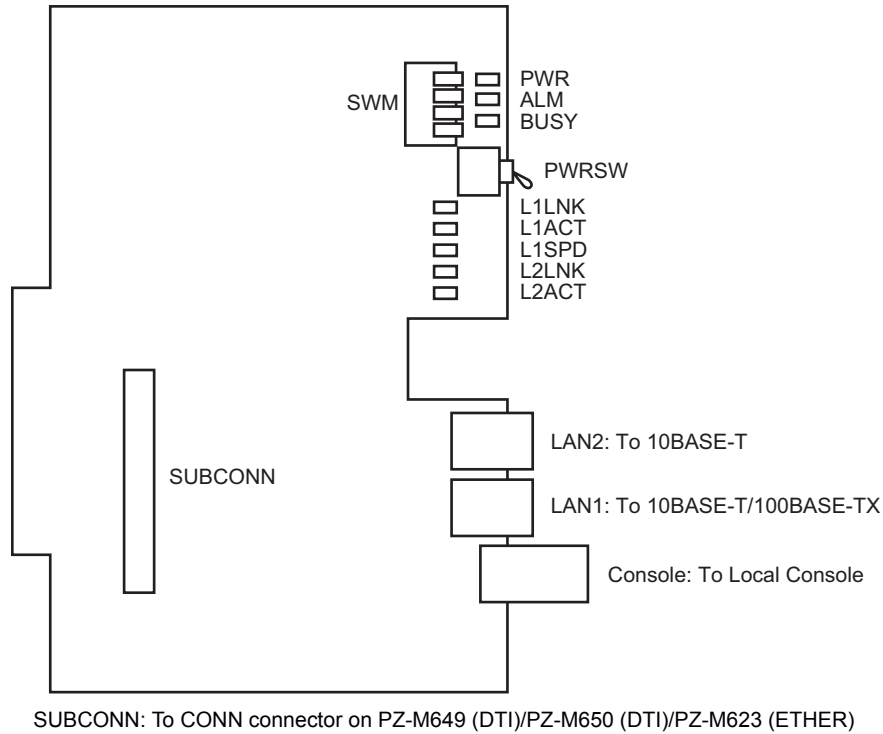
SWITCH NAME	SWITCH NUMBER	SETTING POSITION	FUNCTION	CHECK
DK (Connector) 	02	Ground detection		
	01	Ground sending		
JP0 (Jumper pin) 	/		 For normal operation (Battery backup ON)	
			DOWN Not used (Battery backup OFF)	
JP1 (Jumper pin) 	/		RIGHT For using external hold tone source	
			 For using internal hold tone source	

The figure in the SWITCH NAME column and the position of  in the SETTING POSITION column indicate the standard setting of the switch. When the switch is not set as shown by the figure and , the setting of the switch varies with the system concerned.

Switch Settings of PN-RTA Card

Set the switches to appropriate position according to the figure and tables shown below.

Locations of Lamps, Switches, and Connectors




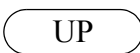
Lamp Indications

LAMP NAME	COLOR	FUNCTION
PWR	Green	ON : Operating power is ON. OFF: Operating power is OFF.
ALM	Red	Remains lit when a trouble occurs.
BUSY NOTE 1	Green	Remain lit while writing/reading the data to/from the flash memory.
L1LNK	Green	Remains lit while LAN1 port is connected to the network.
L1ACT	Green	Flashes while LAN1 port is sending or receiving the data.
L1SPD	Green	Remains lit while LAN1 port is operating at 100 Mbps.
L2LNK	Green	Remains lit while LAN2 port is connected to the network.
L2ACT	Green	Flashes while LAN2 port is sending or receiving the data.

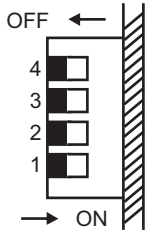
Switch Settings

CAUTION

When the operating power is being supplied to this circuit card, **do not plug/unplug this circuit card into/from its mounting slot.**

SWITCH NAME	SWITCH NUMBER	SETTING POSITION	FUNCTION	CHECK
PWRSW (Toggle SW)  NOTE 2	/		Operating power is OFF	
		DOWN	Operating power is ON	

Continued on next page

SWITCH NAME	SWITCH NUMBER	SETTING POSITION	FUNCTION	CHECK
SWM (Piano Key SW) 	1	ON	Test Mode	
		<input type="radio"/>	For normal operation	
	2	ON	For aging	
		<input type="radio"/>	For normal operation	
	3	<input type="radio"/>	Not used	
	4	ON	Super Reset	
		<input type="radio"/>	For normal operation	

The figure in the SWITCH NAME column and the position of in the SETTING POSITION column indicate the standard setting of the switch. When the switch is not set as shown by the figure and , the setting of the switch varies with the system concerned.

NOTE 1: Do not turn off the system power and operating power of PN-RTA card while the BUSY lamp is lit.

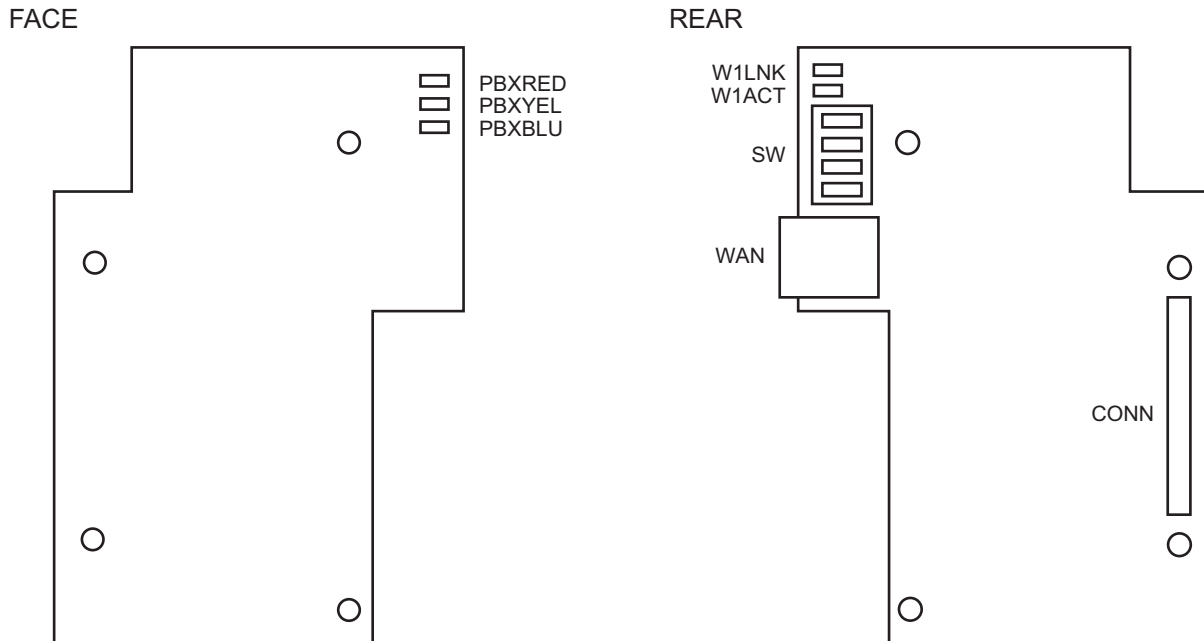
NOTE 2: When the power is on, flip the PWRSW switch to UP position (Operating power is off) before plugging/unplugging the circuit card.

Switch Settings of PZ-M649 Card

Set the switches to appropriate position according to the figure and tables shown below.



Locations of Lamps, Switches, and Connectors

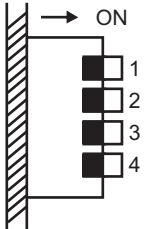


CONN: To SUBCONN Connector on PN-RTA

Lamp Indications

LAMP NAME	COLOR	FUNCTION
W1LNK	Green	Remains lit while WAN port is connected to the network.
W1ACT	Green	Flashes while WAN port is sending or receiving the data.
PBXRED	Red	Remains lit when a trouble occurs in T1 interface for PBX (PCM loss/Multi Frame loss/Frame loss).
PBXYEL	Red	Remains lit when a trouble occurs in T1 interface for PBX (PMT Alarm).
PBXBLU	Red	Remains lit when a trouble occurs in T1 interface for PBX (AIS Alarm).

Switch Settings

SWITCH NAME	SWITCH NUMBER	SETTING POSITION	FUNCTION	CHECK
SW (Piano Key SW) 	1 NOTE 1 NOTE 2	ON	Source clock signal from network is sent to the PLO0 input on MP card (1.5 MHz clock).	
		<input type="radio"/>	Source clock signal from network is not sent to the PLO0 input on MP card (1.5 MHz clock).	
	2 NOTE 1 NOTE 2	ON	Source clock signal from network is sent to the PLO1 input on MP card (1.5 MHz clock).	
		<input type="radio"/>	Source clock signal from network is not sent to the PLO1 input on MP card (1.5 MHz clock).	
	3	<input type="radio"/>	Not used	
	4	ON	WAN port or T1 interface for PBX are available.	
		<input type="radio"/>	Only WAN port is available.	

The figure in the SWITCH NAME column and the position of in the SETTING POSITION column indicate the standard setting of the switch. When the switch is not set as shown by the figure and , the setting of the switch varies with the system concerned.

Continued on next page

NOTE 1: Set SW-1 and SW-2 as follows:

CONDITIONS	DTI0		DTI1		DTI2			DTI7		REMARKS
	SW -1	SW -2	SW -1	SW -2	SW -1	SW -2			SW -1	SW -2	
When one DTI is provided.	ON	OFF	-	-	-	-			-	-	MP card will receive the clock signal from DTI0 at its PLO0 input.
When more than one DTI is provided.	ON	OFF	OFF	ON	OFF	OFF			OFF	OFF	MP card will receive the clock signal from DTI0 at its PLO0 input, under normal conditions. Should a clock failure occurs with DTI0, MP card will automatically switch to the PLO1 input which gets clock from DTI1.

NOTE 2: When the PBX is a clock source office, set the SW-1 and SW-2 on all the DTI cards mounted in PIM0 to "OFF".

NOTE 3: Mount the DTI card which receives a source clock signal into PIM0.

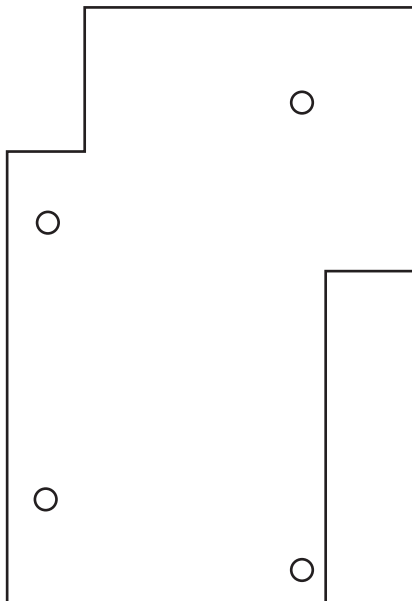
Switch Settings of PZ-M650 Card

Set the switches to appropriate position according to the figure and tables shown below.

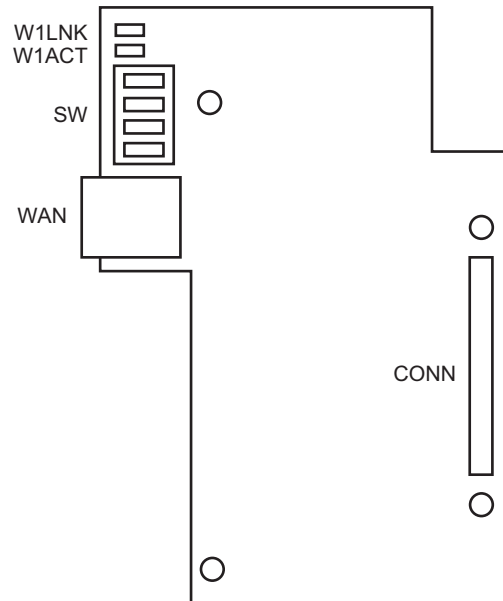


Locations of Lamps, Switches, and Connectors

FACE



REAR

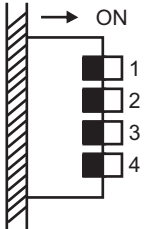


CONN: To SUBCONN Connector on PN-RTA

Lamp Indications

LAMP NAME	COLOR	FUNCTION
W1LNK	Green	Remains lit while WAN port is connected to the network.
W1ACT	Green	Flashes while WAN port is sending or receiving the data.

Switch Settings

SWITCH NAME	SWITCH NUMBER	SETTING POSITION	FUNCTION	CHECK
SW (Piano Key SW) 	1 NOTE 1 NOTE 2	ON	Source clock signal from network is sent to the PLO0 input on MP card (2.0 MHz clock).	
		<input type="radio"/>	Source clock signal from network is not sent to the PLO0 input on MP card (2.0 MHz clock).	
	2 NOTE 1 NOTE 2	ON	Source clock signal from network is sent to the PLO1 input on MP card (2.0 MHz clock).	
		<input type="radio"/>	Source clock signal from network is not sent to the PLO1 input on MP card (2.0 MHz clock).	
	3	<input type="radio"/>	Not used	
	4	ON	WAN port or E1 interface for PBX are available.	
		<input type="radio"/>	Only WAN port is available.	

The figure in the SWITCH NAME column and the position of in the SETTING POSITION column indicate the standard setting of the switch. When the switch is not set as shown by the figure and , the setting of the switch varies with the system concerned.

Continued on next page

NOTE 1: Set SW-1 and SW-2 as follows:

CONDITIONS	DTI0		DTI1		DTI2			DTI7		REMARKS
	SW -1	SW -2	SW -1	SW -2	SW -1	SW -2			SW -1	SW -2	
When one DTI is provided.	ON	OFF	-	-	-	-			-	-	MP card will receive the clock signal from DTI0 at its PLO0 input.
When more than one DTI is provided.	ON	OFF	OFF	ON	OFF	OFF			OFF	OFF	MP card will receive the clock signal from DTI0 at its PLO0 input, under normal conditions. Should a clock failure occurs with DTI0, MP card will automatically switch to the PLO1 input which gets clock from DTI1.

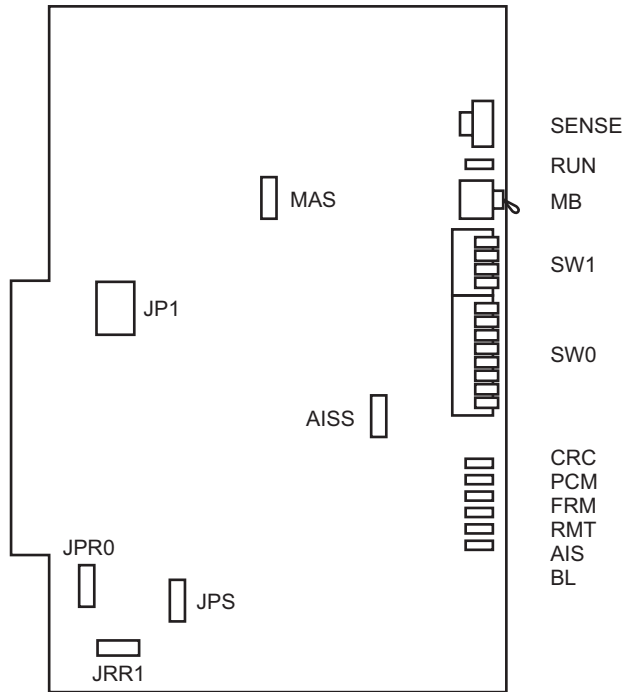
NOTE 2: When the PBX is a clock source office, set the SW-1 and SW-2 on all the DTI cards mounted in PIM0 to "OFF".

NOTE 3: Mount the DTI card which receives a source clock signal into PIM0.

Switch Settings of PN-24DTA-C Card

Set the switches to appropriate position according to the figure and tables shown below.


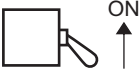
Locations of Lamps, Switches, and Connectors



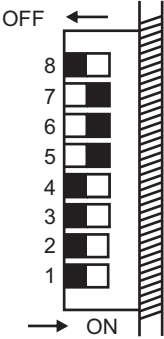
Lamp Indications

LAMP NAME	COLOR	FUNCTION
RUN	Green	Flashes at 120 IPM while this card is operating normally.
CRC	Red	Remains lit when detecting Cyclic Redundancy Checking (CRC) errors.
PCM	Red	Remains lit when detecting PCM signal loss.
FRM	Red	Remains lit when detecting Frame Alignment signal loss.
RMT	Red	Remains lit when receiving Frame Alignment signal loss alarm from a distant office.
AIS	Red	Remains lit when a pattern of consecutive "1" is received. The distant office transmits this signal for a loopback test.
BL	Red	B channel status ON : More than 10 channels are busy OFF : All channels are idle Flash (60 IPM) : Only one channel is busy Flash (120 IPM) : 2 through 10 channels are busy

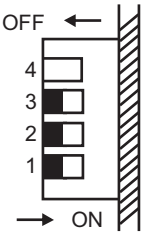



Switch Settings

SWITCH NAME	SWITCH NUMBER	SETTING POSITION	FUNCTION	CHECK																																										
SENSE (Rotary SW)  NOTE 1	0-3	Not used																																												
	4-F	Set the switch to match the AP Number (04-31) to be set by CM05.																																												
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MB (Toggle SW)  NOTE 2	/	UP	For make-busy																																											
		DOWN	For normal operation																																											





Continued on next page



SWITCH NAME	SWITCH NUMBER	SETTING POSITION	FUNCTION	CHECK																											
SW0 (Piano Key SW) 	1 NOTE 3	ON	Source clock signal from network is sent to the PLO0 input on MP card.																												
		OFF	Source clock signal from network is not sent to the PLO0 input on MP card.																												
	2 NOTE 3	ON	Source clock signal from network is sent to the PLO1 input on MP card.																												
		OFF	Source clock signal from network is not sent to the PLO1 input on MP card.																												
	3 NOTE 4	ON	Remote loopback																												
		OFF	For normal operation																												
	4 NOTE 4	ON	Local loopback (AIS send)																												
		OFF	For normal operation																												
5 NOTE 4	ON	Set equalizer according to the cable length between the PBX and the C.O. or CSU.	<ul style="list-style-type: none"> For DS-1 (SW1-3 ON) <table border="1"> <thead> <tr> <th>SW0-5</th> <th>SW0-6</th> <th>SW0-7</th> <th>CABLE LENGTH TO CSU (0.5 ϕ)</th> </tr> </thead> <tbody> <tr> <td>ON</td> <td>ON</td> <td>ON</td> <td>1199-1758 m (3930-5764 ft.)</td> </tr> <tr> <td>OFF</td> <td>ON</td> <td>ON</td> <td>599-1199 m (1965-3930 ft.)</td> </tr> <tr> <td>ON</td> <td>OFF</td> <td>ON</td> <td>0-599 m (0-1965 ft.)</td> </tr> <tr> <td>OFF</td> <td>OFF</td> <td>ON</td> <td>Not used</td> </tr> <tr> <td>OFF</td> <td>OFF</td> <td>OFF</td> <td>Signal is not sent</td> </tr> </tbody> </table>	SW0-5	SW0-6	SW0-7	CABLE LENGTH TO CSU (0.5 ϕ)	ON	ON	ON	1199-1758 m (3930-5764 ft.)	OFF	ON	ON	599-1199 m (1965-3930 ft.)	ON	OFF	ON	0-599 m (0-1965 ft.)	OFF	OFF	ON	Not used	OFF	OFF	OFF	Signal is not sent				
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OFF	OFF	OFF	Signal is not sent																												
OFF	OFF																														
8	OFF	Not used																													

Continued on next page

SWITCH NAME	SWITCH NUMBER	SETTING POSITION	FUNCTION	CHECK	
SW1 (Piano Key SW)  NOTE 4	1	OFF	Not used		
	2	OFF	Not used		
	3	[North America only]			
		ON	DS-1 (T1 with CSU function)		
		OFF	DSX-1 (T1 without CSU function)		
	[Hong Kong/Taiwan]				
OFF	Not used				
4	ON	AP No. 04-15			
	OFF	AP No. 20-31			
JPR0 (Jumper pin) 		UP	Neutral grounding on the receiving line is provided.		
		DOWN	Neutral grounding on the receiving line is not provided.		
JPR1 (Jumper pin) 		RIGHT	Line impedance: 100 Ω		
		LEFT	Line impedance: 110 Ω		
JPS (Jumper pin) 		UP	Neutral grounding on the transmitting line is provided.		
		DOWN	Neutral grounding on the transmitting line is not provided.		

Continued on next page

SWITCH NAME	SWITCH NUMBER	SETTING POSITION	FUNCTION	CHECK
MAS (Jumper pin) 	/	UP	Clock Source	
			Clock Receiver	
AISS (Jumper pin) 	/	UP	AIS signal is sent out when make-busy or power on.	
		DOWN	AIS signal is not sent out when make-busy or power on.	
JP1 (Jumper pin) 	/	LEFT	Always set to LEFT	

The figure in the SWITCH NAME column and the position of  in the SETTING POSITION column indicate the standard setting of the switch. When the switch is not set as shown by the figure and , the setting of the switch varies with the system concerned.

NOTE 1: Set the groove on the switch to the desired position.

NOTE 2: When the power is on, flip the MB switch to ON (UP position) before plugging/unplugging the circuit card.

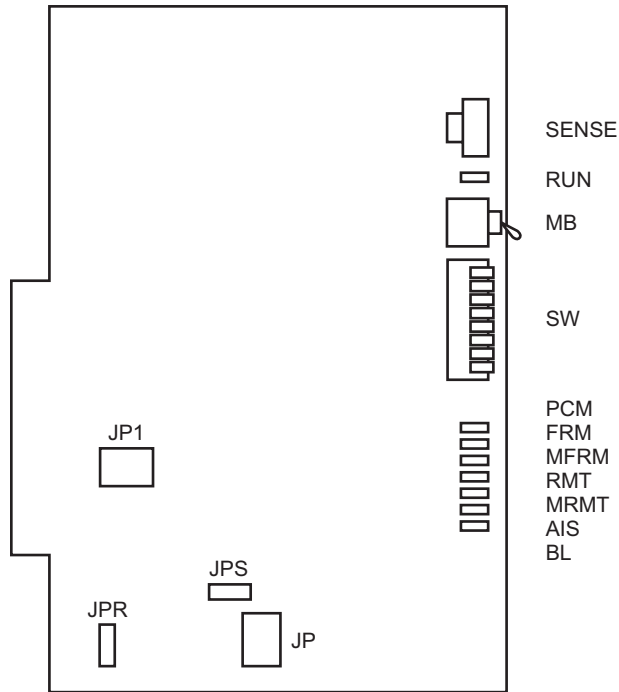
NOTE 3: To receive a clock signal from MP card, set the SW0-1 and SW0-2 on all the DTI cards to "OFF".

NOTE 4: This card must be reset after the SW0-3 to SW0-7 switch settings. Set the MB switch to UP and then DOWN.

Switch Settings of PN-30DTC-C Card

Set the switches to appropriate position according to the figure and tables shown below.


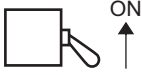
Locations of Lamps, Switches, and Connectors



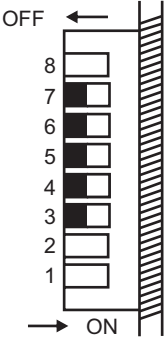
Lamp Indications

LAMP NAME	COLOR	FUNCTION
RUN	Green	Flashes at 120 IPM when this card is normally operating.
PCM	Red	Remains lit when detecting PCM signal loss.
FRM	Red	Remains lit when detecting Frame Alignment signal loss.
MFRM	Red	Remains lit when detecting Multi-Frame Alignment signal loss on time slot 16.
RMT	Red	Remains lit when receiving the alarm from a distant office because Frame Alignment signal loss has been detected at the distant office.
MRMT	Red	Remains lit when receiving the alarm from a distant office because Multi-Frame Alignment signal loss has been detected at the distant office.
AIS	Red	Remains lit when indicating that the pattern of consecutive "1" is being received. The distant office transmits this signal for a loopback test.
BL	Red	B channel status ON : More than 10 channels are busy OFF : All channels are idle Flash (60 IPM) : Only one channel is busy Flash (120 IPM) : 2 through 10 channels are busy




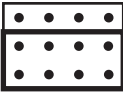
Switch Settings

SWITCH NAME	SWITCH NUMBER	SETTING POSITION	FUNCTION	CHECK																																										
SENSE (Rotary SW)  NOTE 1	0-3	Not used																																												
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MB (Toggle SW)  NOTE 2	/	UP	For make-busy																																											
		DOWN	For normal operation																																											

Continued on next page

SWITCH NAME	SWITCH NUMBER	SETTING POSITION	FUNCTION	CHECK
SW (Piano Key SW) 	1	ON	Source clock signal from network is sent to the PLO0 input on MP card.	
		OFF	Source clock signal from network is not sent to the PLO0 input on MP card.	
	2	ON	Source clock signal from network is sent to the PLO1 input on MP card.	
		OFF	Source clock signal from network is not sent to the PLO1 input on MP card.	
	3	ON	Remote loopback	
		OFF	For normal operation	
	4	ON	Local loopback (AIS send)	
		OFF	For normal operation	
	5	ON	Transmission line cable: Coaxial cable (75 Ω)	
		OFF	Transmission line cable: Twisted-pair cable (120 Ω)	
	6	ON	Not used (Always set to OFF)	
	7	OFF		
	8	ON	AP No. 04-15	
		OFF	AP No. 20-31	

Continued on next page

SWITCH NAME	SWITCH NUMBER	SETTING POSITION	FUNCTION	CHECK
JPS (Jumper pin) 	/	<input type="radio"/> RIGHT	Balanced transmission (For twisted-pair cable)	
		LEFT	TA is grounded on the transmission line (For coaxial cable)	
JPR (Jumper pin) 	/	<input type="radio"/> UP	Balanced transmission (For twisted-pair cable)	
		DOWN	RA is grounded on the transmission line (For coaxial cable)	
JP (Jumper pin) 	/	RIGHT	Line impedance: 75 Ω (For coaxial cable)	
		<input type="radio"/> LEFT	Line impedance: 120 Ω (For twisted-pair cable)	
JP1 (Jumper pin) 	/	<input type="radio"/> DOWN	Always set to DOWN	

The figure in the SWITCH NAME column and the position of in the SETTING POSITION column indicate the standard setting of the switch. When the switch is not set as shown by the figure and , the setting of the switch varies with the system concerned.

NOTE 1: Set the groove on the switch to the desired position.

NOTE 2: When the power is on, flip the MB switch to ON (UP position) before plugging/unplugging the circuit card.

NOTE 3: To receive a clock signal from MP card, set the SW-1 and SW-2 on all the DTI cards to “OFF”.

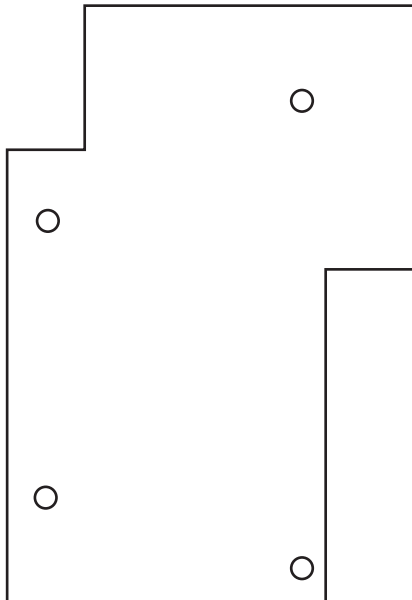
Locations of Lamps and Connectors of PZ-M623 Card

Check the lamp indication and location of connectors in the following figure and table.

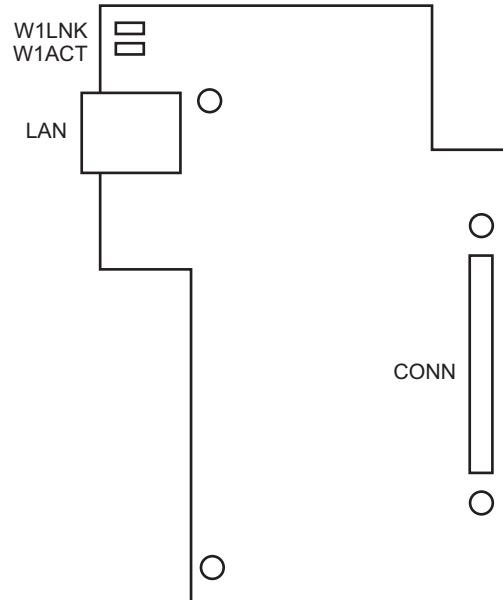


Locations of Lamps, Switches, and Connectors

FACE



REAR



CONN: To SUBCONN Connector on PN-RTA

Lamp Indications

LAMP NAME	COLOR	FUNCTION
W1LNK	Green	Remains lit while LAN port is connected to the network.
W1ACT	Green	Flashes while LAN port is sending or receiving the data.

Mounting PZ-M649 Card/PZ-M650 Card/PZ-M623 Card

- (1) Before mounting PZ-M649 card/PZ-M650 card/PZ-M623 card, set the switches of the PN-RTA card and PZ-M649 card/PZ-M650 card to the appropriate position.
- (2) Mount the PZ-M649 card/PZ-M650 card/PZ-M623 card on the PN-RTA card.



STEP1: Take off four screws from the rear side of PZ-M649 card/PZ-M650 card/PZ-M632 card support.

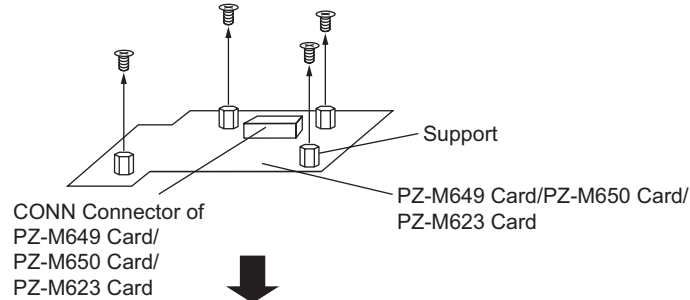
NOTE: Supports and screws are attached to the PZ-M649 card/PZ-M650 card/PZ-M632 card.

STEP2: Connect the CONN connector on the PZ-M649 card/PZ-M650 card/PZ-M632 card and the SUBCONN connector on the PN-RTA card.

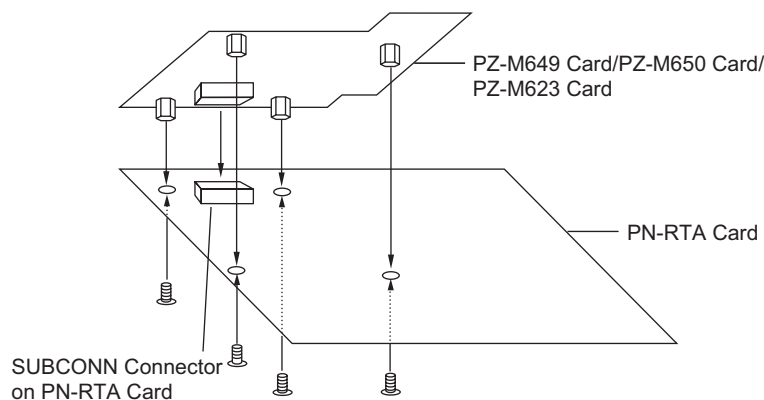
STEP3: Secure the PZ-M649 card/PZ-M650 card/PZ-M632 card to the PN-RTA card with four screws which have been taken off by STEP1.

NOTE: Only one PZ-M649 card, or one PZ-M650 card, or one PZ-M623 card can be mounted to one PN-RTA card.

Taking off Screws



Mounting PZ-M649 Card/PZ-M650 Card/PZ-M623 Card on PN-RTA Card



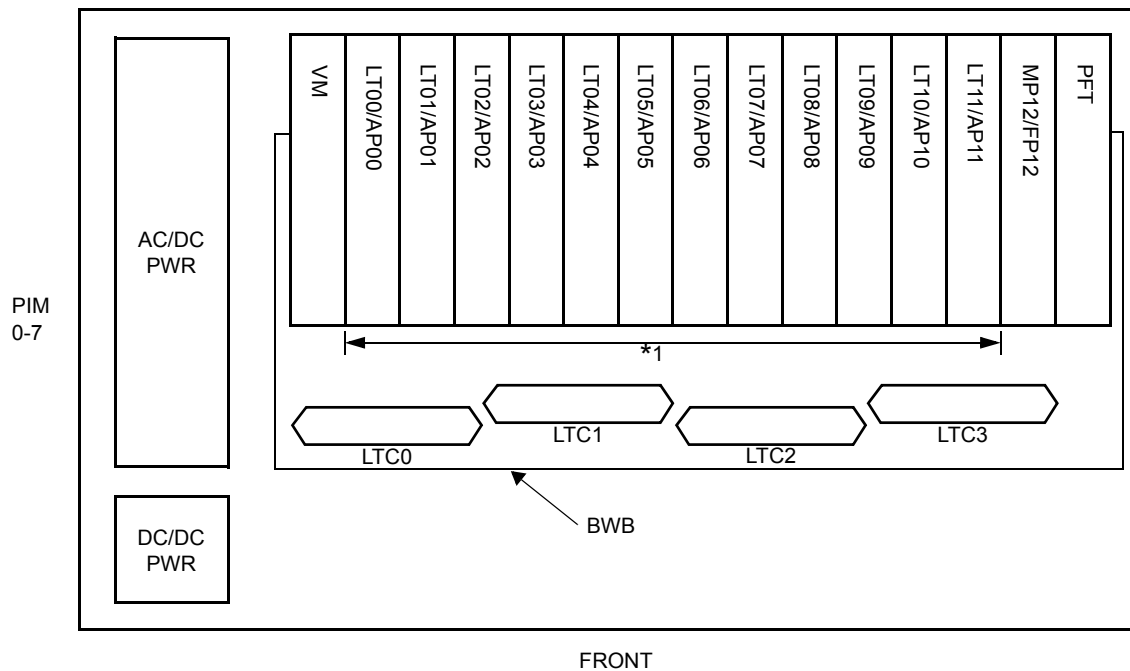
Mounting PN-RTA Card

- (1) Before mounting PN-RTA card, set the PWRSW switch to UP position (Operating power is OFF).
- (2) Mount the PN-RTA card in the AP00-AP11 slots of PIM0-PIM7, or AP00-AP10 slots of PIM0 (for Backup CPU). Maximum of eight PN-RTA cards are mountable per PIM.



PN-RTA Card Mounting Slots

- Regular PIM



LT00-LT11 : Line/Trunk card mounting slots
 AP00-AP11 : Application Processor card mounting slots
 MP12 : PN-CP24-A/PN-CP24-B mounting slot
 FP12 : PN-CP15 mounting slot

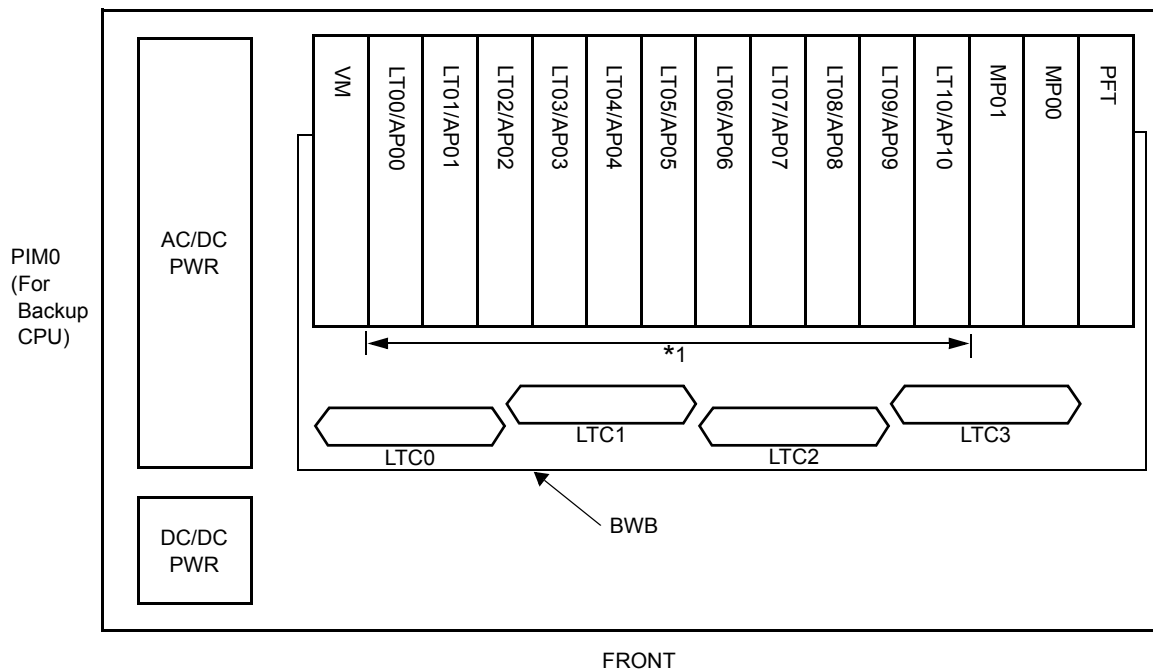
VM : PZ-VM00/VM00-M/VM03-M mounting slot
 PFT : PZ-8PFTB mounting slot
 AC/DC PWR: PZ-PW121/PW126 mounting slot
 DC/DC PWR: PZ-PW122 mounting slot

***1** PN-RTA card can be mounted in the AP00-AP11 slots of PIM0-7.

Continued on next page

PN-RTA Card Mounting Slots

- PIM0 for Backup CPU System



LT00-LT10 : Line/Trunk card mounting slots
 AP00-AP10 : Application Processor card mounting slots
 MP00/MP01 : PN-CP27-A mounting slot

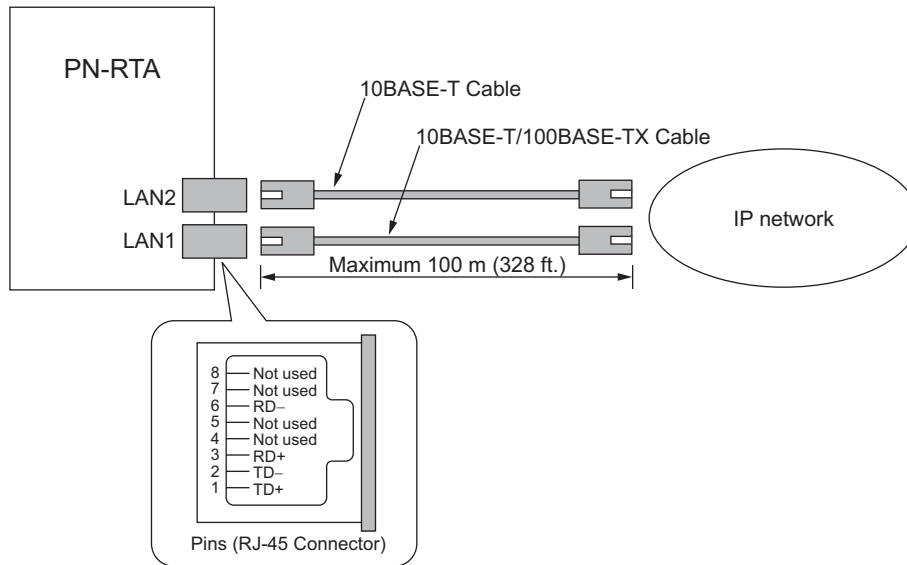
VM : PZ-VM00/VM00-M/VM03-M mounting slot
 PFT : PZ-8PFTB mounting slot
 AC/DC PWR: PZ-PW121/PW126 mounting slot
 DC/DC PWR: PZ-PW122 mounting slot

- *1** PN-RTA card can be mounted in the AP00-AP10 slots of PIM0.

LAN Cable Connection of PN-RTA Card

Connect the LAN connector on the PN-RTA card and the IP network by using a 10BASE-T/100BASE-TX cable.

PN-RTA - IP network Cable Connection



Cable Connection of PZ-M649 Card

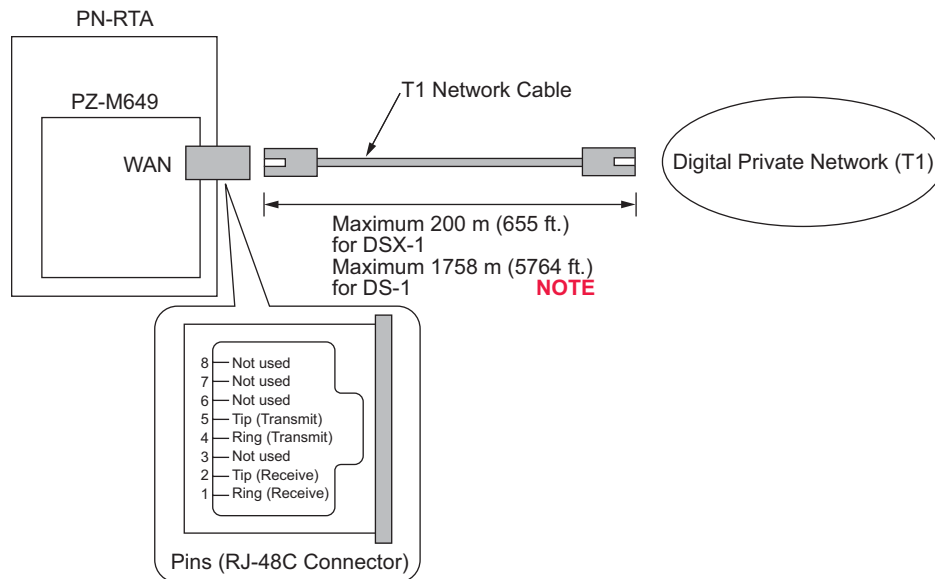
Connect the cable to PZ-M649 card to provide a digital private network (T1). [Page 59](#)

When originating a call from legacy terminal (single line telephone/D^{term}) to a digital private network (T1) via PZ-M649 card, connect the cable between PN-RTA card and PN-24DTA-C (DTI) card via MDF [Page 60, 61](#) in addition to the above connection.

Cable Connection of WAN connector on PZ-M649 Card

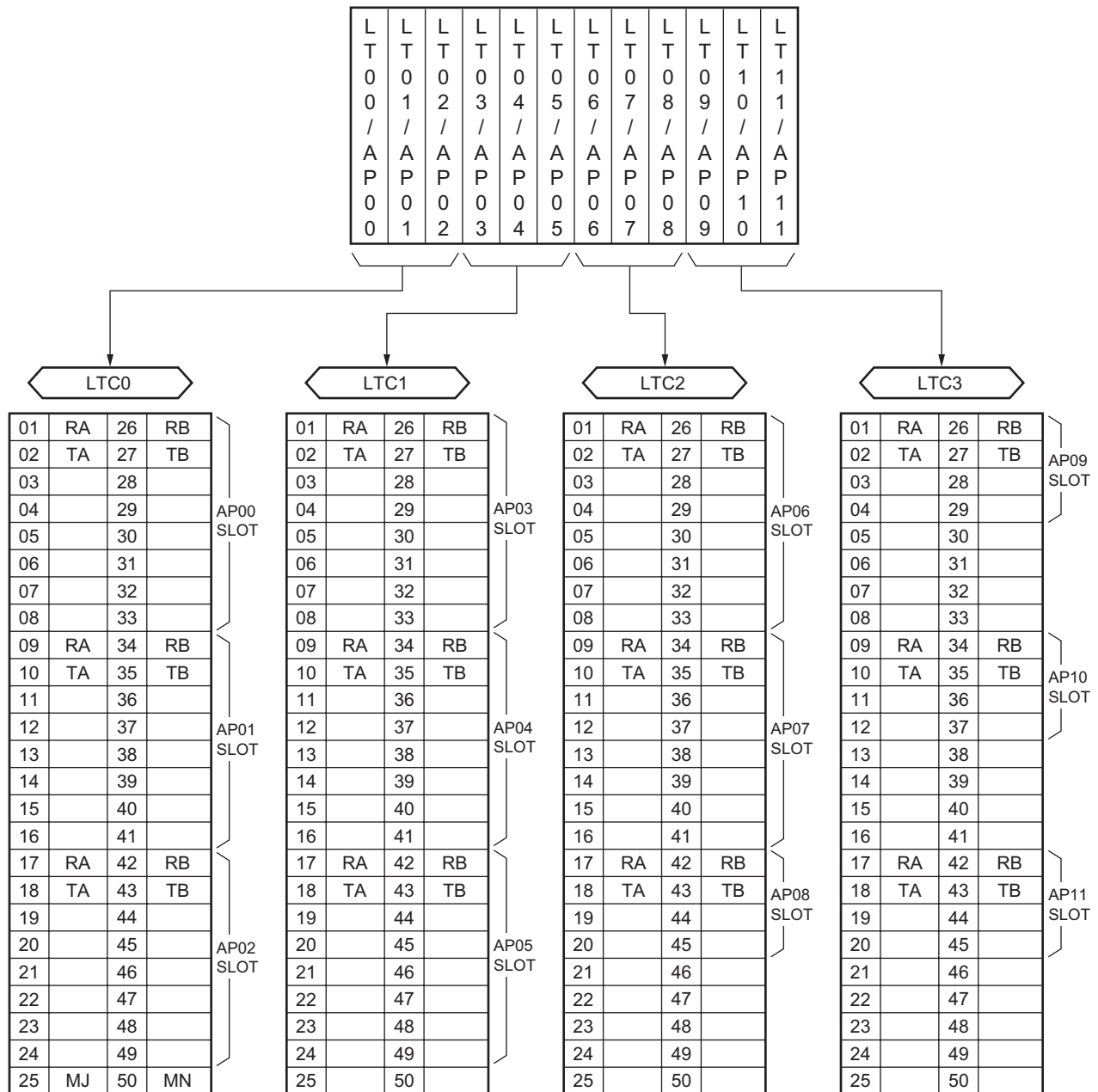
Connect the WAN connector on the PZ-M649 card and the digital private line (T1).

PZ-M649 - Digital private network (T1) Cable Connection

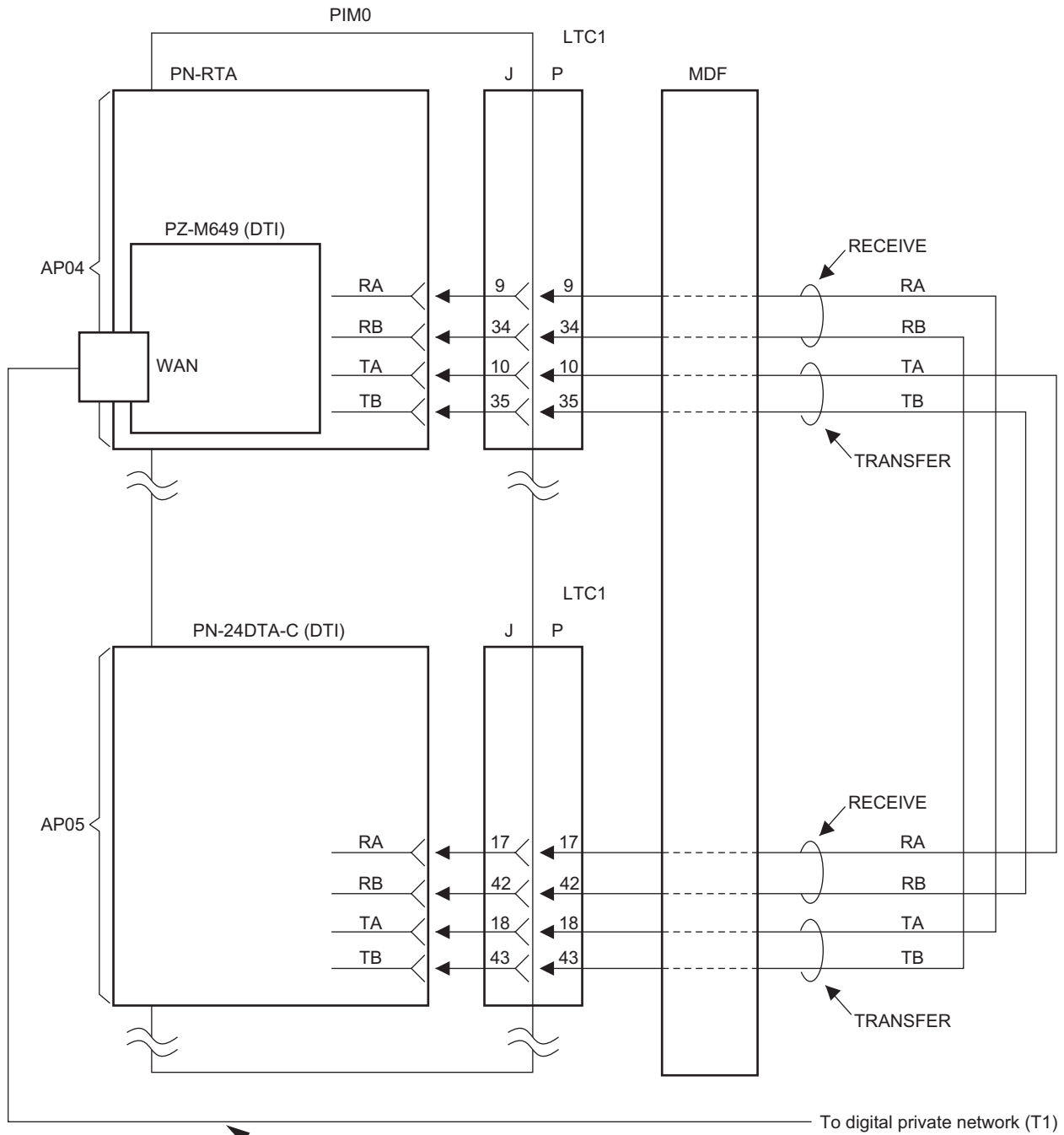


NOTE: *The cable length can be set by the interface command via the CLI (T1 lbo short-haul FEET or T1 lbo long-haul DB). The default setting is short-haul 0 (0 to 40 m [0 to 132 ft.]). For details, refer to “Router Command Reference Manual”.*

Location of AP Slots and LTC Connectors for PN-24DTA-C (DTI)

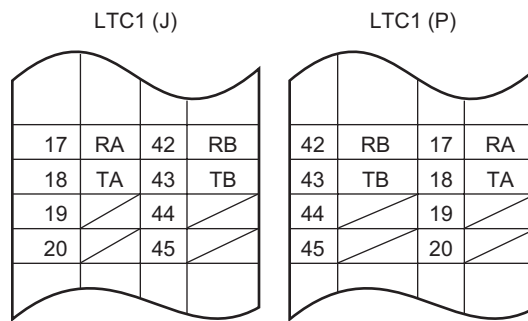
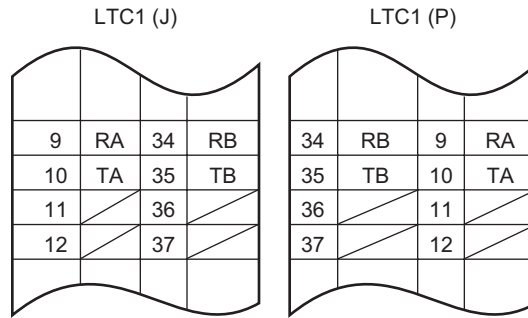


Example of MDF Cross Connection for PN-24DTA-C (DTI)



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Example of MDF Cross Connection for PN-24DTA-C (DTI)



Cable Connection of PZ-M650 Card

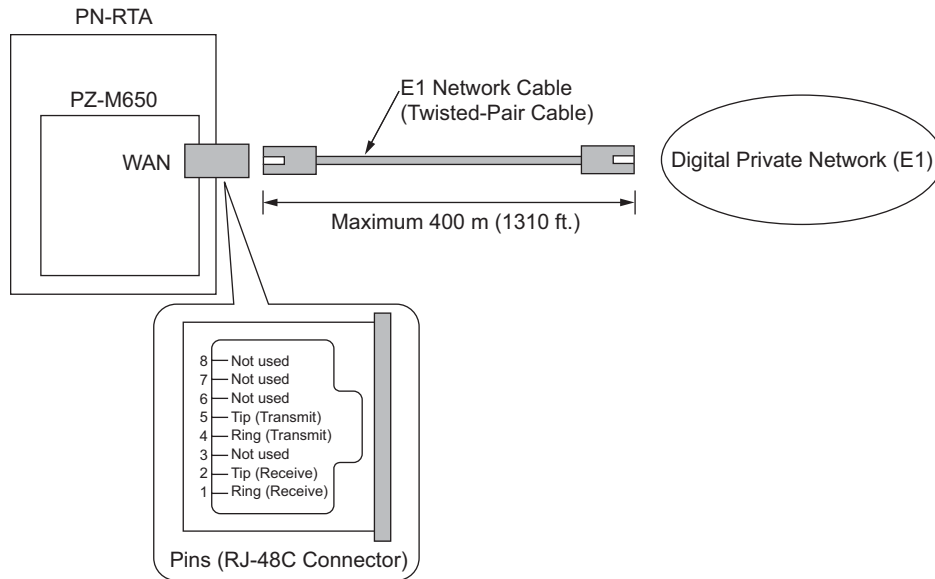
Connect the cable to PZ-M650 card to provide a digital private network (E1). [Page 64](#)

When originating a call from legacy terminal (single line telephone/D^{term}) to a digital private network (E1) via PZ-M650 card, connect the cable between PN-RTA card and PN-30DTC-C (DTI) card via MDF [Page 65, 66](#) in addition to the above connection.

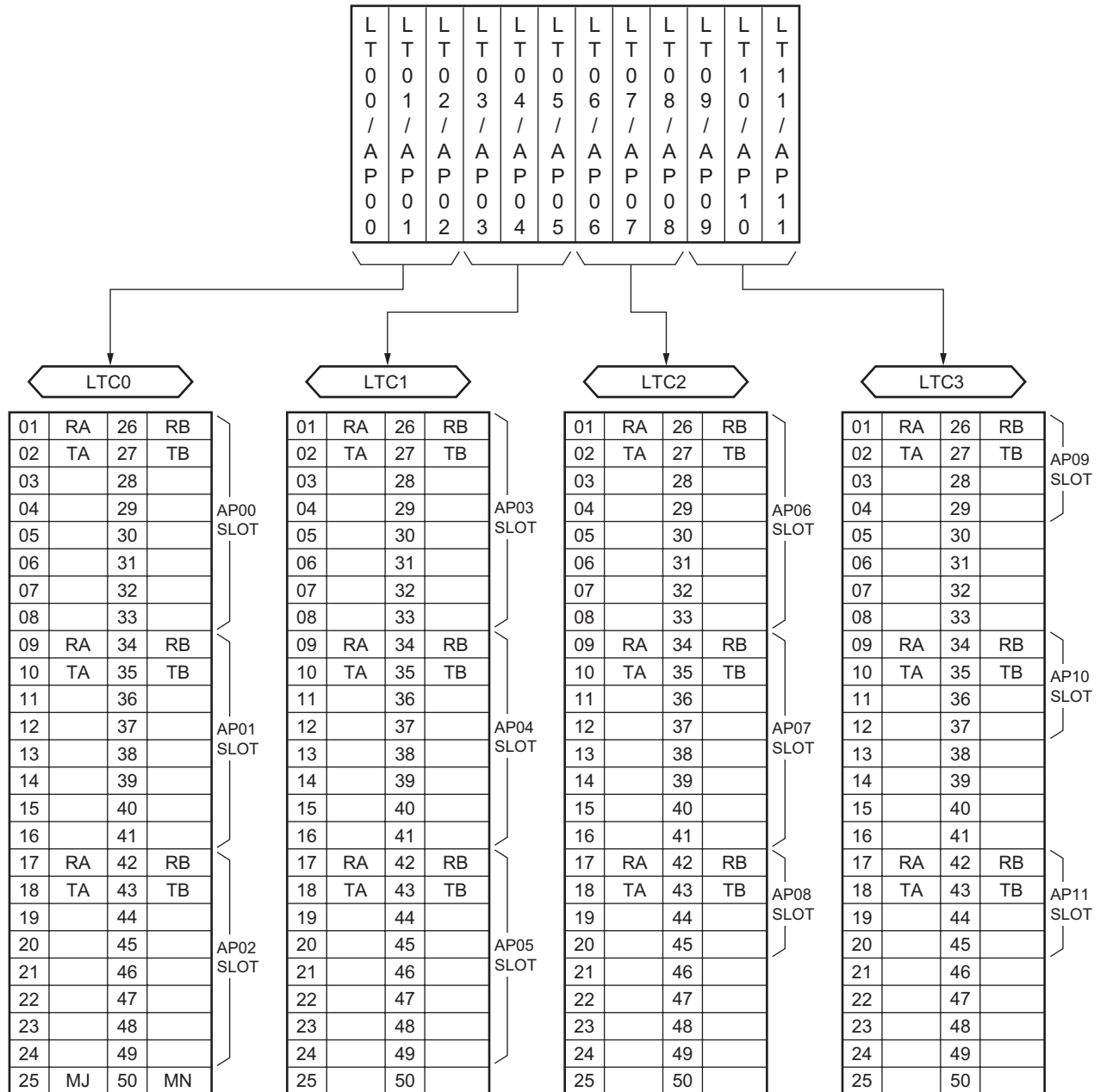
Cable Connection of WAN connector on PZ-M650 Card

Connect the WAN connector on the PZ-M650 card and the digital private line (E1).

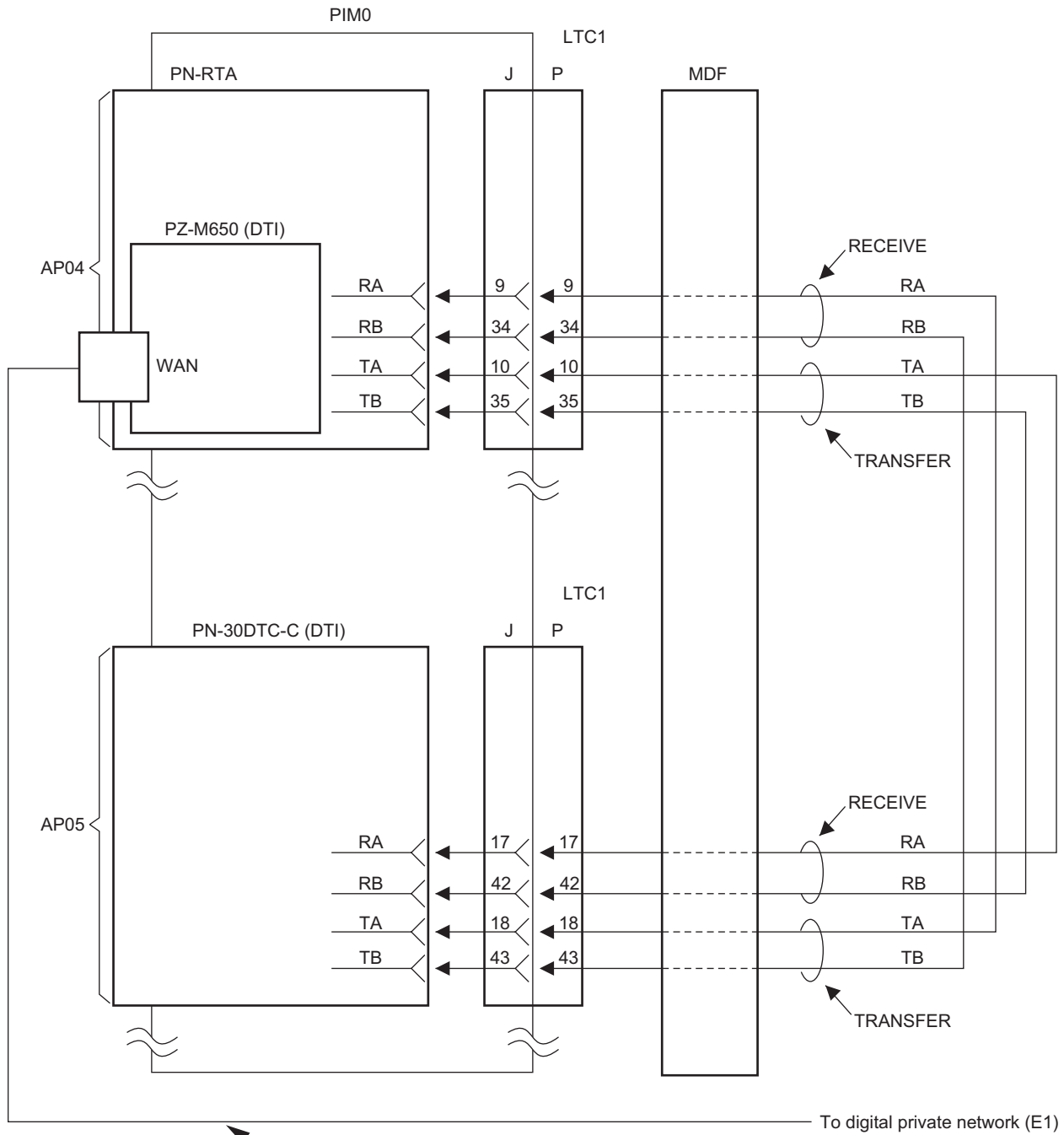
PZ-M650 - Digital private network (E1) Cable Connection



Location of AP Slots and LTC Connectors for PN-30DTC-C (DTI)



Example of MDF Cross Connection for PN-30DTC-C (DTI)

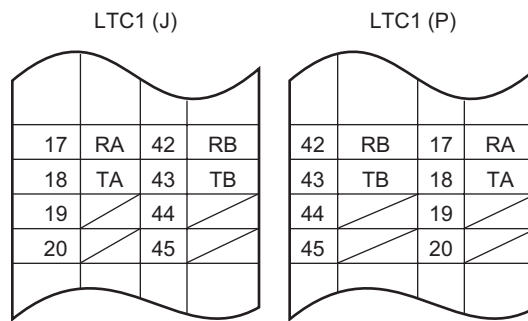
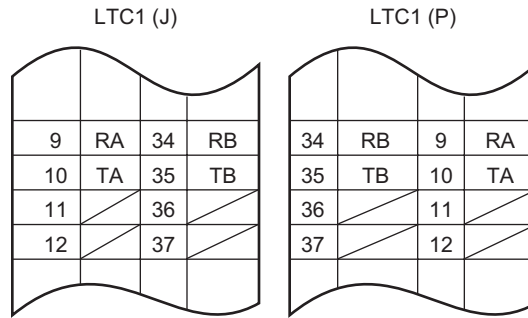


E1 Network cable

To digital private network (E1)

Continued on next page

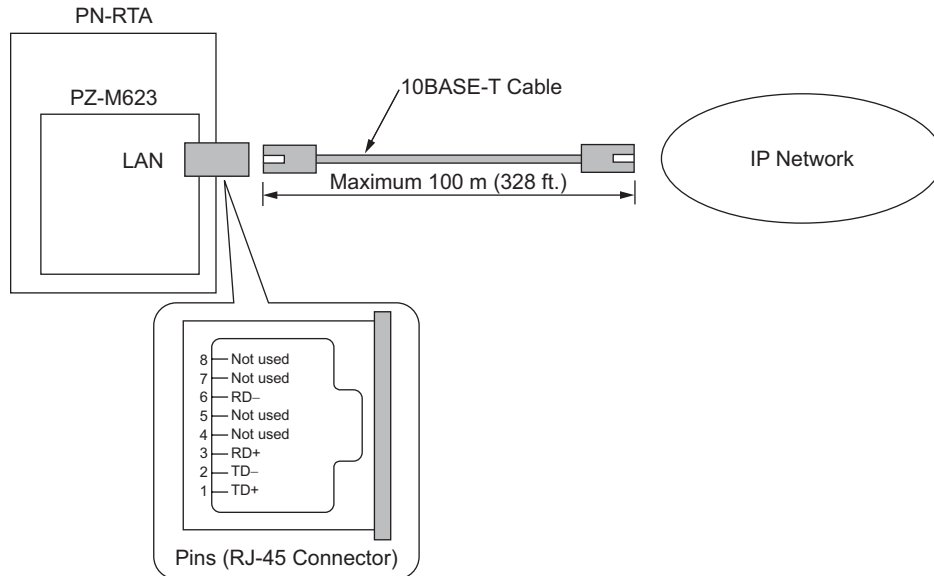
Example of MDF Cross Connection for PN-30DTC-C (DTI)



LAN Cable Connection of PZ-M623 Card

Connect the LAN connector on the PZ-M623 card and the IP network by a 10BASE-T cable.

PZ-M623 - IP network Cable Connection

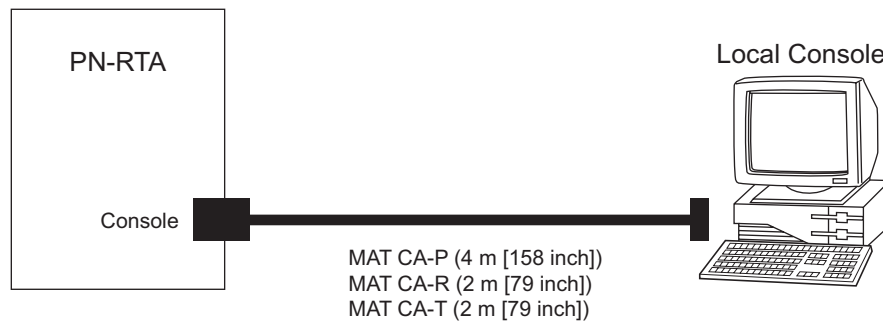


Connecting Local Console to PN-RTA Card

Connect the Console connector on the PN-RTA card and the local console by using a MAT CA-P/CA-R/CA-T cable.

Assign the initial data for the In-Skin Router from the local console.

Connecting Local Console to PN-RTA Card



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CHAPTER 3

BASICOPERATIONS AND VARIOUS EXPLANATIONS

This chapter explains the each key function that is used by the console, each of mode, login and user rights, and the program configuration.

COMMAND ENTRY	72
KEY OPERATIONS AND SCREEN DISPLAYS	73
MODES	78
LOGIN AND USER RIGHTS	81
SETTING DATA AND PROGRAM FILES	85

KEY OPERATIONS AND SCREEN DISPLAYS

During command entry, you can use the cursor movement, character deletion, command entry assist, and help functions.

Moving the cursor

On the command line, you can move the cursor to the right and left.

Ctrl + b, or ←	Moves the cursor one character to the left.
Ctrl + f, or →	Moves the cursor one character to the right.
Ctrl + a	Moves the cursor to the beginning of the line.
Ctrl + e	Moves the cursor to the end of the line.

Router # enable – config		Ctrl + b, or ← (Move one character to the left)
Router # enable – config		Ctrl + a (Move to the beginning of the line)
Router # enable – config		Ctrl + f, or → (Move one character to the right)
Router # enable – config		Ctrl + e (Move to the end of the line)
Router # enable – config		

Editing characters on the command line

In combination with the cursor movement functions, you can use the following functions to edit (delete and replace) the desired characters on the command lines.

Back Space	Deletes the single character to the left of the cursor.
Ctrl + d	Deletes the single character at the cursor position.
Ctrl + t	Replaces the character at the cursor position with the preceding one.
Ctrl + k	Deletes all characters ranging from the cursor position to the end of the line.
Ctrl + c	Deletes all characters on the command line.

Router # enable - cnofofig	↪ Ctrl + d (Delete the character "f" at the cursor position)
Router # enable - cnoofig	↪ Back Space (Delete the character "o" to the left of the cursor)
Router # enable - cnofig	↪ Ctrl + t (Replace the character "o" at the cursor position with the preceding one "n")
Router # enable - config	↪ Ctrl + k (Deletes all characters ranging from the cursor position to the end of the line)
Router # enable - co	↪ Ctrl + c (Delete all characters)
Router #	

Calling previously entered commands

With appropriate key operations, you can call the commands that you have previously entered. You can call the commands in the order from the newest to the oldest or from the oldest to the newest. After you run through the history of commands in the buffer, you will be back to the previous prompt. You can perform character editing operations on called commands.

MEMO: Upon a restart, the command history is cleared.

Ctrl + p , or ↑	Calls the previously entered commands in the order from the newest to the oldest.
Ctrl + n , or ↓	Calls the previously entered commands in the order from the oldest to the newest.

If you have entered the three commands “exit”, “telnet”, and “help” in this order since startup, you can call them in the order shown below.


Router #	
Router # help	↪ Ctrl + p , or ↑
Router # telnet	↪ Ctrl + p , or ↑
Router # exit	↪ Ctrl + p , or ↑
Router #	↪ Ctrl + p , or ↑

You can use the two command call functions in combination to go back and forth through the buffer.

```

Router # █
Router # help █
Router # telnet █
Router # help █
Router # █
Router # exit █

```



Ctrl + p, or ↑
Ctrl + p, or ↑
Ctrl + n, or ↓
Ctrl + n, or ↓
Ctrl + n, or ↓

Getting assistance in command entry

Entering only the first several characters of a command and pressing the [Tab] key causes the full form of the command to be displayed on the screen.

If there is only one command that begins with the entered characters, pressing the [Tab] key causes the remaining characters of the command to be displayed on the screen.

```

Router # en █ Tab
Router # enable - config █

```

MEMO: *If there are several commands that begin with the entered characters, pressing the [Tab] key does not cause the remaining characters of any of the commands to be displayed; instead, the commands that begin with the entered characters are listed on the screen.*

```

Router # e █ Tab
  enable - config      -- Enter configuration mode
  exit                 -- Exit from the router
Router # e █

```

MEMO: *If, after entering all characters of a command, you want to display command candidates with the [Tab] key, first press the [Space] key to indicate that you have entered all characters of the command and then press the [Tab] key. If you do not press the [Space] key to delimit the command, the command candidates that begin with the entered characters will be listed.*

```

Router (config – Ethernet0.0) # ip [Tab]
ip          -- IPv4 interface subcommands
ipsec       -- IPSec configuration commands
ipv6        -- IPv6 interface subcommands
Router (config – Ethernet0.0) # ip [Space] [Tab]
access – list -- Configure access lists
cache – size  -- Configure routing cache table size
dhcp        -- Configure DHCP server

(Omitted)
    
```

← If the **Space** key is not pressed

← If the **Space** key is pressed

Entering an abbreviation of a command

If there is only one command that begins with the entered characters, you can enter the command simply by pressing the [Enter] key.

```

Router # en [Enter]
Router (config) #
    
```

For a command consisting of several words, you can enter an abbreviation of each word, provided that word can be abbreviated. Delimit each word abbreviation with a space.

In the following example, the write memory command is entered with abbreviations of the respective words.

```

Router (config) # wr m [Enter]
Router (config) #
    
```

Help functions

The [?] key can display a list of command explanations.

Pressing the [?] key displays a list of explanations of the commands or parameters that are available in that state.

```
Router (config - Ethernet0.0) # ip address [?]
A.B.C.D/<0 - 32> -- IP address
dhcp          -- Enable DHCP dynamic address assign
ipcp          -- Enable IPCP dynamic address assign
unnumbered    -- Enable IP processing without an explicit address
Router (config - Ethernet0.0) # ip address [ ]
```

MEMO: *To get help, you can use the [Tab] key instead of the [?] key. If, however, there is only one command candidate, the [Tab] key, which is an entry assist function key, display the remaining characters of the command, instead of an explanation of the command.*

Screen displays

If more information than can be displayed on the screen at a time is to be displayed, "--More--" is displayed in the middle of the display. To view the next several lines, press the [Space] key. To view the next lines one at a time, press the [Enter] key. Pressing the [Q] key quits the display of the subsequent lines, returning you to the prompt.

```
-- More -- [ ]
```

Notes on command entry

During command entry, note the following:

Use of ASCII characters not including control characters

For command entry, use ASCII characters (not including control characters).

Double quotation marks (“)

The ASCII double quotation (“) is handled in a special way in command parameter entry; the string of characters enclosed in double quotations (“) are considered a valid string.

Either one of a pair of double quotations (“) is optional. If you omit the closing double quotation (“) used to indicate the end of a valid character string, the character string ranging from the opening double quotation (“) to the end of the character string is considered valid. If you omit the opening double quotation (“), the character string ranging from the first character to the closing double quotation (“) is considered valid.

MODES

Mode configuration

The In-Skin Router provides operation mode and config mode. Config mode is divided into the following three modes.

- Operation mode
- Config mode

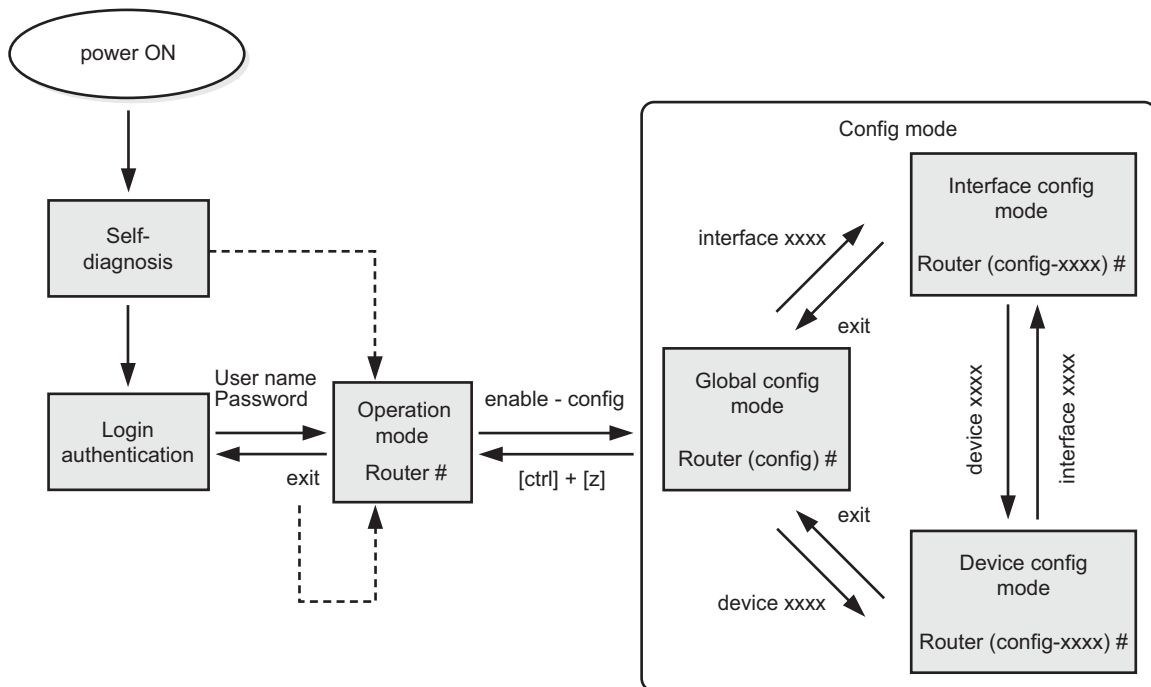
Global config mode : Mode in which general setup can be performed

Device config mode : Mode in which each port can be set up for a specific physical operation

Interface config mode: Mode in which a physical port can be set up for a specific logical connection operation

Each command is associated with a specific mode, and can be entered only after the router enters that mode.

Mode Configuration



The characters "Router" preceding the prompt on the screen is the default setting. If you set a host name using the hostname command for router identification purposes, "Router" is replaced by this host name.

- - - ➔ Indicates the transition assumed when no user is registered
(for example, when the router is just shipped from the factory)

MEMO: Besides the modes mentioned above, the router also provides boot monitor mode. The router never enters this mode during normal operation; use this mode to maintain the In-Skin Router in the event of a fault or emergency.

Changing the In-Skin Router between operation and config modes

From operation mode to config mode

To change the In-Skin Router from operation mode to config mode, use the enable-config command. Upon entering config mode, the In-Skin Router shows a different prompt.

```
Router # enable - config [Enter]
Router (config) #
```

MEMO: When the In-Skin Router changes from operation mode to config mode for the first time, it enters global config mode. If, after the In-Skin Router changed from config mode to operation mode, you enter the enable-config command, the In-Skin Router enters the immediately preceding config mode (global, interface, or device).

```
Router # enable - config [Enter]
Router (config - Ethernet0.0) #
```

NOTE: You cannot change the In-Skin Router directly from operation mode to interface config or device config mode.

From config mode to operation mode

To change the In-Skin Router from config mode to operation mode, press [Ctrl] + [z].

```
Router (config) # [Ctrl] + [z]
Router #
```

Changing the In-Skin Router between different config modes

From global config mode to interface or device config mode

To change the In-Skin Router from global config mode to interface or device config mode, specify the interface or device that you want to set up.

```
Router (config) # interface Ethernet0.0   
Router (config - Ethernet0.0) # █
```

From interface or device config mode to global config mode

To change the In-Skin Router from interface or device config mode to global config mode, use the exit command.

```
Router (config - Ethernet0.0) # exit   
Router (config) # █
```

From operation mode to login authentication (logout)

To log out, use the exit command.

```
Router # exit   
login : █
```

LOGIN AND USER RIGHTS

User rights

The In-Skin Router provides two user rights:

Monitor : Allows you to use the view, statistical information, cache information clear commands.
Does not allow you to use setup commands.

Administrator: Allows you to use all commands.

By looking at the command prompt, you can determine with which user right you have logged in.

If you have logged in with the administrator right

If you have logged in with the administrator right, you will see the “#” prompt.

```
Router # █
```

If you have logged in with the monitor right

If you have logged in with the monitor right, you will see the “%” prompt.

```
Router % █
```

Registering users and setting user rights

To register a user and set a user right, use the username command in global config mode.

In this example, a user is registered with the user name “nec-admin”, the password “to34kyo61”, and the user right “administrator”. To register the user with the user right “monitor”, use monitor for the parameter. The user name and the password may be up to 250 characters in total. The user name may, however, be up to 16 characters.

```
Router (config) # username nec – admin password plain to34kyo61 administrator   
% User 'nec – admin' has been added.  
Router (config) # █
```

MEMO: *If you attempt to enter an existing user name, an error message will be displayed.*

```
Router (config) # username nec – admin password plain kyo69to397 monitor   
% User 'nec – admin' is already configured.  
Router (config) #
```

NOTE 1: *For security, register at least one user with the administrator right. If no user is registered with the administrator right, no login authentication is performed. Bear this in mind.*

NOTE 2: *The password should be a combination of characters and digits that is difficult for other people to guess.*

Changing passwords

You can change your password once you have logged in. To do this, use the password command in global config mode.

In this example, the password of the user who has logged in with the user name “nec-admin” and the password “to34kyo61” is changed to “kyo69to397”.

```
Router (config) % password to34kyo61 kyo69to397   
% Current user's password has been changed.  
Router (config) % █
```

NOTE: *Only the passwords of those users who have logged in can be changed. The passwords of other users cannot be changed.*

Erasing users

You can erase the registered users.

For erasure, use the no username command in global config mode. You must log in with the administrator right.

```
Router (config) # no username nec – admin   
% User 'nec – admin' has been deleted.  
Router (config) # █
```

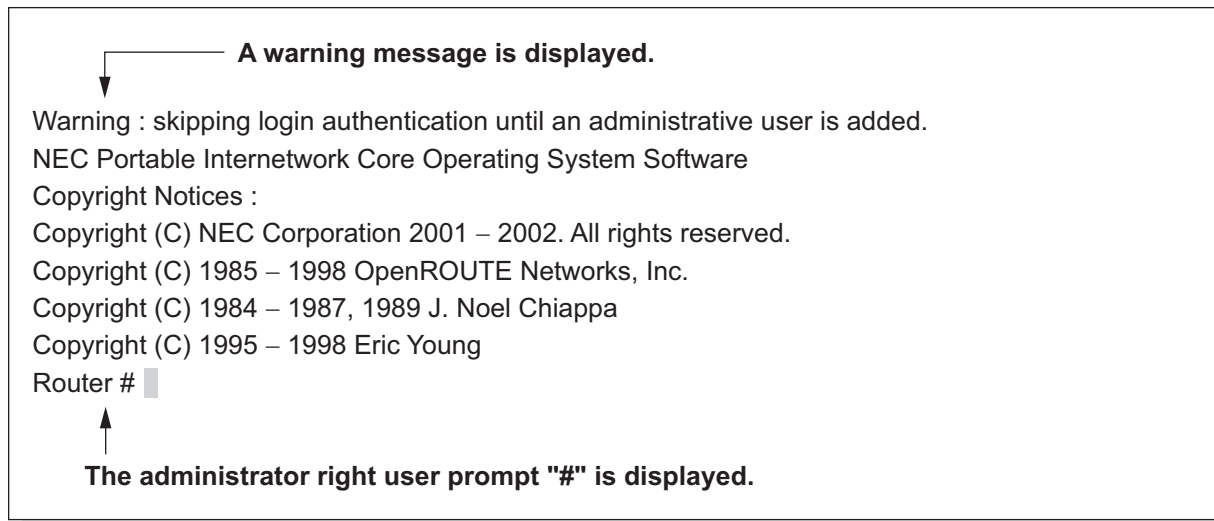
Login

If a user has been registered with the administrator right, login authentication is performed at startup and at access from a remote console. Log in with the registered user name and password.

In this example, a user logs in with the user name “nec-admin”, the password “to34kyo61”, and the user right “administrator”.

```
login : nec – admin   
Password : to34kyo61  ← In reality, the password is  
not displayed on the screen  
when you enter it.  
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Copyright (C) 1995 – 1998 Eric Young  
Router # █
```

NOTE: *If no user has been registered with the administrator right, no login authentication is performed even if users have been registered with the monitor right.
If started up in this state, the router displays a warning message, followed by the administrator right user prompt. Anyone can then enter commands with the administrator right. This is in order to prevent setup or change from becoming impossible.*



Use of modes by more than one user

There are limits on the number of users that can enter the respective modes:

Operation mode: Up to three users (remote console: 2 + local console: 1)

Config mode : Only one user (remote/local console)

Only a single user can enter config mode at a time. This is in order to prevent setup competition.

Users with the administrator right and those with the monitor right are treated equal.

Forced logout due to timeout

If the user in config mode has not entered any command for a prescribed period of time, he or she will be forced to log out, with the “login:” prompt displayed on the terminal used by that user. You can set the timeout time with the terminal timeout command.

SETTING DATA AND PROGRAM FILES

Setting data and programs

The main program and setting data of the In-Skin Router are as shown below.

Program

Program: Program for the In-Skin Router. It executes various router functions. It can be upgraded.

Setting data

Config: Config is the setting data used to determine the operation of the In-Skin Router.

There are two types of config, running config and startup config.

The config in the DRAM area that is in use is called running config, while the config in flash memory is called startup config. Startup config is loaded into DRAM at startup to become running config.

Statistical and other information

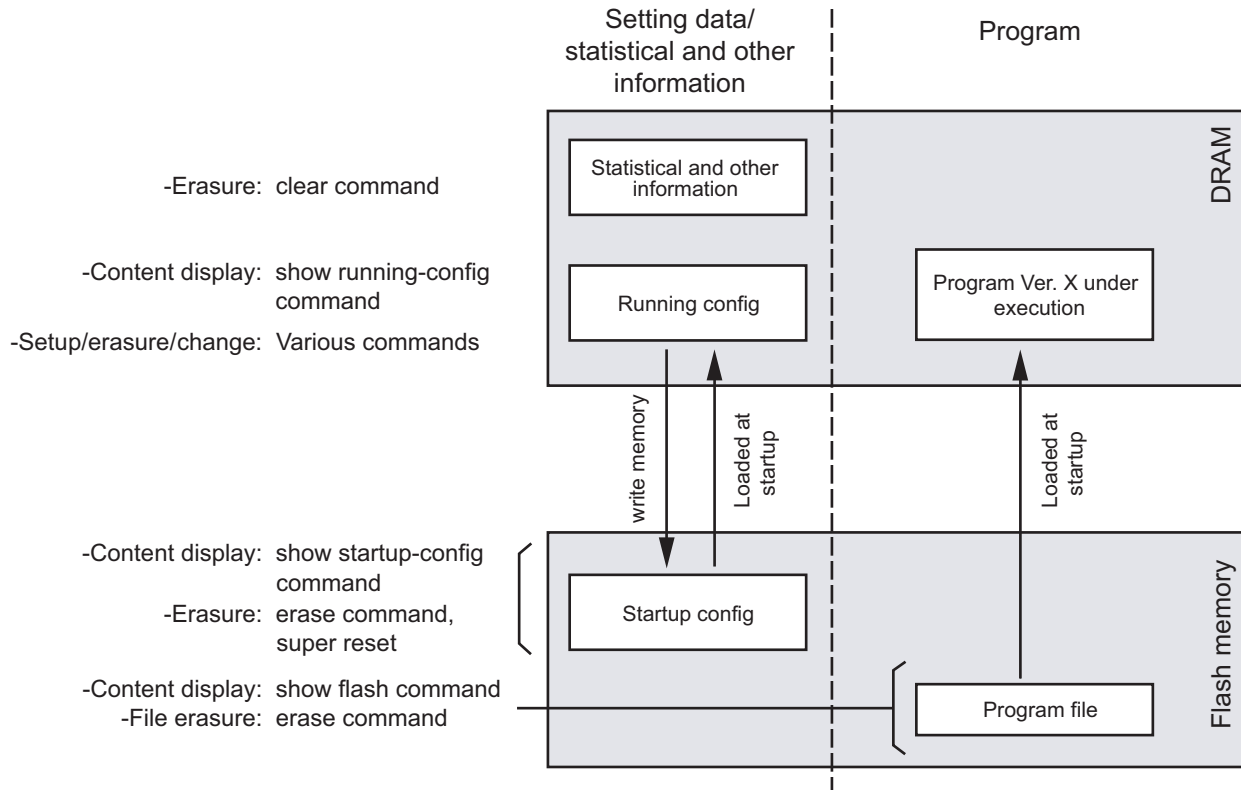
Statistical and other information: Statistical information, event information, routing table and other data that have been collected during the operation of the program.

Besides the above, there is a boot section. When the power switch is turned ON, the boot section operates first to perform self-diagnosis of the In-Skin Router, load the program, and perform the other necessary operations. If the program loading is interrupted due to an error such as a program file error, the In-Skin Router enters device recovery mode called “boot monitor”.

Locations used to store setting data and the program

An outline of the configuration of the In-Skin Router is as shown in the figure below, as well as the locations used to store setting data.

Locations Used to Store Setting Data



Flash memory

Flash memory can store program files and startup config.

At startup by turning the power ON and at a restart with the reload command, the program files and startup config in flash memory are loaded into DRAM.

With appropriate commands, you can erase files from flash memory and transfer files to and from a TFTP server.

Even after the power is turned OFF, the program files will not be erased.

NOTE: *Turning OFF the power switch while writing to the file system is in progress (the BUSY lamp is flashing) may cause the files in the file system to be destroyed. During writing, never turn OFF the power switch.*

Operation area (DRAM)

This is the memory area where you can overwrite and erase data.

At startup, DRAM is cleared entirely, and program files and startup config are loaded from flash memory.

To make changes in setting data with a command is to make changes in running config in this area.

Startup config and running config

At startup, startup config is loaded into DRAM and becomes running config, so that immediately after startup, startup config and running config are identical. If you make setting changes with a command, running config will differ from startup config.

To always keep startup config up to date, be sure to update startup config by overwriting it with running config with the write memory command whenever you have made setting changes.

Startup sequence

At startup by turning ON the power switch

When you turn ON the power switch, the following sequence of operations takes place:

- (1) With the power switch turned ON, the boot section starts to operate to perform self-diagnosis of the In-Skin Router.
- (2) The DRAM area is cleared.
- (3) The program set with the boot entry command is loaded.
- (4) The program is loaded into DRAM as the program to be executed.
- (5) Startup config is loaded into DRAM as running config.

If no startup config is found, the factory settings are used at startup.

NOTE: *If no startup program is set with the boot entry command, the program to be displayed at the top with the show flash command will be loaded.*

```
IX1000 Series Router POST (Power On Self Test)

  DRAM TEST 1   : Pass
  DRAM TEST 2   : Pass
  NVRAM TEST    : Pass
  CPU TEST      : Pass
  PLD TEST      : Pass
  LAN1 TEST     : Pass
  LAN2 TEST     : Pass
  VOLTAGE       : 3.199V Pass
  TEMPERATURE  : +36.0degC Pass

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Loading using Flash Load Image "ix1000 – ms – 4.0.5.ldc"
-----
Starting at 20000

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Router # █
```

(1) Self – diagnosis

(3) (4) Boot program check and loading

(5) Command prompt display

At a restart with the reload command

Almost the same operations as those performed at startup by turning ON the power switch are performed, except that self-diagnosis is not performed and the (2) and subsequent steps are performed. All of the running config and statistical and other information, that existed before the restart will be lost.

```
Router # reload 
Are you sure you want to reload the router? (Yes or [No]) : y 
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Loading using Flash Load Image "ix1000 – ms – 4.0.5.ldc"
-----
Starting at 20000

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Router # █
```

At a restart with the restart command

No program loading is performed, but the program previously loaded into DRAM is restarted. Startup config is loaded into DRAM as running config. If startup config cannot be found, the factory settings will be used at startup.

All of the running config and statistical and other information, that existed before the restart will be lost.

```
Router # restart 
Are you sure you want to restart the router? (Yes or [No] ) : y 

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Router # █
```

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CHAPTER 4

INITIALIZATION

This chapter explains the basic setup operations that you must perform initially. Also explains the required setup for connecting a remote console.

INITIALIZATION PROCEDURE	92
TURNING ON THE POWER	93
REGISTERING USERS AND SETTING PASSWORDS	94
SETTING THE DATE AND TIME	96
SETTING DEVICE NAMES	97
SAVING RUNNING CONFIG	98
RESTARTING THE IN-SKIN ROUTER WITH A COMMAND AND LOGGING IN	99
TURNING OFF THE POWER TO TERMINATE THE IN-SKIN ROUTER	100
SETTING UP THE LAN PORTS FOR SUITABLE COMMUNICATION MODES	101
SETTING UP THE WAN PRIVATE LINE (T1)	104
SETTING UP THE WAN PRIVATE LINE (E1)	106
SETUP FOR A REMOTE CONSOLE	108

INITIALIZATION PROCEDURE

This chapter explains the minimum setup operations that you must perform after you purchase an In-Skin Router.

Perform the following basic setup operation on the local console:

- (1) Turn ON the power
- (2) Register users and set passwords
- (3) Set the date and time
- (4) Set device names
- (5) Save running config
- (6) Restart the router with a command and log in
- (7) Turn OFF the power to terminate the In-Skin Router
- (8) Set up the LAN ports for suitable communication modes
- (9) Setting up the WAN private line
- (10) Set up a remote console

TURNING ON THE POWER

Turn ON the power switch (PWRSW) on the PN-RTA card. The system status is displayed as follows:

- (1) Self-diagnosis is executed. Upon normal termination, the diagnosis result “Pass” is displayed.
- (2) The program is loaded. The name of the program to be loaded is displayed.
While the program is being loaded, “--” indicates the progress of loading.
- (3) Upon normal termination of loading, a prompt is displayed.

```
IX1000 Series Router POST (Power On Self Test)

  DRAM TEST 1   : Pass
  DRAM TEST 2   : Pass
  NVRAM TEST    : Pass
  CPU TEST      : Pass
  PLD TEST      : Pass
  LAN1 TEST     : Pass
  LAN2 TEST     : Pass
  VOLTAGE       : 3.199V Pass
  TEMPERATURE  : +36.0degC Pass

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No valid boot records found, attempting flash load
Loading using Flash Load Image "ix1000 – ms – 4.0.5.ldc"
-----
Starting at 20000

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Router # █
```

(1) Execution of self – diagnosis

(2) Program loading

(3) Command prompt display

REGISTERING USERS AND SETTING PASSWORDS

Register as many users with the administrator right as required and as many users with the monitor right as required.

To register a user, use the username command in global config mode. The parameters to the username command are the user name, password, and user right (either administrator or monitor). The user name and the password may be up to 250 characters in total. The user name may, however, be up to 16 characters.

For checking, use the show running-config command.

MEMO 1: *To change the password of a registered user, use the password command.*

MEMO 2: *To erase a registered user, use the no username command.*

MEMO 3: *To set a password, use either plain or plain hash. If, after entry, you check the setting with the show config command, the password will be displayed as a hash value.*

NOTE 1: *For security, the password should be a combination of characters and digits that is difficult for other people to guess.*

NOTE 2: *See to it that you never forget the passwords. If you should forget the passwords of all users with the administrator right, you can no longer make setting changes. In that event, you must perform a super reset. At a super reset, both running config and startup config will be lost.*

Setting

In this example, a user is registered as one with the administrator right, the user name “nec-admin”, and password “to34kyo61”, and another user is registered as one with the monitor right, the user name “nec-moni”, and password “kyo69to397”.

```
Router # enable – config 
Router (config) # username nec – admin password plain to34kyo61 administrator 
% User 'nec – admin' has been added.
Router (config) # username nec – moni password plain kyo69to397 monitor 
% User 'nec – moni' has been added.
Router (config) # █
```

Checking

For checking, use the show running-config command.

MEMO: *User names and user rights are displayed, but no passwords are displayed.*

```
Router (config) # show running – config 

hostname Router
username nec – admin password hash 6CE21C6C548272C27C administrator
username nec – moni password hash 841A0C844AB44214CC62 monitor

(Omitted)

Router (config) # █
```

SETTING THE DATE AND TIME

The In-Skin Router has a built-in calendar clock with battery backup. Set the difference from the international standard time and the current date and time in U.S.A.

To set the time difference, use the `timezone` command in global config mode. As the parameter to the `timezone` command, a time difference can be set in the range from -12 to 12.

To set the date and time, use the `clock` command. As the parameters to the `clock` command, you can enter the hour (0-23), minute (0-59), and second (0-59), day (1-31), month (1-12), and year (2001-2098) in this order, delimiting each with a space. To check the date and time, use the `show clock` command.

Setting

In this example, the In-Skin Router is placed in global config mode, the difference from the international standard time “-5” is set, and 3:12:0 p.m., October 20, 2001 is set as the date and time in U.S.A. Enter the `clock` command in accordance with a time signal or an accurate clock.

```
Router # enable - config   
Router (config) # timezone -5   
Router (config) # clock 15 12 0 20 10 2001   
Router (config) # █
```

MEMO 1: *By default, the difference from the international standard time is set to “+9”. Set the time difference from the international standard time in your country.*

MEMO 2: *To enter the time only, you can enter the hour, minute, and second only, omitting the day, month, and year.*

Checking

For checking, use the `show clock` command.

```
Router (config) # show clock   
Saturday, 20 October 2001 15 : 12 : 07 - 05.00  
Router (config) # █
```

SETTING DEVICE NAMES

If using multiple In-Skin Routers on a network, you can set their device names to identify the individual In-Skin Routers. To set a device name, use the `hostname` command in global config mode.

Setting and checking

In this example, the In-Skin Router is placed in global config mode and “ix1000-01” is registered as a device name. The character string preceding the command prompt is replaced by the device name, indicating that the name has been set properly.

```
Router (config) # hostname ix1000 – 01   
ix1000 – 01 (config) # █
```

SAVING RUNNING CONFIG

Any data that you have set and changed is written in the DRAM area as part of running config. It will, therefore, be lost when the power is turned OFF.

To prevent the data from loss even after the power is turned OFF, save running config to flash memory as startup config.

To save running config as startup config, use the write memory command in global config mode. Running config is written over startup config.

Saving

Entering the write memory command causes the BUSY lamp to light to indicate that writing to flash memory is in progress. Upon completion of writing, the BUSY lamp goes out and the command prompt is displayed.

```
ix1000 - 01 (config) # write memory   
ix1000 - 01 (config) #
```

NOTE: *Do not turn OFF the power switch while the BUSY lamp is lit. Otherwise, the data in flash memory may be destroyed.*

RESTARTING THE IN-SKIN ROUTER WITH A COMMAND AND LOGGING IN

Check that the data that you have set is saved properly and that the In-Skin Router can be restarted with that data.

To restart the In-Skin Router, use the reload command in operation mode.

Restarting with a command

Place the In-Skin Router in operation mode, then restart it with the reload command.

After the restart, log in with the registered user name and password.

In this example, a user registered with the administrator right, the user name “nec-admin”, and password “to34kyo61” logs in.

```
rt1000 - 01 (config) #  + 
rt1000 - 01 # reload 
Are you sure you want to reload the router? (Yes or [No]) : y 
Copyright (C) NEC Corporation 2001. All rights reserved.
Copyright 1985 - 1998 Proteon, Inc. All rights reserved.

No valid boot records found, attempting flash load
Loading using Flash Load Image "ix1000 - 2.1.1.ldc"
-----
Starting at 20000

login : nec - admin 
password : to34kyo61  ← In reality, the password
is not displayed on the
screen when you enter it.

NEC Portable Internetwork Core Operating System Software

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(Omitted)

rt1000 - 01 # █
```

TURNING OFF THE POWER TO TERMINATE THE IN-SKIN ROUTER

To terminate the In-Skin Router, check that the BUSY lamp is not flashing, then turn the power switch (PWRSW on the PN-RTA) OFF (UP position).

SETTING UP THE LAN PORTS FOR SUITABLE COMMUNICATION MODES

Set up the LAN ports for the communication modes suitable to the environment used.

This section uses the LAN1 (10/100BASE-TX) port as an example.

Setup method

To set up the LAN port for a specific communication mode, enter device config mode.

By default, the In-Skin Router is set up for automatic negotiation (auto negotiation) for both communication rate and communication direction.

Setting the communication rate

In this example, the communication rate is set to 10 Mbps.

```
ix1000 - 01 # enable - config   
ix1000 - 01 (config) # device FastEthernet0   
ix1000 - 01 (config - FastEthernet0) # speed 10   
ix1000 - 01 (config - FastEthernet0) # █
```

Setting the communication direction

In this example, the communication direction is set to half duplex.

```
ix1000 - 01 # enable - config   
ix1000 - 01 (config) # device FastEthernet0   
ix1000 - 01 (config - FastEthernet0) # duplex half   
ix1000 - 01 (config - FastEthernet0) # █
```

NOTE: *When you connect a communication device (such as a HUB) to the LAN1 (10/100BASE-TX) port of the In-Skin Router, and either the In-Skin Router or that communication device is set up for auto negotiation, transfer efficiency may be impaired due to the mismatch between the communication modes of these devices, although a link has been established. If this occurs, set the communication rate of the LAN1 (10/100BASE-TX) port appropriately (to 10 Mbps, 100 Mbps, or auto negotiation), as well as the communication direction (to full duplex, half duplex, or auto negotiation), referring to the following combination table.*

Setting in the In-Skin Router		Communication rate and direction assumed if both the rate and direction of the opposite device are set to auto negotiation
Rate	Direction	
Auto negotiation	Auto negotiation	100 Mbps, full duplex
Auto negotiation	Fixed at full duplex	Undefined (may impair transfer efficiency)
Auto negotiation	Fixed at half duplex	100 Mbps, half duplex
Fixed at 100 Mbps	Auto negotiation	100 Mbps, full duplex
Fixed at 100 Mbps	Fixed at full duplex	Undefined (may impair transfer efficiency)
Fixed at 100 Mbps	Fixed at half duplex	100 Mbps, half duplex
Fixed at 10 Mbps	Auto negotiation	10 Mbps, full duplex
Fixed at 10 Mbps	Fixed at full duplex	Undefined (may impair transfer efficiency)
Fixed at 10 Mbps	Fixed at half duplex	100 Mbps, half duplex

Checking of the settings

Check the settings with the show interfaces command.

```

ix1000 - 01 (config - FastEthernet0) # exit 
ix1000 - 01 (config) # show interfaces FastEthernet0.0 
Interface FastEthernet0.0 is up

(Omitted)

FastEthernet statistics :
  Physical address 00 : 00 : 4c : a4 : 03 : 18
  Half - duplex, 10Mb/s, 100BaseTX ←
(Omitted)

ix1000 - 01 (config) #
    
```

**Check the settings.
 (In this example, half duplex,
 10 Mbps)**

Setting up the 10BASE-T port

You can set the communication direction of the LAN2 port of the PN-RTA card and LAN port of PZ-M623 card to either full duplex or half duplex. (The default is half duplex.) You cannot set these ports to auto negotiation. Nor can you set their communication rate to 100 Mbps. You can set their communication direction in the same way as that of the LAN1 port.

SETTING UP THE WAN PRIVATE LINE (T1)

You can connect the In-Skin Router (PZ-M649 card is required) to a digital private line (T1).

To do this, use the following procedure.

- (1) Set line attributes for a T1 Line
- (2) Shutting down and restarting the interface for the settings to take effect
- (3) Save setting data
- (4) Check the status of interface

Setting line attributes for a T1 Line

Set the line attributes of a T1 line if necessary.

The line attributes you can set are a type (default: b8zs) of line code (b8zs/ami), lbo (default: 0 [db]/0 to 132 [feet]), and the number of time slots for T1 (default: 12 time slots).

If you use default settings, you do not need to perform these settings.

To set line attributes of a T1 line, use the Serial0 in device config mode.

For details, refer to “Router Command Reference Manual”.

```
ix1000 - 01 # enable - config 
ix1000 - 01 (config) # device Serial0 
ix1000 - 01 (config - Serial0) # █
```

NOTE: *If you change a line attribute of a T1 line to another, you must shut down and restart the interface for the change to take effect.*

Shutting down and restarting the interface for the settings to take effect

If you change a line attribute of a T1 line, you must shut down and restart the interface for the change to take effect.

To shut down and restart the interface, use the Serial0.0 in device config mode.

To stop the interface operation, use shutdown, and to restart it, use no shutdown.

If setting was changed after shutdown, only no shutdown is necessary.

```
ix1000 - 01 # enable - config [Enter]
ix1000 - 01 (config) # interface Serial0.0 [Enter]
ix1000 - 01 (config - Serial0.0) # shutdown [Enter]
ix1000 - 01 (config - Serial0.0) # no shutdown [Enter]
ix1000 - 01 (config - Serial0.0) # █
```

If setting was changed after shutdown, only no shutdown is necessary.

Saving setting data

Upon completion of setting, use the write memory command to save as startup config the data that you have set before a restart.

```
ix1000 - 01 (config - Serial0.0) # exit [Enter]
ix1000 - 01 (config) # write memory [Enter]
ix1000 - 01 (config) # █
```

NOTE: *Do not turn OFF the power switch while the BUSY lamp is lit. Otherwise, the data in flash memory may be destroyed.*

Checking the status of interface

Check the status of interface by show interface command.

```
ix1000 - 01 # enable - config [Enter]
ix1000 - 01 (config) # show interfaces Serial0.0 [Enter]
Interface Serial0.0 is up ← Check that "up" is
                             displayed.
(Omitted)
ix1000 - 01 (config) # █
```

SETTING UP THE WAN PRIVATE LINE (E1)

You can connect the In-Skin Router (PZ-M650 card is required) to a digital private line (E1).

To do this, use the following procedure.

- (1) Set line attributes for an E1 Line
- (2) Shutting down and restarting the interface for the settings to take effect
- (3) Save setting data
- (4) Check the status of interface

Setting line attributes for an E1 Line

Set the line attributes of an E1 line if necessary.

The line attributes you can set are a type (default: CRC4) of line code (HDB3) and the number of time slots for E1 (default: 30 time slots).

If you use default settings, you do not need to perform these settings.

To set line attributes of an E1 line, use the Serial0 in device config mode.

For details, refer to “Router Command Reference Manual”.

```
ix1000 - 01 # enable - config   
ix1000 - 01 (config) # device Serial0   
ix1000 - 01 (config - Serial0) # █
```

NOTE: *If you change a line attribute of an E1 line to another, you must shut down and restart the interface for the change to take effect.*

Shutting down and restarting the interface for the settings to take effect

If you change a line attribute of an E1 line, you must shut down and restart the interface for the change to take effect.

To shut down and restart the interface, use the Serial0.0 in device config mode.

To stop the interface operation, use shutdown, and to restart it, use no shutdown.

If setting was changed after shutdown, only no shutdown is necessary.

```
ix1000 - 01 # enable - config [Enter]
ix1000 - 01 (config) # interface Serial0.0 [Enter]
ix1000 - 01 (config - Serial0.0) # shutdown [Enter]
ix1000 - 01 (config - Serial0.0) # no shutdown [Enter]
ix1000 - 01 (config - Serial0.0) # █
```

If setting was changed after shutdown, only no shutdown is necessary.

Saving setting data

Upon completion of setting, use the write memory command to save as startup config the data that you have set before a restart.

```
ix1000 - 01 (config - Serial0.0) # exit [Enter]
ix1000 - 01 (config) # write memory [Enter]
ix1000 - 01 (config) # █
```

NOTE: *Do not turn OFF the power switch while the BUSY lamp is lit. Otherwise, the data in flash memory may be destroyed.*

Checking the status of interface

Check the status of interface by show interface command.

```
ix1000 - 01 # enable - config [Enter]
ix1000 - 01 (config) # show interfaces Serial0.0 [Enter]
Interface Serial0.0 is up ← Check that "up" is
                           displayed.
(Omitted)
ix1000 - 01 (config) # █
```

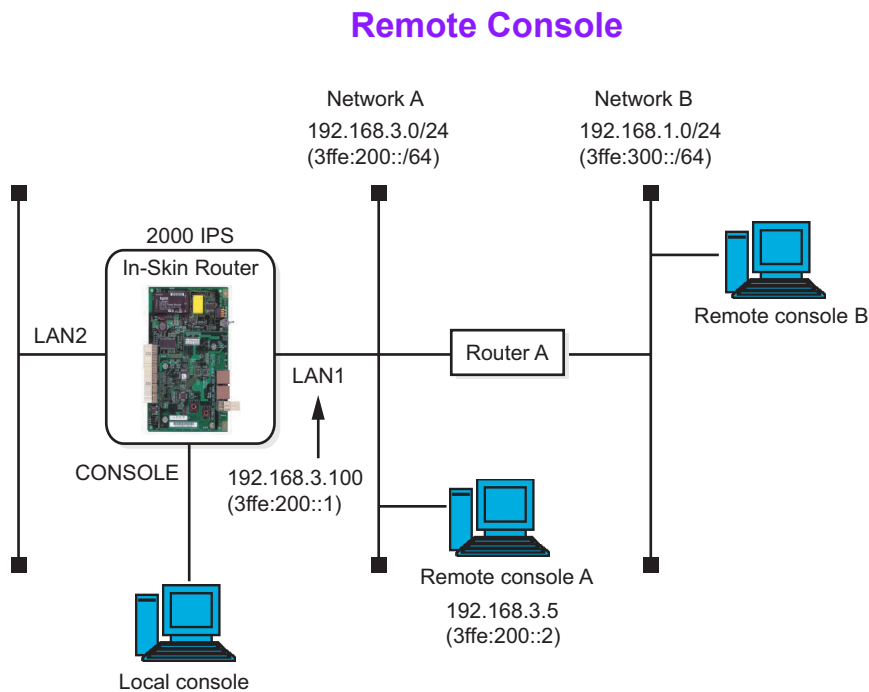
SETUP FOR A REMOTE CONSOLE

To enable a remote console using telnet to gain access to the In-Skin Router, you must set an IP address and other information. No IP address is factory-set in the In-Skin Router. To set an IP address for the first time, therefore, you must use the local console.

Once an IP address has been set so that telnet connections are possible, all commands that can be used from the local console can also be used from a remote console connected to the network.

Using the simple network shown below, this section explain the setup for enabling remote console A to gain access to the In-Skin Router on the network.

To enable a remote console on a network not directly connected to this device, such as remote console B, to gain access, routing setup is necessary. See [“ROUTING SETUP EXAMPLES \(IPv4\)”](#) [Page 116](#) and [“ROUTING SETUP EXAMPLES \(IPv6\)”](#) [Page 120](#) in Chapter 5.



The addresses in parentheses are those for IPv6.

LAN1=10/100BASE-TX (FastEthernet)
 LAN2=10BASE-T (Ethernet)

Performing the following setup operations on the In-Skin Router makes telnet access possible.

- (1) Set an IP address and validate the interface
- (2) Check the settings
- (3) Start up the telnet server
- (4) Check the communication state
- (5) Save setting data

You must set up the terminal (such as a PC) used as a remote console in advance so that telnet can be used, referring to the instruction manual supplied with that terminal.

If using telnet with IPv6, make sure that software that enables IPv6 communication has been installed in the terminal used as a remote console.

Setting an IP address and validating the interface

In this example, the LAN1 (10/100BASE-TX) port is connected to network A (192.168.3.0/24 for IPv4 and 3ffe:200::/64 for IPv6).

To set the IP address of the LAN1 (10/100BASE-TX) port, use the ip address command in interface config mode (FastEthernet0.0). For IPv6, use the ipv6 address command.

Setting the IP address

In this example, 192.168.3.100 is set as the IPv4 address and 24 (255.255.255.0) is set as the subnet mask.

```
ix1000 - 01 (config) # interface FastEthernet0.0   
ix1000 - 01 (config - FastEthernet0.0) # ip address 192.168.3.100/24   
ix1000 - 01 (config - FastEthernet0.0) # █
```

In this example, 3ffe:200::1 is set as the IPv6 address and 64 is set as the prefix length.

```
ix1000 - 01 (config) # interface FastEthernet0.0   
ix1000 - 01 (config - FastEthernet0.0) # ipv6 address 3ffe : 200 : : 1/64   
ix1000 - 01 (config - FastEthernet0.0) # █
```

MEMO: *When specifying an IPv6 address, you can omit any consecutive “0”s with a double colon “::”. You can, however, use only one double colon in a single address.*

Validating the interface

Validate the interface.

To valid the interface, use the no shutdown command in interface config mode (FastEthernet0.0).

```
ix1000 - 01 (config - FastEthernet0.0) # no shutdown   
ix1000 - 01 (config - FastEthernet0.0) # █
```

MEMO: *To invalidate the interface, use the shutdown command.*

Checking the settings

Checking the IP address

To check the IP address, use the show ip address command for IPv4 and the show ipv6 address command for IPv6.

```
ix1000 - 01 (config - FastEthernet0.0) # show ip address   
Interface FastEthernet0.0 is up  
Internet address is 192.168.3.100/24 ← Check the settings.  
Broadcast address is 255.255.255.255  
Address determined by config  
ix1000 - 01 (config - FastEthernet0.0) # █
```

```
ix1000 - 01 (config - FastEthernet0.0) # show ipv6 address   
Interface FastEthernet0.0  
Global address (es) :  
  3ffe : 200 : : 1 prefixlen 64 ← Check the settings.  
  3ffe : 200 : : 0 prefixlen 64 anycast  
Link - local address (es) :  
  fe80 : : 200 : 4cff : fea4 : 31c prefixlen 64  
  fe80 : : 0 prefixlen 64 anycast  
  
(Omitted)  
  
ix1000 - 01 (config - FastEthernet0.0) # █
```

NOTE: *For IPv6, you can check the IPv6 address with the show ipv6 address command when the LAN port is validated with the no shutdown command. When the LAN port is not validated, however, you cannot check the IPv6 address with the show ipv6 address command.*

MEMO: *You can use the `show running-config` command instead.*

```
ix1000 - 01 (config - FastEthernet0.0) # show running - config   
  
(Omitted)  
  
device Ethernet0  
interface FastEthernet0.0  
  ip address 192.168.3.100/24  
  ipv6 address 3ffe : 200 : : 1/64  
  no shutdown  
interface FastEthernet0.1  
  
(Omitted)  
  
ix1000 - 01 (config - FastEthernet0.0) # █
```

Checking that the interface is validated

Use the `show interfaces` command to check that the interface is validated; check that “up” is displayed.

```
ix1000 - 01 (config - FastEthernet0.0) # show interfaces   
Interface FastEthernet0.0 is up ←————— Check that "up" is  
                                     displayed.  
  
(Omitted)  
  
ix1000 - 01 (config - FastEthernet0.0) # █
```

Starting up the telnet server

To start up the telnet server, use the `telnet-server ip enable` command for IPv4 and the `telnet-server ipv6 enable` command for IPv6 in global config mode.

NOTE: *To prevent a remote console from making illegal access to In-Skin Router, register users before starting up the telnet server. For an explanation of registering users, see “[REGISTERING USERS AND SETTING PASSWORDS](#)”  [Page 94](#) in this chapter.*

MEMO: *To stop the telnet server, enter the `no telnet-server ip enable` command for IPv4 and the `no telnet-server ipv6 enable` command for IPv6.*

Startup

```
ix1000 - 01 (config - FastEthernet0.0) # exit   
ix1000 - 01 (config) # telnet - server ip enable   
ix1000 - 01 (config) # █
```

```
ix1000 - 01 (config - FastEthernet0.0) # exit   
ix1000 - 01 (config) # telnet - server ipv6 enable   
ix1000 - 01 (config) # █
```

Checking

Use the show running-config command to check the startup state of the telnet server.

```
ix1000 - 01 (config) # show running - config   
  
(Omitted)  
  
timezone + 9  
telnet - server ip enable ← Check that "enable" is  
telnet - server ipv6 enable displayed.  
device FastEthernet0  
device Ethernet0  
Interface FastEthernet0.0  
 ip address 192.168.3.100/24  
 ipv6 address 3ffe : 200 : : 1/64  
 no shutdown  
interface FastEthernet0.1  
 encapsulation pppoe  
  
(Omitted)  
  
ix1000 - 01 (config) # █
```

Checking the communication state

Check the telnet communication inside the In-Skin Router and between remote consoles.

For checking, use the ping command for IPv4 and the ping6 command for IPv6, with the IP address of the remote console specified. You can use the ping and ping6 commands in both global config mode and interface config mode.

Checking communication between the remote console and the In-Skin Router

Specify the IP address of the remote console (192.168.3.5 for IPv4 and 3ffe:200::2 for IPv6) using the ping or ping6 command.

Check that a message indicating packages have been received is displayed.

```
ix1000 - 01 (config) # ping 192.168.3.5 

PING 192.168.3.5 : 56 data bytes
64 bytes from 192.168.3.5 : icmp_seq=0. time=0.382 ms
64 bytes from 192.168.3.5 : icmp_seq=1. time=0.373 ms
64 bytes from 192.168.3.5 : icmp_seq=2. time=0.370 ms
64 bytes from 192.168.3.5 : icmp_seq=3. time=0.373 ms
64 bytes from 192.168.3.5 : icmp_seq=4. time=0.370 ms

----192.168.3.5 PING Statistics----
5 packets transmitted, 5 packets received, 0% packet loss
round - trip (ms) min/avg/max = 0.370/0.373/0.382
Press any key. 

ix1000 - 01 (config) # █
```

```
rt1000 - 01 (config) # ping6 3ffe : 200 :: 2 

PING 3ffe : 200 :: 1 -> 3ffe : 200 :: 2 56 data bytes
64 bytes from 3ffe : 200 :: 2 icmp_seq=0 hlim=64 time=0.875 ms
64 bytes from 3ffe : 200 :: 2 icmp_seq=1 hlim=64 time=0.867 ms
64 bytes from 3ffe : 200 :: 2 icmp_seq=2 hlim=64 time=0.863 ms
64 bytes from 3ffe : 200 :: 2 icmp_seq=3 hlim=64 time=0.862 ms
64 bytes from 3ffe : 200 :: 2 icmp_seq=4 hlim=64 time=0.868 ms

---- 3ffe : 200 :: 2 PING Statistics----
5 packets transmitted, 5 packets received, 0% packet loss
round - trip (ms) min/avg/max = 0.862/0.867/0.875
Press any key. 

rt1000 - 01 (config) # █
```

MEMO: *If setup has not been performed properly, for example, the LAN port remains invalidated, a message as shown below is displayed (This particular message is displayed if the no shutdown command is not entered so that the LAN port remains invalidated).*

```
rt1000 - 01 (config) # ping 192.168.3.5   
  
PING 192.168.3.5 : 56 data bytes  
Using default gateway address (192.168.3.100) for source  
  
----192.168.3.5 PING Statistics----  
5 packets transmitted, 0 packets received, 100% packet loss  
Press any key.   
  
rt1000 - 01 (config) # █
```

Saving setting data

Upon completion of setup, save running config as startup config with the write memory command.

CHAPTER 5

EXAMPLES OF SETUP ON NETWORKS



This chapter explains examples of setup for routing on IPv4 and IPv6 networks.

ROUTING SETUP EXAMPLES (IPv4)	116
ROUTING SETUP EXAMPLES (IPv6)	120
PPPoE SETUP EXAMPLE	124
DIGITAL PRIVATE LINE NETWORK EXAMPLE (T1)	127
DIGITAL PRIVATE LINE NETWORK EXAMPLE (E1)	130

ROUTING SETUP EXAMPLES (IPv4)

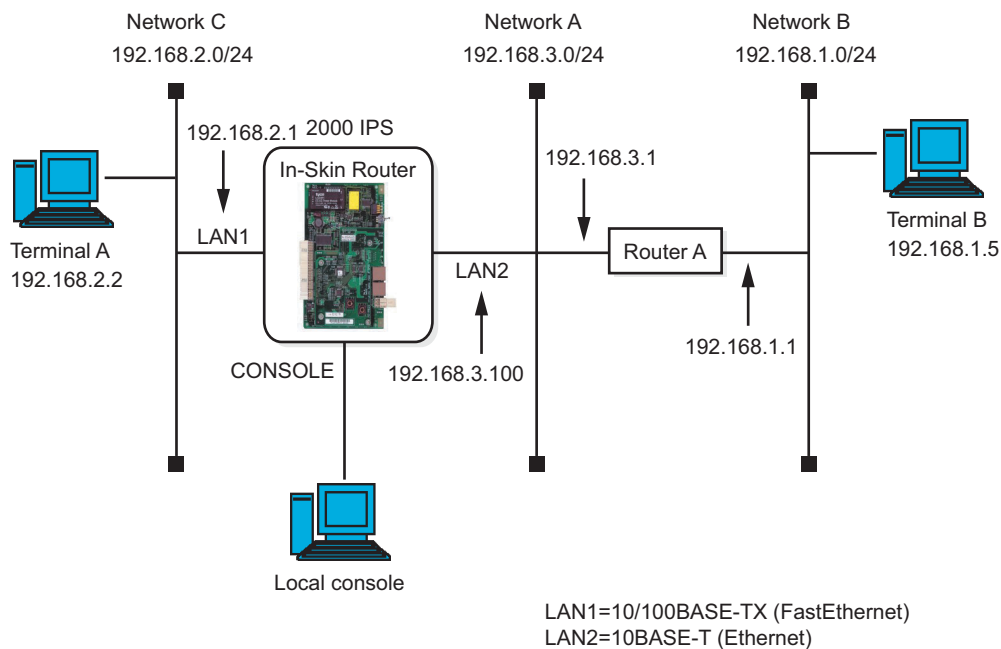
The In-Skin Router supports both static routing and dynamic routing. For dynamic routing, it supports RIP, RIPv2 (IPv4), and RIPng (IPv6).

Using the following IPv4 network, this section explains basic routing setup. In this example, the routing setup required for terminal A to gain access to terminal B is explained.

The setup includes the following operations:

- (1) Set a static route
- (2) Set RIP and RIPv2
- (3) Check the communication state

Routing Setup Examples (IPv4)



Setting a static route

Setting

Directly specify the diversion location of a packet destined to a particular network (or host address).

In this example, a static route is set as follows: because the diversion location of a packet destined to network B “192.168.1.0/24” on which terminal B is located is the address “192.168.3.1” of the router on network A.

```
Router # enable – config   
Router (config) # ip route 192.168.1.0/24 192.168.3.1   
Router (config) # █
```

MEMO: To set the address “192.168.3.1” as the default route, perform the following:

```
Router # enable – config   
Router (config) # ip route default 192.168.3.1   
Router (config) # █
```

Checking

Use the show ip route command to check the settings.

```
Router (config) # show ip route   
IP Routeing Table – 3 entry  
Codes : C – Connected, S – Static, R Ⓜ RIP, * – Candidate default  
Timers : Age  
S   192.168.1.0/24 [1/1] via 192.168.3.1, Ethernet0.0, 0 : 00 : 01  
C   192.168.2.0/24 [0/1] is directly connected, FastEthernet0.0, 0 : 00 : 22  
C   192.168.3.0/24 [0/1] is directly connected, Ethernet0.0, 0 : 00 : 01  
Router (config) # █
```

Setting RIP and RIPv2

Setting

The following explains an example of setting RIPv2.

To set RIPv2, use the `ip rip` command in interface config mode in which an RIP routing advertisement can be sent. You can set RIPv2 in the same way as RIP except that you must use “2” as the version parameter.

In this example, RIPv2 is set in LAN2 (Ethernet network).

```
Router (config) # interface Ethernet0.0   
Router (config – Ethernet0.0) # ip rip send version 2   
Router (config – Ethernet0.0) # ip rip receive version 2   
Router (config – Ethernet0.0) # ip rip enable   
Router (config – Ethernet0.0) # 
```

MEMO: *By default, the In-Skin Router operates with RIPv2. You can, therefore, omit the `ip rip send version 2` command and the `ip rip receive version 2` command.*

Starting RIP

Start RIP. To start and stop RIP, use the `ip router rip` command in global config mode.

Use the `redistribute` command to report information on network C to router A that performs RIP communication with the In-Skin Router (redistribution with an external route).

```
Router (config – Ethernet0.0) # exit   
Router (config) # ip router rip   
Router (config – ip – rip) # redistribute conneted   
Router (config – ip – rip) # exit   
Router (config) # 
```


Checking the routing table

Use the show ip route command to check the information stored in the routing table.

```
Router (config) # show ip route 
IP Routing Table – 3 entry
Code : C – Connected, S – Static, R – RIP, O – OSPF, IA – OSPF inter area
E1 – OSPF external type 1, E2 – OSPF external type 2,
* – Candidate default
Timers : Age
R   192.168.1.0/24 [120/2] via 192.168.3.1, Ethernet0.0, 0 : 00 : 10
C   192.168.2.0/24 [0/1] is directly connected, FastEthernet0.0, 0 : 14 : 57
C   192.168.3.0/24 [0/1] is directly connected, Ethernet0.0, 0 : 14 : 44
Router (config) # █
```

Checking the communication state

Checking

Use the ping command to send a packet from terminal A to terminal B to check that communication can be performed normally.

ROUTING SETUP EXAMPLES (IPv6)

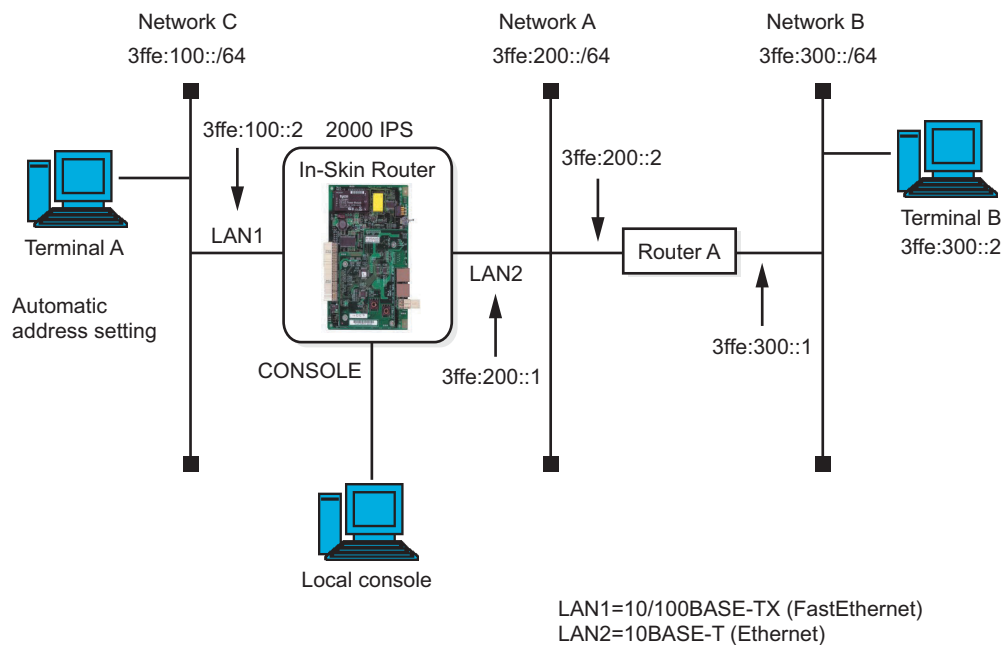
Using the following IPv6 network, this section explains basic routing setup. In this example, the routing setup required for terminal A to gain access to terminal B is explained.

It is assumed that on terminal A, “automatic address setting”, which is one of the features of IPv6, is used.

The setup includes the following operations:

- (1) Enable automatic address setting
- (2) Set a static route
- (3) Set RIPng
- (4) Check the communication state

Routing Setup Example (IPv6)



Enabling automatic address setting

Setting

Set up the In-Skin Router to send a “Router Advertisement Message” in response to a “Router Solicitation Message” from terminal A.

This setup causes terminal A to automatically generate an IPv6 address, using the “prefix information (3ffe:100::/64)” contained in the “Router Advertisement Message” and the MAC address contained in the terminal itself.

In this example, the FastEthernet command is used in interface config mode because terminal A is on LAN1 (FastEthernet network).

```
Router # enable - config 
Router (config) # interface FastEthernet0.0 
Router (config - FastEthernet0.0) # ipv6 address 3ffe:100 :: 2/64 
Router (config - FastEthernet0.0) # ipv6 nd ra - transmit 
Router (config - FastEthernet0.0) # █
```

Setting a static route

Setting

Directly specify the diversion location of a packet destined to a particular network (or host address).

```
Router (config - FastEthernet0.0) # exit 
Router (config) # ipv6 route 3ffe : 300 :: /64 3ffe : 200 :: 2 
Router (config) # █
```

MEMO: To set the address “3ffe:200::2” as the default route, perform the following:

```
Router (config - FastEthernet0.0) # exit 
Router (config) # ipv6 route default 3ffe : 200 :: 2 
Router (config) # █
```

Checking

Use the show ipv6 route command to check the settings.

```
Router (config) # show ipv6 route   
IPv6 Routing Table – 7 entry  
Codes : C – Connected, L – Local, S – Static, R – RIPng  
Timers : Uptime/Age  
C 3ffe : 100 :: 0/64 default_site [0/1]  
  :: , interface FastEthernet0.0, 0 : 00 : 57/0 : 00 : 00  
L 3ffe : 100 :: 0/128 default_site [0/1]  
  :: , interface FastEthernet0.0, 0 : 00 : 58/0 : 00 : 00  
L 3ffe : 100 :: 2/128 default_site [0/1]  
  :: , interface FastEthernet0.0, 0 : 00 : 57/0 : 00 : 00  
C 3ffe : 200 :: 0/64 default_site [0/1]  
  :: , interface Ethernet0.0, 0 : 00 : 40/0 : 00 : 00  
L 3ffe : 200 :: 0/128 default_site [0/1]  
  :: , interface Ethernet0.0, 0 : 00 : 41/0 : 00 : 00  
L 3ffe : 200 :: 1/128 default_site [0/1]  
  :: , interface Ethernet0.0, 0 : 00 : 40/0 : 00 : 00  
S 3ffe : 300 :: 0/64 default_site [1/1]  
  3ffe : 200 :: 2, interface Ethernet0.0, 0 : 00 : 05/0 : 00 : 00  
Router (config) # █
```

Setting RIPng

Setting

The following explains an example of setting RIPng.

To set RIPng, use the ipv6 rip command in interface mode in which an RIPng routing advertisement can be sent.

Enter the settings necessary to send and receive RIPng advertisements and validate the settings.

In this example, the settings are entered on LAN2 (Ethernet network).

```
Router (config) # interface Ethernet0.0   
Router (config – Ethernet0.0) # ipv6 rip send   
Router (config – Ethernet0.0) # ipv6 rip receive   
Router (config – Ethernet0.0) # ipv6 rip enable   
Router (config – Ethernet0.0) # █
```

MEMO: *You can omit the ipv6 rip send command and the ipv6 rip receive command.*

Starting RIPng

Start RIPng. To start and stop RIPng, enter global config mode.

Use the redistribute command to report information on network C to router A that performs RIP communication with the In-Skin Router (redistribution with an external route).

```
Router (config - Ethernet0.0) # exit   
Router (config) # ipv6 router rip   
Router (config - ipv6 - rip) # redistribute connected   
Router (config - ipv6 - rip) # exit   
Router (config) # █
```

Checking the routing table

Use the show ipv6 route command to check the information stored in the routing table.

```
Router (config) # show ipv6 route   
IPv6 Routing Table - 7 entry  
Codes : C - Connected, L - Local, S - Static, R - RIPng  
Timers : Uptime/Age  
C 3ffe : 100 :: 0/64 global [0/1]  
  :: , interface FastEthernet0.0, 0 : 04 : 21/0 : 00 : 00  
L 3ffe : 100 :: 0/128 global [0/1]  
  :: , interface FastEthernet0.0, 0 : 04 : 23/0 : 00 : 00  
L 3ffe : 100 :: 2/128 global [0/1]  
  :: , interface FastEthernet0.0, 0 : 04 : 22/0 : 00 : 00  
C 3ffe : 200 :: 0/64 global [0/1]  
  :: , interface Ethernet0.0, 0 : 02 : 48/0 : 00 : 00  
L 3ffe : 200 :: 0/128 global [0/1]  
  :: , interface Ethernet0.0, 0 : 02 : 49/0 : 00 : 00  
L 3ffe : 200 :: 1/128 global [0/1]  
  :: , interface Ethernet0.0, 0 : 02 : 48/0 : 00 : 00  
R 3ffe : 300 :: 0/64 global [120/2]  
  fe80 :: 200 : 4cff : fea4 : 318, interface Ethernet0.0, 0 : 02 : 13/0 : 00 : 12  
  
Router (config) # █
```

Checking the communication state

Checking

Use the ping6 command to send a packet from terminal A to terminal B to check that communication can be performed normally.

PPPoE SETUP EXAMPLE

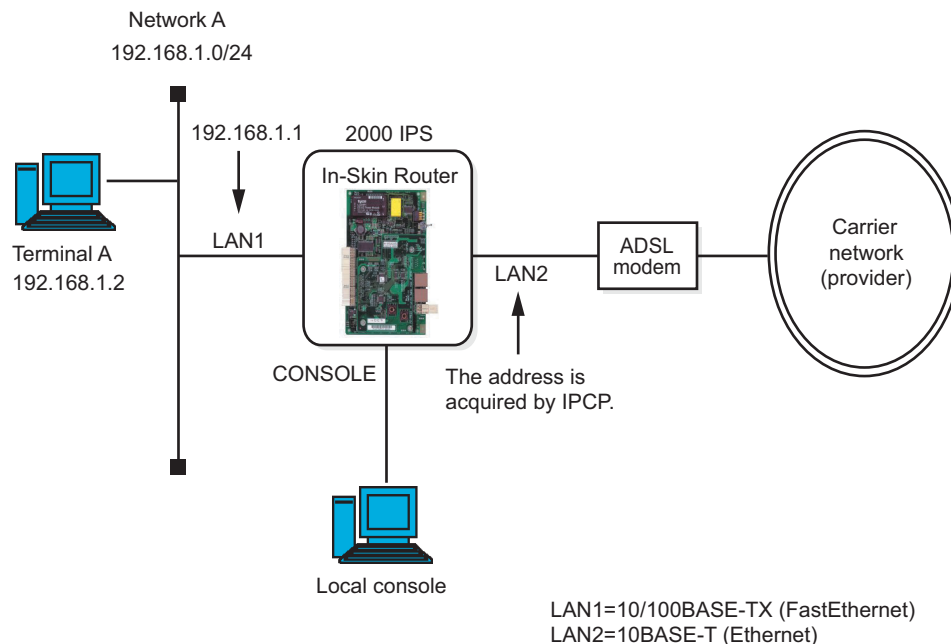
As a protocol for connecting to those carriers that offer broadband services such as ADSL and optical fiber services, the PPPoE protocol for establishing a PPP connection to any of these carriers via a LAN port is available.

This section explains an example of establishing a terminal-type connection to a provider with the PPPoE protocol.

The setup includes the following operations:

- (1) Set PPPoE
- (2) Set the route
- (3) Set the terminal-side network
- (4) Set the DNS server

PPPoE Setup Example



Setup procedure

Setting PPPoE

Set the PPPoE interface Ethernet0.1. Specify the ID and password information and authentication response types (both PAP and CHAP) used to connect to a provider. In this example, “my-router@xxx.nec.com” is set as the user ID and “8643bca29” is set as the password.

As the IP address of Ethernet0.1, use the one acquired by IPCP.

```
Router (config) # ppp profile biglobe 
Router (config - ppp - biglobe) # authentication myname my - router@xxx.nec.com 
Router (config - ppp - biglobe) # authentication password my - router@xxx.nec.com
                               8643bca29 
Router (config - ppp - biglobe) # authentication accept chap - pap 
Router (config - ppp - biglobe) # exit 
Router (config) # interface Ethernet0.1 
Router (config - Ethernet0.1) # encapsulation pppoe 
Router (config - Ethernet0.1) # ppp binding biglobe 
Router (config - Ethernet0.1) # ip address ipcp 
Router (config - Ethernet0.1) # no shutdown 
Router (config - Ethernet0.1) #
```

Setting the route

As the default route, specify the interface Ethernet0.1.

```
Router (config - Ethernet0.1) # exit 
Router (config) # ip route default Ethernet0.1 
Router (config) #
```

Setting the terminal-side network

Set the IP address of the terminal-side interface FastEthernet0.0. Also, use NAPT so that multiple terminals can establish Internet connections at the same time.

```
Router (config) # interface FastEthernet0.0 
Router (config - FastEthernet0.0) # ip address 192.168.1.1/24 
Router (config - FastEthernet0.0) # no shutdown 
Router (config - FastEthernet0.0) # interface Ethernet0.1 
Router (config - Ethernet0.1) # ip napt enable 
Router (config - Ethernet0.1) #
```

Setting the DNS server

Use proxy DNS. To use the DNS server address permanently, set the address as follows:

```
Router (config – Ethernet0.1) # exit   
Router (config) # proxy – dns server (DNS – server – address)   
Router (config) # proxy – dns enable   
Router (config) # █
```

MEMO: *If using proxy DNS, register the IP address set in the FastEthernet0.0 of the In-Skin Router as the DNS server address to be set on this terminal.*

To let IPCP automatically acquire the address of the DNS server, perform the following instead of the above example.

```
Router (config – Ethernet0.1) # exit   
Router (config) # proxy – dns dynamic ipcp   
Router (config) # proxy – dns enable   
Router (config) # █
```

Shutting down a PPPoE connection

To shut down a PPPoE connection, be sure to use the shutdown command. This causes a PPPoE disconnection sequence to be performed between the In-Skin Router and the provider-side access server.

```
Router (config) # interface FastEthernet0.0   
Router (config – FastEthernet0.0) # shutdown   
Router (config – FastEthernet0.0) # █
```

NOTE: *If you shut down a connection by turning OFF the power switch or by other means, instead of using the shutdown command, it will take a few minutes to establish the next connection.*

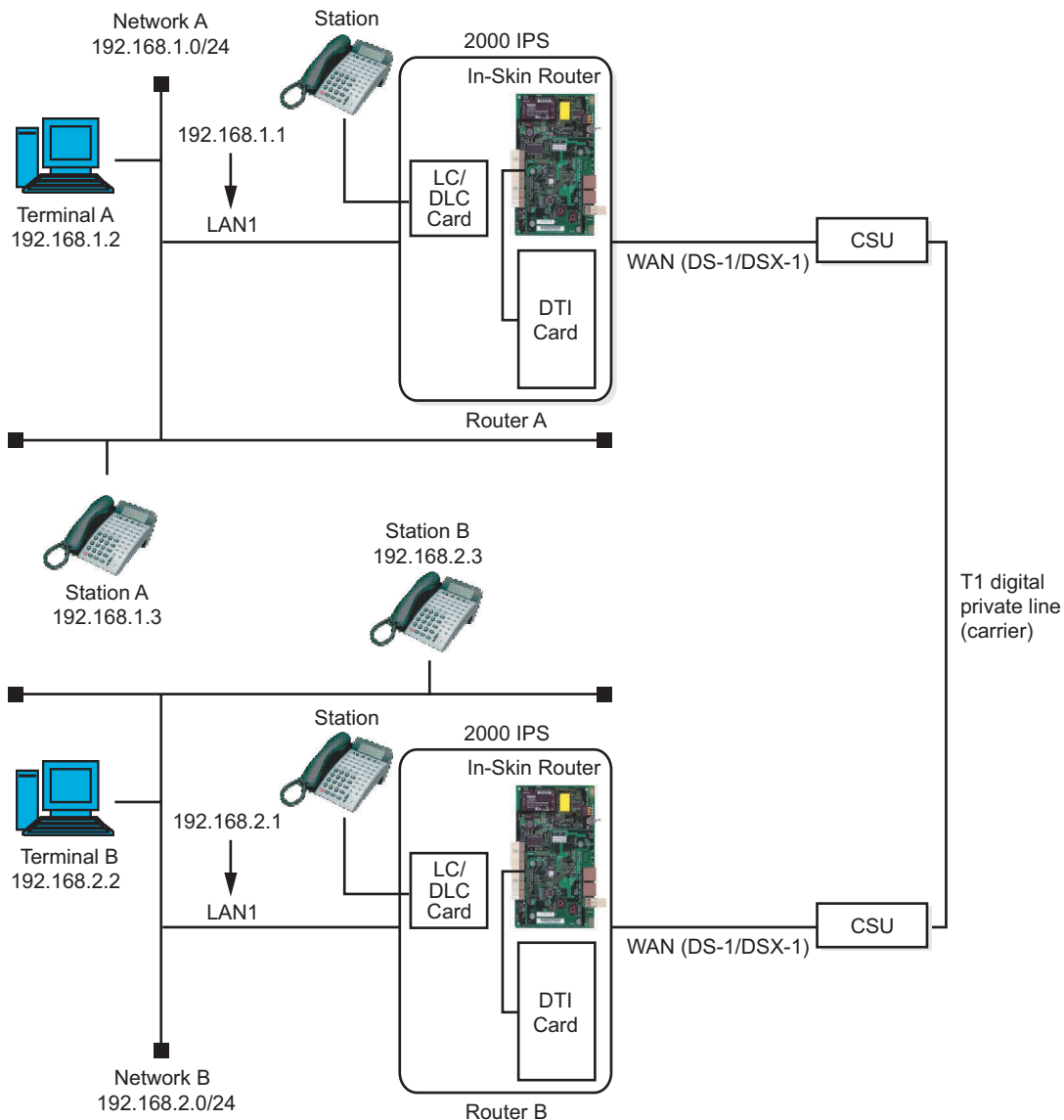
DIGITAL PRIVATE LINE NETWORK EXAMPLE (T1)

This section explains an example of establishing an inter-LAN connection with a private line (T1), using the digital private line (T1) interface of the In-Skin Router (PZ-M649 is required).

In this example, networks A and B are connected together with a digital private line, using two In-Skin Routers. In the example shown in the figure, external CSUs are used. If the built-in CSUs of the In-Skin Routers are used, the same setup procedure can be used.

The setup includes the following operations:

- Setting the digital private line (T1)
- Setting an IP address to the serial interface
- Setting the route
- Setting DTI card



Setup procedure

Setting the digital private line (T1)

Check that the WAN port has been set up properly, referring to “[SETTING UP THE WAN PRIVATE LINE \(T1\)](#)”. [Page 104](#)

Assigning an IP address to the serial interface and setting PPP

To establish an inter-LAN connection with a digital private line, assign an IP address to the serial interface of WAN or set the IP address as unnumbered.

In this example, the two routers are connected together without assigning an IP address to the digital private line of the routers, so that routers A and B operate as if they were a single router. For this reason, the IP address of the serial interface of WAN is set as unnumbered, so that the address to be used by the In-Skin Router itself when sending an IP packet to the digital private line is the one assigned to the FastEthernet 0.0 interface of LAN1.

To start PPP on the serial interface, associate the user-defined PPP profile (in this example, “router-a” and “router-b”) with the serial interface. Use the PPP profile command to create a profile. Then, use the ppp binding command to associate the created profile with the T1 interface.

Set the LAN addresses of routers A and B according to their respective networks.

Setting for router A

```
Router # enable – config 
Router (config) # ppp profile router – a 
Router (config – ppp – router – a) # no ipcp request – local – dns 
Router (config – ppp – router – a) # exit 
Router (config) # interface FastEthernet0.0 
Router (config – FastEthernet0.0) # ip address 192.168.1.1/24 
Router (config – FastEthernet0.0) # no shutdown 
Router (config – FastEthernet0.0) # interface Serial0.0 
Router (config – Serial0.0) # ppp binding router – a 
Router (config – Serial0.0) # ip unnumbered FastEthernet0.0 
Router (config – Serial0.0) # no shutdown 
Router (config – Serial0.0) # 
```

Setting for router B

```
Router # enable – config 
Router (config) # ppp profile router – b 
Router (config – ppp – router – b) # no ipcp request – local – dns 
Router (config – ppp – router – b) # exit 
Router (config) # interface FastEthernet0.0 
Router (config – FastEthernet0.0) # ip address 192.168.2.1/24 
Router (config – FastEthernet0.0) # no shutdown 
Router (config – FastEthernet0.0) # interface Serial0.0 
Router (config – Serial0.0) # ppp binding router – b 
Router (config – Serial0.0) # ip unnumbered FastEthernet0.0 
Router (config – Serial0.0) # no shutdown 
Router (config – Serial0.0) # 
```

Setting the route

As the default route, use Serial0.0. Perform this on both routers A and B.

```
Router (config – FastEthernet0.0) # exit 
Router (config) # ip route default Serial0.0 
Router (config) # 
```

Setting DTI card

When originating a call from legacy terminal (single line telephone/D^{term}) to a digital private network (T1) via PZ-M649 card, the PN-24DTA-C (DTI) card is required. For the setting of DTI card, do the office data programming for Direct Digital Interface (Refer to the Feature Programming Manual).

NOTE: *The time slot number of both PN-RTA card side (PZ-M649 card) and PN-24DTA-C card side have to be the same. Therefore, in the office data programming for Direct Digital Interface, assign the same time slot number as PN-RTA card side by using CM07 Y=01. For example, if the time slot number of PN-RTA card side is default setting (12 to 23), specify 12 to 23 for the channel number of PN-24DTA-C card in the data assignment of CM07 Y=01.*

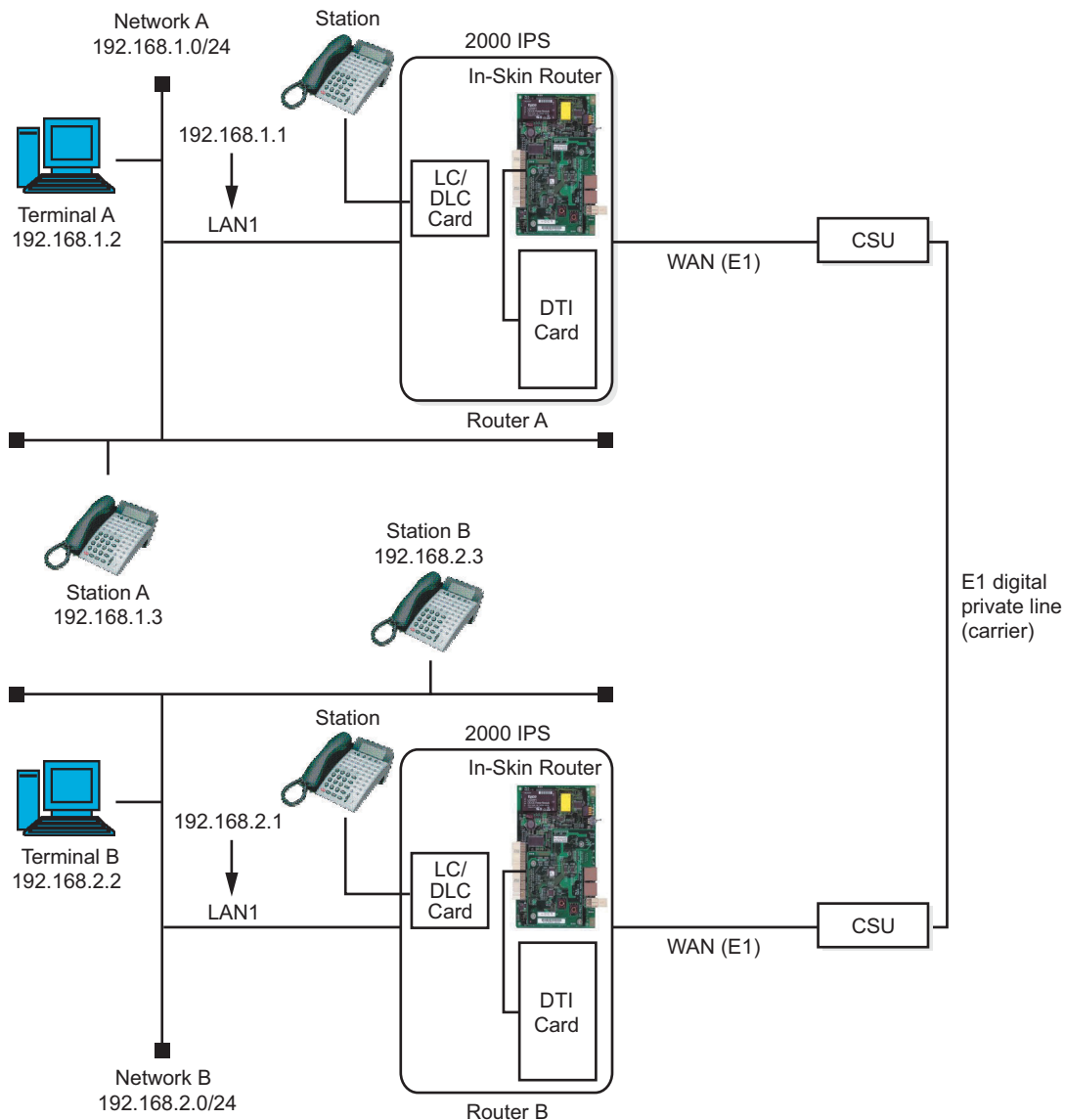
DIGITAL PRIVATE LINE NETWORK EXAMPLE (E1)

This section explains an example of establishing an inter-LAN connection with a private line (E1), using the digital private line (E1) interface of the In-Skin Router (PZ-M650 is required).

In this example, networks A and B are connected together with a digital private line, using two In-Skin Routers. In the example shown in the figure, external CSUs are used. If the built-in CSUs of the In-Skin Routers are used, the same setup procedure can be used.


The setup includes the following operations:

- Setting the digital private line (E1)
- Setting an IP address to the serial interface
- Setting the route
- Setting DTI card



Setup procedure

Setting the digital private line (E1)

Check that the WAN port has been set up properly, referring to [“SETTING UP THE WAN PRIVATE LINE \(E1\)”](#).  [Page 106](#)

Assigning an IP address to the serial interface and setting PPP

To establish an inter-LAN connection with a digital private line, assign an IP address to the serial interface of WAN or set the IP address as unnumbered.

In this example, the two routers are connected together without assigning an IP address to the digital private line of the routers, so that routers A and B operate as if they were a single router. For this reason, the IP address of the serial interface of WAN is set as unnumbered, so that the address to be used by the In-Skin Router itself when sending an IP packet to the digital private line is the one assigned to the FastEthernet 0.0 interface of LAN1.

To start PPP on the serial interface, associate the user-defined PPP profile (in this example, “router-a” and “router-b”) with the serial interface. Use the PPP profile command to create a profile. Then, use the ppp binding command to associate the created profile with the E1 interface.

Set the LAN addresses of routers A and B according to their respective networks.

NOTE: *For the E1 interface, “disused timeslot” is required to be set depending on the service contract with the carrier. This is because the timeslot 16 is usually reserved for a signalling use. By default, the “disused timeslot” is not specified; to reserve the timeslot 16 for the signalling use, use “disuse-timeslot” command in the Serial0 device config mode to configure.*

Setting for router A

```
Router # enable - config [Enter]
Router (config) # device Serial0 [Enter]
Router (config - Serial0) # e1 disuse - timeslot 16 [Enter]
Router (config - Serial0) # exit [Enter]
Router (config) # ppp profile router - a [Enter]
Router (config - ppp - router - a) # no ipcp request - local - dns [Enter]
Router (config - ppp - router - a) # exit [Enter]
Router (config) # interface FastEthernet0.0 [Enter]
Router (config - FastEthernet0.0) # ip address 192.168.1.1/24 [Enter]
Router (config - FastEthernet0.0) # no shutdown [Enter]
Router (config - FastEthernet0.0) # interface Serial0.0 [Enter]
Router (config - Serial0.0) # encapsulation ppp [Enter]
Router (config - Serial0.0) # ppp binding router - a [Enter]
Router (config - Serial0.0) # ip unnumbered FastEthernet0.0 [Enter]
Router (config - Serial0.0) # no shutdown [Enter]
Router (config - Serial0.0) # █
```

Setting for router B

```
Router # enable - config [Enter]
Router (config) # device Serial0 [Enter]
Router (config - Serial0) # e1 disuse - timeslot 16 [Enter]
Router (config - Serial0) # exit [Enter]
Router (config) # ppp profile router - b [Enter]
Router (config - ppp - router - b) # no ipcp request - local - dns [Enter]
Router (config - ppp - router - b) # exit [Enter]
Router (config) # interface FastEthernet0.0 [Enter]
Router (config - FastEthernet0.0) # ip address 192.168.1.1/24 [Enter]
Router (config - FastEthernet0.0) # no shutdown [Enter]
Router (config - FastEthernet0.0) # interface Serial0.0 [Enter]
Router (config - Serial0.0) # encapsulation ppp [Enter]
Router (config - Serial0.0) # ppp binding router - b [Enter]
Router (config - Serial0.0) # ip unnumbered FastEthernet0.0 [Enter]
Router (config - Serial0.0) # no shutdown [Enter]
Router (config - Serial0.0) # █
```

Setting the route

As the default route, use Serial0.0. Perform this on both routers A and B.

```
Router (config – FastEthernet0.0) # exit   
Router (config) # ip route default Serial0.0   
Router (config) # █
```

Setting DTI card


When originating a call from legacy terminal (single line telephone/D^{term}) to a digital private network (E1) via PZ-M650 card, the PN-30DTC-C (DTI) card is required. For the setting of DTI card, do the office data programming for Direct Digital Interface (Refer to the Feature Programming Manual).

NOTE: *The time slot number of both PN-RTA card side (PZ-M650 card) and PN-30DTC-C card side have to be the same. Therefore, in the office data programming for Direct Digital Interface, assign the same time slot number as PN-RTA card side by using CM07 Y=01.
For example, if the time slot number of PN-RTA card side is default setting (12 to 23), specify 12 to 23 for the channel number of PN-30DTC-C card in the data assignment of CM07 Y=01.*

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CHAPTER 6

MANAGEMENT AND MAINTENANCE



This chapter explains the information for maintenance and management, including file management, program upgrading, and event information collection procedures.


TFTP SETUP FOR FILE MANAGEMENT	136
CONFIG MANAGEMENT	137
UPGRADING THE PROGRAM	139
MANAGEMENT WITH SNMP	144
SETTING UP EVENT INFORMATION COLLECTION	148
TELNET SECURITY	151
RESTARTING THE IN-SKIN ROUTER DURING OPERATION	152
SUPER RESET	154

TFTP SETUP FOR FILE MANAGEMENT

For program file management, file transfer with TFTP is used.

For TFTP file transfer, a TFTP server is required.

If a TFTP program is installed on a terminal (such as a PC or a workstation) connected to the network, and is started, the terminal can be used as a TFTP server.

On the In-Skin Router, the following two setup operations are required. If the network is available for use, the operations should have already been performed. To perform the operations now, see “[Setting an IP address and validating the interface](#)”  [Page 109](#) in Chapter 4.

- Set an IP address
- Validate the interface

MEMO: *Prepare a TFTP program that can be used on the remote console terminal used.*

CONFIG MANAGEMENT

Running config is retained in DRAM during operation, and is erased when the power to the In-Skin Router is turned OFF. To start the In-Skin Router with the same settings the next time the power is turned ON, therefore, you must save the current running config to flash memory as startup config. The data in flash memory will not be erased even after the power is turned OFF.

NOTE: *In case that the In-Skin Router cannot start, save running config after you have confirmed the settings. Config is information specific to the In-Skin Router, and if it is not saved, you will need to reconfigure the In-Skin Router with appropriate commands from the start.*

MEMO: *To check the settings with which the In-Skin Router is currently operating, you can view running config with the show running-config command. To check the saved settings, you can view startup config with the show startup-config command.*

Saving with the write memory command

Executing the write memory command in global config mode causes running config to be saved as startup config. Running config is written over startup config.

```
Router # enable – config   
Router (config) # write memory   
Router (config) # 
```

MEMO: *To check that saving has been performed properly, use the show startup-config command.*

Config management with text files

We recommend that you display settings on the console screen by using the show startup-config or show running-config command and save them to a log file.

If you require any of these settings later, you can copy the necessary data from this text file and paste it to the console screen to enter it directly as commands, and depending on the communication software used, you can even send the text file directly to the In-Skin Router.

You can also write a text file as startup config, using the TFTP client function of the In-Skin Router.

NOTE: *If writing a text file as the startup config for the In-Skin Router using the TFTP client function, make sure that the text file contains only ASCII characters (not including control characters).*

UPGRADING THE PROGRAM

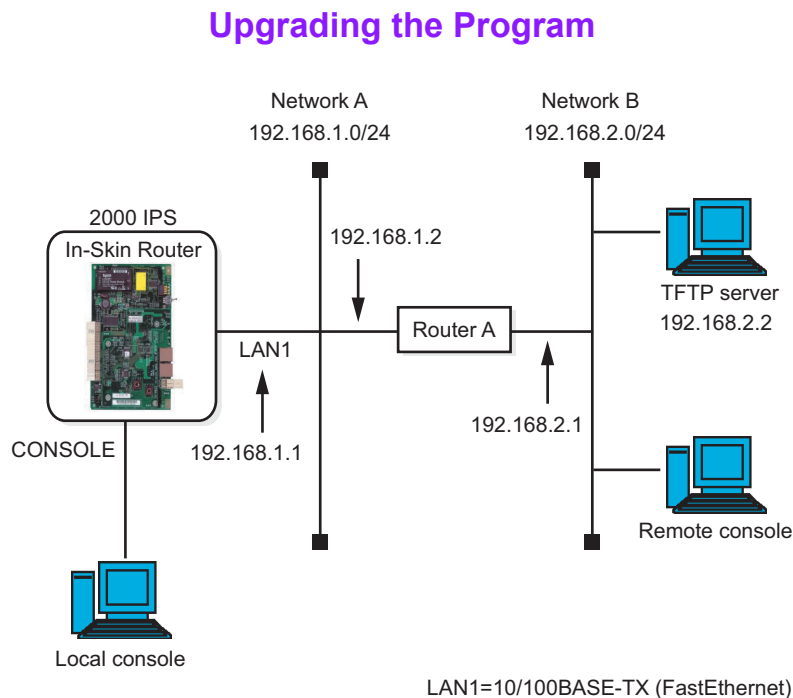
When a new version of the program is released, you can upgrade your program to the new one.

To upgrade the program, use the TFTP client function of the In-Skin Router to download the new program file from the TFTP server over the network.

The program file is displayed as “xxxxxxx.ldc” with the show flash command.

In this example, the following network is used. It is assumed that the name of the program file of the new version is “ix1000-ms-4.0.6.ldc” and the name of the current program file stored in flash memory is “ix1000-ms-4.0.5.ldc”.

MEMO: *The console to gain access to the In-Skin Router may be either the local or remote console, provided that it can gain access.*



Upgrading procedure

To upgrade the program, use the following procedure. In case that an unexpected fault occurs during downloading, you must set up network boot. Be sure to do this for safety.

- (1) Preparations
- (2) Set up network boot and save the settings
- (3) Delete the current program file
- (4) Download the new program file from the TFTP server
- (5) Check that the downloaded file is normal
- (6) Delete the network boot settings and save the new settings
- (7) Restart the In-Skin Router

NOTE 1: *After you have updated the program file, you must restart the In-Skin Router. A restart will cause automatically created statistical information, routing table information, and other information to be lost.*

NOTE 2: *Network boot via a PPP or PPPoE line is not supported. To upgrade the program via a PPP or PPPoE line, omit steps (2) and (6).*

Preparations

Execute the ping command on the TFTP server to check that the network between the In-Skin Router and the TFTP server is normal.

Use the write memory command to save running config as startup config.

MEMO: *In case that a fault occurs, use the show running-config or show startup-config command to display startup config or running config, then save it to a log file on the editor.*

Setting up network boot and saving the settings

In case that a fault occurs, set up the In-Skin Router so that it can be restarted over the network, and save the settings.

The reason why this step is required is that if an automatic restart occurs for some reason (such as turning the power OFF and ON) while the new program file is being downloaded, the program file in flash memory may be destroyed, making the In-Skin Router unable to start.

To do this, use the boot source-address and boot entry commands.

```
Router # enable – config 
Router (config) # boot source – address FastEthernet0.0 192.168.1.1/24 
Router (config) # boot entry 192.168.2.2 ix1000 – ms – 4.0.6.ldc 192.168.1.2 
Router (config) # write memory 
Router (config) # █
```

MEMO: *When using the boot entry command to download the file over the network, be sure to specify the next hop address.*
When the TFTP server is on the remote network, the next hop address to be specified is the address of the router that is located on the route to the TFTP server and is on the same link as the In-Skin Router (in this example [📄 Page 139](#), “192.168.1.2”).
If the TFTP server is on the local network, specify “0.0.0.0” as the next hop address.

Deleting the current program file

Use the erase command to delete from flash memory the program file of the older version currently used.

```
Router (config) # erase ix1000 – ms – 4.0.5.ldc 
Now erasing ix1000 – ms – 4.0.5.ldc please wait...
Router (config) # █
```

NOTE: *Turning OFF the power switch while writing to flash memory is in progress (the BUSY lamp is flashing) may cause the files in the file system to be destroyed. During writing, never turn OFF the power switch of PN-RTA card and the system.*

Downloading the new program file from the TFTP server

Place the new program file on the TFTP server, and download the file using TFTP command.

In this example, the file is transferred from the TFTP server with the address “192.168.2.2”.

```
Router (config) # tftp get 192.168.2.2 : ix1000 – ms – 4.0.6.ldc ix1000 – ms – 4.0.6.ldc 
-----
TFTP transfer complete, status : OK
Router (config) # █
```

NOTE: *Turning OFF the power switch while writing to flash memory is in progress (the BUSY lamp is flashing) may cause the files in the file system to be destroyed. During writing, never turn OFF the power switch of PN-RTA card and the system.*

Checking that the downloaded file is normal

Check that the file downloaded and stored in flash memory is normal. Check that the result of the CRC check is “O.K”.

```
Router (config) # show flash ix1000 – ms – 4.0.6.ldc 
Copyright (C) NEC Corporation 2001. All rights reserved.
:
(Omitted)
:
Now checking crc ... ok
Router (config) # █
```

Deleting network boot settings and saving the new settings

After you have checked that the file is normal in step “Checking that the downloaded file is normal”, delete the network boot settings made in step “Setting up network boot and saving the settings” and save the new settings.

```
Router (config) # no boot source – address FastEthernet0.0 192.168.1.1/24 
Router (config) # no boot entry 192.168.2.2 ix1000 – ms – 4.0.6.ldc 192.168.1.2 
Router (config) # write memory 
Router (config) # █
```


Restarting the router

Restart the In-Skin Router either by using the reload command or by turning the power switch OFF and back ON of PN-RTA card and the system. The reload command must be executed in operation mode.

Check that the In-Skin Router has restarted with the program of the new version.

```
Router (config) # Ctrl + Z
Router # reload Enter
Are you sure you want to reload the router? (Yes or [No]): y Enter
Copyright (C) NEC Corporation 2001. All rights reserved.
Copyright (C) 1985-1998 OpenROUTE Networks, Inc.
Copyright (C) 1995-1998 Eric Young

Loading using Flash Load Image "ix1000 - ms - 4.0.6.ldc" ←
-----
Starting at 20000

(Omitted)

Router # █
```

**Check that the
started program is
of the new version.**

MANAGEMENT WITH SNMP

The In-Skin Router allows the use of SNMP (Simple Network Management Protocol) as the network management protocol.

If an error occurs in the In-Skin Router, SNMP causes an item of information called a trap to be sent to the SNMP management host to notify the maintenance personnel of the fault.

If you do not perform network management, you need not set up SNMP.

Types of traps to be sent

You can set the types of traps to be sent to the SNMP management host. The In-Skin Router offers the nine trap types listed below. You can select more than one trap type to be sent.

SNMP traps (five types)

- cold-start (0) : A trap to be sent if a reset is performed due to power disconnection or other failures.
- warm-start (1) : A trap to be sent if the system software for device management is restarted.
- link-down (2) : A trap to be generated if a network link is taken down.
- link-up (3) : A trap to be generated if a network link is brought up.
- auth-fail (4) : A trap to be generated if an access attempt with a community name not set is detected.

NOTE: *The number in the parentheses is a generic ID.*

Enterprise traps (four types)

- temperature-fault (3) : A trap to be generated if the In-Skin Router detects an abnormal temperature.
- temperature-restoration (4): A trap to be generated if the In-Skin Router returns to a normal temperature.
- voltage-fault (5) : A trap to be generated if the In-Skin Router falls out of the operation-guaranteed voltage range.
- voltage-restoration (6) : A trap to be generated if the In-Skin Router returns to the operation-guaranteed voltage range.

NOTE: *The number in the parentheses is a specific ID.*

Community name

Network management with SNMP requires that a community name be set. The community name is used in the authentication function that limits access to this device by the SNMP manager. As a rule, set a community name according to the settings of the SNMP manager.

You can specify more than one IP address for a single community. Each time you want to add another address, you must enter the appropriate command.

NOTE: *If using multiple SNMP managers, you must set the community names for all the SNMP managers.*

Setup procedure

For setup, use the following procedure:

- (1) Set the MIB number for which access is to be permitted (set MIB View)
- (2) Set a community name and an access type
- (3) Specify a trap source interface
- (4) Set the IP address of the trap destination
- (5) Set the type of trap to be sent
- (6) Start an SNMP agent
- (7) Check the settings
- (8) Save the settings

Setting the MIB number for which access is to be permitted (setting MIB View)

To specify the MIB number for which access is to be permitted, use the label “View”.

In this example, the name “private-view” is set in “View” so that access is permitted for MIB II (1.3.6.1.2.1) only.

```
Router # enable – config   
Router (config) # snmp – agent view private_view 1.3.6.1.2.1   
Router (config) # █
```

Setting a community name and an access type

Set a community name and the type of access to the In-Skin Router. Either of the following can be set as the access type. The default is “ro” (MIB read only).

- (1) MIB read only (ro), Trap transmission
- (2) MIB read/write (rw), Trap transmission

In this example, “private” is set as a community name and “rw” in (2) above is set as an access type.

Assign “private_view” to the community. This permits the SNMP manager attempting to access with the community name “private” to gain access to MIB II information only.

```
Router (config) # snmp – agent ip community private view private_view rw   
Router (config) # █
```

NOTE: *For security, the community name should be a combination of characters and digits that is difficult for other people to guess.*

Specifying a trap source interface

Assign the IP address of the desired interface as the address of the trap packet source.

```
Router (config) # snmp – agent trap – source FastEthernet0.0   
Router (config) # █
```

Setting the IP address of the trap destination

Set the trap destination address. Up to eight trap destination addresses can be registered.

In this example, the address 10.42.64.21 is set on the SNMP host.

```
Router (config) # snmp – agent host 10.42.64.21 private   
Router (config) # █
```

Setting the type of trap to be sent

By default, the In-Skin Router sends all traps. To prevent the In-Skin Router from sending a specific trap, use the `no snmp-agent trap` command.

In this example, the In-Skin Router is prohibited to send the “link-up” trap.

```
Router (config) # no snmp – agent trap private snmp link – up   
Router (config) # █
```

Starting an SNMP agent

Start an SNMP agent.

```
Router (config) # snmp – agent ip enable   
Router (config) # █
```

Checking the settings

Use the `show running-config` command to check the settings.

Check also that MIB is obtainable from the SNMP manager and that traps have been sent normally.

Saving the settings

Use the `write memory` command to save the settings as startup config.

SETTING UP EVENT INFORMATION COLLECTION

You can view the event information generated during the operation of the In-Skin Router. You can collect the information necessary for fault analysis. You can set an event information type, an event information level, and where to output event information.

You can set the event information type for each of the functions of the In-Skin Router, such as ARP, IP, ICMP, and PPP. For setting, use the logging command with the SUBSYSTEM parameter.

You can specify the following event information levels:

error : Error state level

warn : Warning state level

notice: Normal level

info : Informational level

debug: Debugging level

You can output event information to the following terminals. To output event information to a syslog server, use the syslog command.

- Local console
- Remote console
- syslog server

NOTE: *If collecting event information, set up the In-Skin Router so that only the messages related to the problems that have occurred are displayed. Displaying unnecessary messages will increase the load on the In-Skin Router unnecessarily.*
If, in particular, a console is established to remote from the In-Skin Router, displaying unnecessary messages will cause the In-Skin Router to spend most of its operational time in communication with the remote console.

Displaying event information on a console

Setup for display

In this example, Ether port is specified as the event information type, and error detection as the event information level. As the time stamp (selectable between event information generation time [timeofday] and elapse of time since startup [uptime]), the generation time is specified.

```
Router (config) # logging subsystem eth error   
Router (config) # logging timestamp timeofday   
Router (config) # █
```

Starting the display of event information

Start the display of event information in operation mode. As events occur, the event information specified with the logging command is displayed on the console.

```
Router (config) # event – terminal start   
00 : 30 : 58 ETH.047 : Eth self – test Check network loopback data fld Maintenance  
failure nt 0 int Eth/0  
00 : 31 : 03 ETH.047 : Eth self – test Check network loopback data fld Maintenance  
failure nt 0 int Eth/0  
00 : 31 : 13 ETH.047 : Eth self – test Check network loopback data fld Maintenance  
failure nt 0 int Eth/0
```

Stopping the display of event information

To stop the display of event information, use the event-terminal stop command.

MEMO: *If the In-Skin Router detects an event while you are entering this command, an event message may be displayed following a part of the command character string you have entered, whereas the subsequent part is erased from the screen. Even if this occurs, the In-Skin Router stores the subsequent part and you need not re-type the event-terminal stop command from the beginning; just keep on typing.*

Transferring event information to a syslog server

You can transfer the event information specified with the logging command to a syslog server.

To set up transfer to a syslog server, use the syslog command in global config mode. Set the IP address of the syslog packet source (address of the interface to be connected to the syslog server) and the IP address of the syslog server.

In this example, “192.168.47.100” is set as the address of the syslog server.

```
Router (config) # syslog host 192.168.47.100   
Router (config) # █
```


TELNET SECURITY

The telnet-server ip enable or telnet-server ipv6 command permits all hosts connected to the In-Skin Router to establish a connection. You can increase the security of telnet in two ways:

- (1) Change the telnet port number
- (2) Permit only a specific host to gain access with telnet

Changing the telnet port number

In this example, the port number 2323 is set.

```
Router # enable – config   
Router (config) # telnet – server ip port 2323   
Router (config) # █
```

Permitting only a specific host to gain access with telnet

In this example, only the source address “1.1.1.1/32” is permitted to gain access. “tokyo” is set as an access list name.

```
Router # enable – config   
Router (config) # ip access – list tokyo permit ip src 1.1.1.1/32 dest any   
Router (config) # telnet – server ip access – list tokyo   
Router (config) # █
```

RESTARTING THE IN-SKIN ROUTER DURING OPERATION

If you need to restart the In-Skin Router during operation for some reason or other, three methods are available. Each differs in startup operation; perform the restart suitable to your need.

Restarting by turning the power switch OFF and back ON

The restart with this method involves self-diagnosis, program loading, the loading of startup config, and the clearing of DRAM.

Restarting procedure

Check that the BUSY lamp is not flashing, then turn OFF the power switch of PN-RTA card (PWRSW) to stop the In-Skin Router. In a few seconds, turn ON the power switch again to restart the In-Skin Router.

Restarting with the reload command

The restart with this method involves program loading, the loading of startup config, and the clearing of DRAM.

Restarting procedure

Use the reload command in operation mode.

```
Router # reload 
Are you sure you want to reload the router? (Yes or [No]) : y 
Copyright (C) NEC Corporation 2001. All rights reserved.
Copyright (C) 1985 – 1998 OpenROUTE Networks, Inc.
Copyright (C) 1995 – 1998 Eric Young

No valid boot records found, attempting flash load
Loading using Flash Load Image "ix1000 – ms – 4.0.5.ldc"
-----
Starting at 20000

NEC Portable Internetwork Core Operating System Software

(Omitted)

Router # █
```

Restarting with the restart command

The restart with this method involves the loading of startup config and the clearing of DRAM.

Restarting procedure

Use the restart command in operation mode.


```
Router # restart   
Are you sure you want to restart the router? (Yes or [No]) : y   
  
NEC Portable Internetwork Core Operating System Software  
  
(Omitted)  
  
Router # 
```

SUPER RESET

If you have forgotten the passwords of all users with the administrator right, or if you want to return all settings to the factory settings, perform a super reset.

NOTE 1: *Performing a super reset causes the In-Skin Router settings to return to the factory settings; only the local console can access the In-Skin Router.*

NOTE 2: *Performing a super reset causes all running config and startup config to be erased. The license key is not, however, erased.*

MEMO 1: *If you want to save the current running config or startup config, save it before a super reset, referring to “[CONFIG MANAGEMENT](#)”  [Page 137](#) in this chapter.*

MEMO 2: *The date and time will be retained even after you have performed a super reset.*

Procedure for performing a super reset

(1) Checking

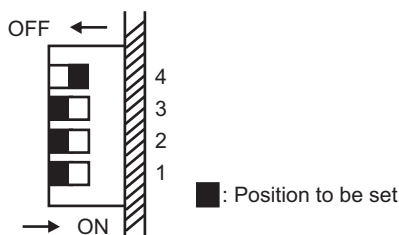
Check that the local console has been connected properly.

(2) Turning OFF the power switch

Check that the BUSY lamp is not flashing, then turn OFF the power switch of *PN-RTA card (PWRSW)*.

(3) Setting the Piano key switch

Set bit 4 of the Piano key switch (SWM) to ON.



NOTE: *Make sure that bits 1 to 3 of the Piano key switch are set to OFF. These bits are used for inspection at the factory. If you use the In-Skin Router with bits 1 to 3 being set to ON, we cannot guarantee its proper operation.*

(4) Turning ON the power switch to start the device

Turn ON the power switch (PWRSW). Check that a message indicating that startup config has been erased is displayed on the local console and a prompt is then displayed.

```
IX1000 Series Router POST (Power On Self Test)

DRAM TEST 1   : Pass
DRAM TEST 2   : Pass
NVRAM TEST    : Pass
CPU TEST      : Pass
PLD TEST      : Pass
LAN1 TEST     : Pass
LAN2 TEST     : Pass
VOLTAGE       : 3.199V Pass
TEMPERATURE   : +32.0degC Pass

Config memory is cleared ←————— Check that config
                                   has been cleared.

Copyright (C) NEC Corporation 2001. All rights reserved.
Copyright (C) 1985 – 1998 OpenROUTE Networks, Inc.
Copyright (C) 1995 – 1998 Eric Young

No valid boot records found, attempting flash load
Loading using Flash Load Image "ix1000 – ms – 4.0.5.ldc"

(Omitted)

Router # █
```

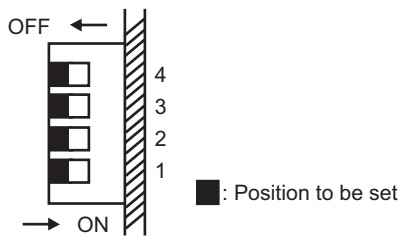
NOTE: *Never turn OFF the power switch until a prompt is displayed. Otherwise, the contents of flash memory may be destroyed.*

(5) Turning OFF the power switch

Turn OFF the power switch (PWRSW) to stop the In-Skin Router.

(6) Setting bit 4 of the Piano key switch to OFF

Return bit 4 of the Piano key switch (SWM) to OFF to cancel the super reset setting.



(7) Turning ON the power switch to start the device

Turn ON the power switch (PWRSW). After a prompt appears on the local console, perform the necessary setup, referring to “Initialization”.

CHAPTER 7

TROUBLESHOOTING

This chapter explains the information that you may find helpful if an unexpected error occurs.

IF THE LOCAL CONSOLE CANNOT BE USED	158
IF A REMOTE CONSOLE CANNOT BE USED	159
IF COMMUNICATION IS IMPOSSIBLE	160
IF THE IN-SKIN ROUTER DOES NOT START	161
COLLECTING FAULT INFORMATION	164
IF YOU WANT TO ERASE CONFIG	165
IF SELF-DIAGNOSIS DOES NOT TERMINATES NORMALLY	166

IF THE LOCAL CONSOLE CANNOT BE USED

Check the following:

- (1) The MAT cable is connected to the In-Skin Router collectly.
- (2) The power to the In-Skin Router has been turned ON.

IF A REMOTE CONSOLE CANNOT BE USED

Use the ping (ping6) command from the local console to perform a communication check, referring to “If Communication is Impossible” in this chapter.

If the remote console cannot be used even after a check on communication with the In-Skin Router has terminated normally, use the telnet-server ip (ipv6) enable command to check that the telnet server has started.

IF COMMUNICATION IS IMPOSSIBLE

If communication with a specific network is impossible

Use the ping (ping6) command to perform a communication check on the routers connected to network with which communication is impossible.

First, perform a communication check on the router nearest your terminal. Then, perform a communication check on the router second nearest, third nearest, and so on.

In this way, you can identify the router with which communication is impossible. Check the routing table and the address of the identified router, the cable, and so on.

If communication is sometimes possible and sometimes impossible

Check the line traffic and load. Check the cable for poor contact and check that the cable is not of a category less than specified.

If no communication is possible

Check whether an intermediate router device is turned OFF or faulty, and whether a communication cable is disconnected.

By using the ping command with the specification of the IP address of the In-Skin Router and that of a remote console from the local console, you can determine which remote router is faulty.

IF THE IN-SKIN ROUTER DOES NOT START

If the In-Skin Router does not start, check the following and take the appropriate action.

If the ALARM lamp on the PN-RTA card is lit

If it is lit, check the installation environment for the In-Skin Router (including the temperature and humidity). If it is lit even when the installation environment is proper, replace the PN-RTA card.

If none of the lamps on the PN-RTA card is lit

Check that the power cord is connected properly and that the power switch is turned ON of PN-RTA card and the system. If none of the lamps is lit after the cord is connected properly and the power switch is turned ON, replace the PN-RTA card.

If the boot monitor mode screen is displayed

If all the program files in the file system have been deleted or destroyed by accident, the In-Skin Router cannot start, displaying the boot monitor mode screen shown below.

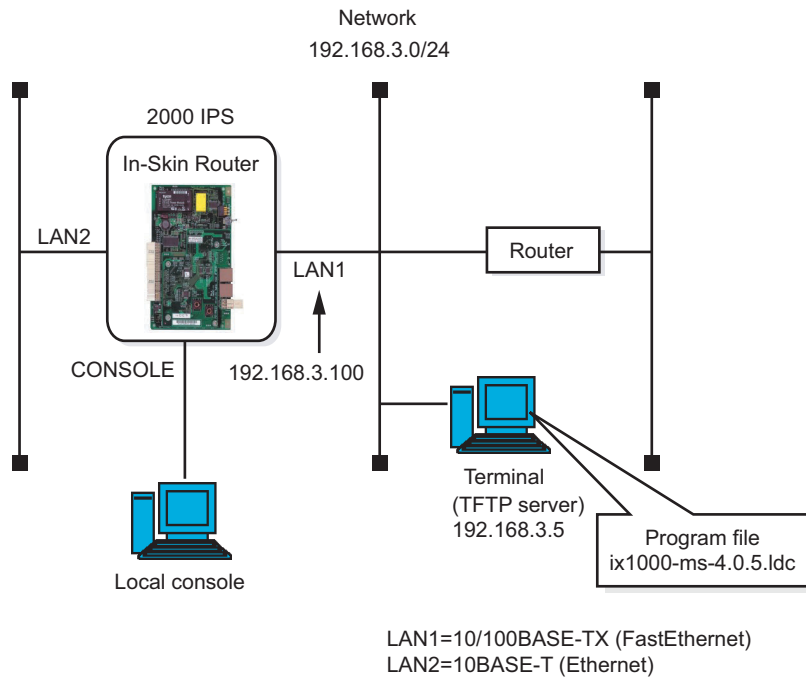


MEMO: *On the screen, "FastEther" indicates the LAN1 port, while "Ethernet" indicates the LAN2 port. If this occurs, you can use the TFTP boot function to transfer the necessary program files from the TFTP server and start the In-Skin Router.*

Recovery procedure

This example assumes that the In-Skin Router is connected as described below.

- The IP address of the LAN1 (10/100BASE-TX) port of the In-Skin Router is “192.168.3.100”.
- A TFTP server with the address “192.168.3.5” is connected to the LAN1 port of the In-Skin Router.
- The program file ix1000-ms-4.0.5.ldc of the In-Skin Router is prepared on the TFTP server.



```
Device type : FastEther [Enter]
Connector Type (AUI/RJ45) [AUTO_CONFIG] : [Enter]
Interface IP address : 192.168.3.100 [Enter]
IP mask [FFFFFF00] : FFFFFFF00 [Enter]
Boot from host : 192.168.3.5 [Enter]
Boot file name : ix1000 - ms - 4.0.5.ldc [Enter]

Using FastEther at ( 0, 0).
Auto Negotiation Completed.
  100Mbps Half - Duplex
Trying host 192.168.3.5
      file ix1000 - ms - 4.0.5.ldc
loading
-----
Starting at 20000

(Omitted)

Router (config) # █
```

NOTE 1: *At a start in the recovery procedure, the program files are loaded directly into DRAM, not into the file system. After the recovery procedure, transfer the program files to the file system, referring to “UPGRADING THE PROGRAM” [☞ Page 139](#) in Chapter 6.*

NOTE 2: *For the LAN port of the PZ-M623 card, this recovery procedure is not available. Use either the LAN1 port or LAN2 port of the PN-RTA card.*

COLLECTING FAULT INFORMATION

Use the show tech-support command to view fault information and save it to a file.

To display fault information, use the show tech-support command in global config mode.

```
Router (config) # show tech-support 
```

(Fault information display)

```
Router # █
```


IF YOU WANT TO ERASE CONFIG

If you want to restore the settings of running config to those of startup config

If you want to erase the settings of running config and restore them to those of startup config, use the restart command to restart the In-Skin Router.

NOTE: *A restart will cause temporary data (including statistical information and automatically collected routing table data) to be erased.*

If you want to erase all settings of config

If you want to erase the settings of both running config and startup config and restore them to the factory settings, perform a super reset. See “SUPER RESET”  [Page 154](#) in Chapter 6.

NOTE: *A super reset will cause statistical information, automatically connected routing table data, and other data to be erased.*

IF SELF-DIAGNOSIS DOES NOT TERMINATES NORMALLY

If the result of the “TEMPERATURE” item of self-diagnosis is not “Pass”, check the temperature and humidity of the installation environment.

If the result of the “VOLTAGE” item is not “Pass”, check the power voltage of the power receptacle.

If the temperature, humidity, and voltage are normal or if the result of any of the other items of self-diagnosis is not “Pass”, replace the PN-RTA card.

APPENDIX

SPECIFICATIONS



This appendix explains specifications related to the In-Skin Router.

SPECIFICATIONS A2

SPECIFICATIONS

Item		SPECIFICATIONS	
LAN interface		10BASE-T	1port (full duplex/half duplex)
		10BASE-T/ 100BASE-TX	1port (full duplex/half duplex/auto negotiation)
		VLAN tagging	Conforms to IEEE802.1Q, 8ID
WAN interface	PZ-M649	T1	1port (DS-1/DSX-1)
	PZ-M650	E1	1port
	PZ-M623	10BASE-T	1port (full duplex/half duplex)
LAN protocol		IPv4, IPv6	
Routing protocol		IPv4	RIP, RIPv2, OSPFv2, policy routing
		IPv6	RIPng, policy routing
WAN protocol (IPv4/IPv6)		PPP or PPPoE client	
Extended function		IPv4	DHCP server, DHCP client, DHCP relay agent, proxy DNS, NAT/NAPT, SNTP client, network monitor, proxy ARP
		IPv6	SNTP client
QoS control		IPv4/IPv6	Coloring (IP Precedence value, DSCP value [diffserv]), Priority control (Priority Queuing, weighted Queuing) Band control (Traffic Shaping)
Security		IPv4/IPv6	
		IPsec (AH/ESP, fixed key/automatic key exchange [IKE]) (*) IP packet filtering (static filter, dynamic filter), login authentication IPsec high-speed processing support	
Redundant configuration		IPv4	VRRP
Management protocol		IPv4	SNMP agent, SNMP MIBII, telnet (client, server), TFTP (client)
		IPv6	SNMP via IPv4, IPv6MIB (RFC2465.2466) Telnet6 (client, server) TFTP6 (client)

*: This product includes cryptographic written by Eric Young (eyay@cryptsoft.com).

Continued on next page

Item		SPECIFICATIONS
IPv4-IPv6 communication	Simultaneous communication	IPv4/IPv6 simultaneous communication (Dual stack)
	Tunneling	IPv6 over IPv4, IPv6 over IPv6, IPv4 over IPv6, IPv4 over IPv4, Auto Tunneling
Power		Input: -27 V Output: 3.3 V × 5 V

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