RS3™

RNI
Installation Guide

Software Version 5.0

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EMERSON™
Process Management

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RS3™
RNI Installation Guide

About This Manual

The Rosemount System 3™ Network Interface (RNI) is a gateway that connects a Rosemount System 3 distributed control system with applications running on host computers. RNI Application Development software provides messaging capability between host computers and RNIs. This manual provides:

- Explanation of the steps a system administrator should take to generate RNI program files; install, configure, and startup the RNI software; and boot the RNI.

  NOTE: RI:2, Installation Procedures includes specific installation procedures for operating systems that have been tested by Emerson Process Management.

- Descriptions of the RS3 screens used to monitor the RNI.

Changes for This Release

This release is for RNI 5.0 for Windows XP Professional and Windows Server 2003 only.

Revision Level for This Manual

For This Software Version:	Refer to This Document:		
	Title	Date	Part Number
5.0	RNI Installation Guide	September 2005	1984−3357−0501

References to Other Manuals

References to other RS3 user manuals list the manual, chapter, and sometimes the section as shown below.

Sample Entries:

For ..., see CC: 3.

For ..., see CC: 1-1.

Abbreviations of Manual Titles

- **AL** = Alarm Messages
- **BA** = ABC Batch
- **CB** = ControlBlock Configuration
- **CC** = Console Configuration
- **DT** = Disk and Tape Functions
- **IO** = I/O Block Configuration
- **OP** = Operator's Guide
- **OV** = System Overview and Glossary
- **PW** = PeerWay Interfaces
- **RB** = Rosemount Basic Language
- **RN** = RNI Release Notes
- **RP** = RNI Programmer's Reference Manual
- **SP** = Site Preparation and Installation
- **SQ** = Service Quick Reference
- **SV** = Service

Reference Documents

Prerequisite Documents

You should be familiar with the information in the following documents before using this manual:

System Overview Manual and Glossary	1984-2640-21x0
Software Release Notes, Performance Series 1	12P23600101

Related Documents

You may find the following documents helpful when using this manual:

RNI Programmer's Reference Manual	1984-3356-05x1
RNI Release Notes	10P57485002
Alarm Messages Manual	1984-2657-19x1
Configuration Quick Reference Guide	1984-2812-0808
Console Configuration Manual	1984-2643-21x0
ControlBlock Configuration Manual	1984-2646-21x0
I/O Block Configuration Manual	1984-2645-21x0
Service Manual, Volume 1	10P569802x1
Service Manual, Volume 2	10P569802x2
Site Preparation and Installation Manual	10P569903x1
Software Discrepancies for Performance Series 1	12P23600301
User Manual Master Index	1984-2641-21x0

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Chapter 1:
Introduction

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Section 1:
Introduction to RNI

The RS3™ Network Interface (RNI) is a gateway that connects an RS3 distributed control system (DCS) with applications running on host computers. RNI API Application Kit software provides messaging capability between host computers and RNIs.

This manual explains the steps required for a system administrator to:

- Generate RNI program files
- Install, configure, and start up the RNI software
- Boot up the RNI.

Intended Users and Typical Applications

The intended users of this manual are system administrators who support application developers, including: Emerson Process Management software developers or integrators, third-party application vendors, third-party integrators, or customers doing custom application integration.

The typical types of application software integrated with the RNI are plant database or Manufacturing Execution System (MES) applications. These applications are commercially available from Emerson Process Management or third parties.

How this Guide is Organized

This guide contains the following sections:

- Chapter 1. Introduction
- Chapter 2. Installation Procedures
- Chapter 3. Configuring the RNI
- Chapter 4. Monitoring the RNI
- Appendix A. Reloading Bootload Data
- Appendix B. Error Log Messages

Ethernet to PeerWay Connection

As shown in Figure 1.1.1, the RNI resides both as a node on the PeerWay (the RS3 proprietary data highway) and as a host on an Ethernet network using Transmission Control Protocol/Internet Protocol (TCP/IP).

At least one multiprocessing host is required to deliver configuration, security, error logging, and boot services for the RNI. The host is a Microsoft® Windows® system. The API library can reside on multiple host systems if desired.

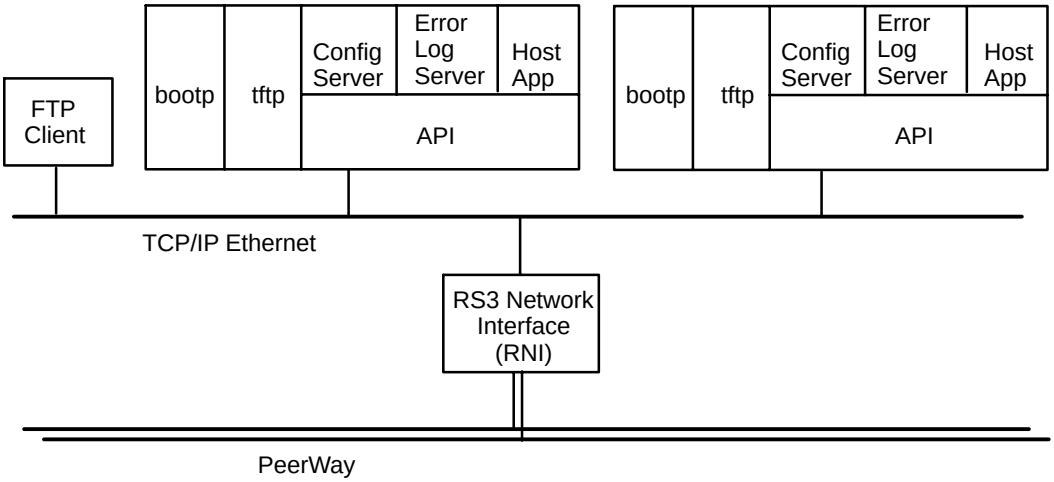


Figure 1.1.1. RNI Connects Applications on a TCP/IP Ethernet to the PeerWay

The RNI is designed to support the information access needs of a single PeerWay. For multiple PeerWay systems, at least one RNI should be installed on each PeerWay, as shown in Figure 1.1.2. Multiple RNIs can also be installed on a single PeerWay for redundancy or higher throughput.

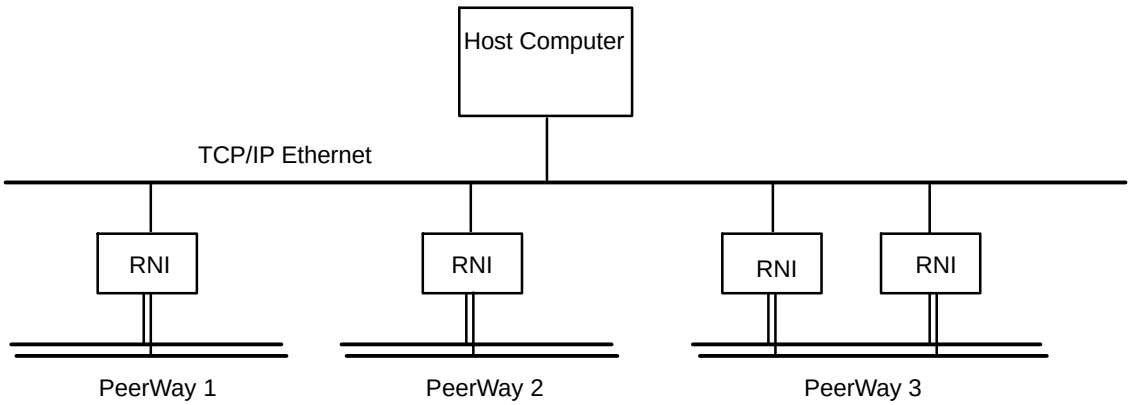


Figure 1.1.2. Connecting Multiple PeerWays or Multiple RNIs

Section 2:
Hardware Overview

This section describes the RNI hardware. The RNI (10P−5333−0001) is mounted in an RS3 cabinet as shown in Figure 1.2.1.

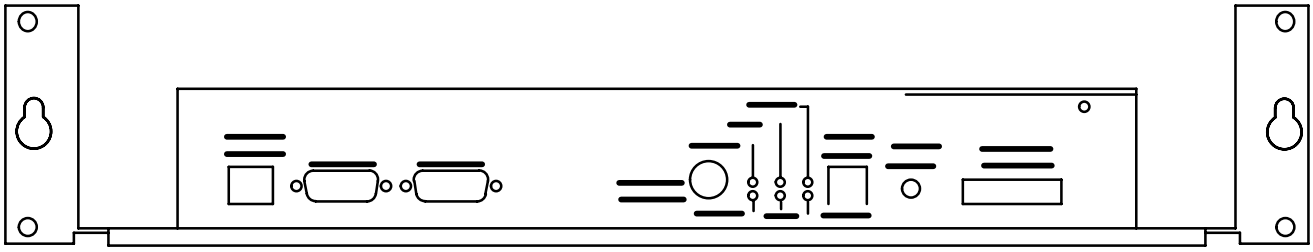


Figure 1.2.1. RNI Hardware

The RNI is connected to a PeerWay tapset using standard redundant drop cables (see Figure 1.2.2). The RNI has jumper-selected connectors for 10BaseT twisted pair cable, or 10Base2 coaxial cable for connecting to an Ethernet. For more information on the jumper, refer to SV: 7−6−9

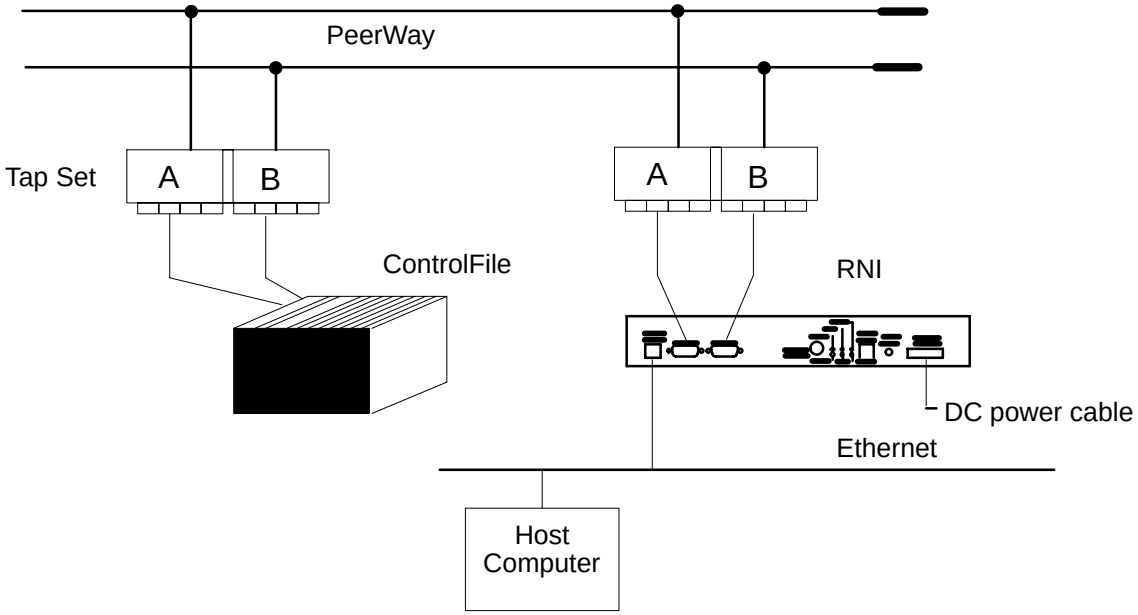


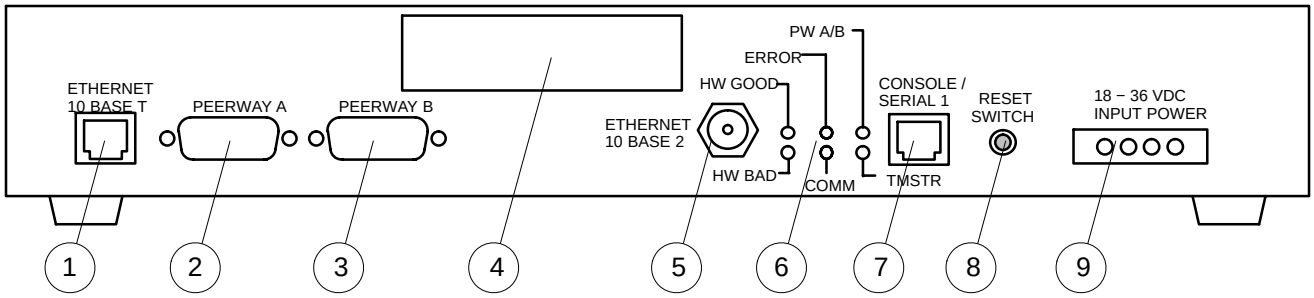
Figure 1.2.2. RNI Connection to PeerWay and Ethernet

Hardware Overview (continued)

Figure 1.2.3 shows the location of the connectors and switches on the RNI hardware box.

The RNI is started either by turning on the power or by pressing the Reset switch (see CAUTION in Figure 1.2.3). The RNI then waits for an Ethernet host to send it boot software. At least one host node on the Ethernet must be configured to send the boot software and configuration information to the RNI. For booting instructions, see RI:2.

For installation instructions, see the *RS3 Site Preparation and Installation Manual*. For hardware maintenance information, see the *RS3 Service Manual*.



No	Item	No.	Item
1	Ethernet 10BaseT connector	6	LEDs
2	PeerWay A drop cable connector	7	Console/Serial connector for terminal communicating with the RNI
3	PeerWay B drop cable connector	8	Reset switch **CAUTION.** Pressing the Reset switch can result in the loss of the RNI software image. Do not press RESET unless you want to load a new software image.
4	Write-on label. Look on the label for the Ethernet MAC address.		
5	Ethernet 10Base2 connector **NOTE:** 10BaseT is the default. RNI requires an internal jumper change to use 10BASE2.	9	DC power connector

Figure 1.2.3. RNI Hardware

Section 3:
Software Overview

This section covers these topics:

- Software components
- Monitoring the RNI
- Sample functions

Software Components

Two types of licensed software, shown in Figure 1.3.1, are associated with the RNI:

- Software that resides in the RNI (RNI program)
- Software that resides in the host (host-based software)

RNI Program

The software that resides in the RNI (rni_os.bin) is called the RNI program. It must be installed on at least one host on the Ethernet and is loaded to the RNI by the tftp program. The RNI program includes:

- Program Monitor server
- Security Management server
- Alarm Generation server
- Read/Write server
- Dynamic Data Services server
- Status Data server
- Message Monitor server
- FTP server
- Configuration Management Interface
- Error Logging System
- Block Change Notification Server

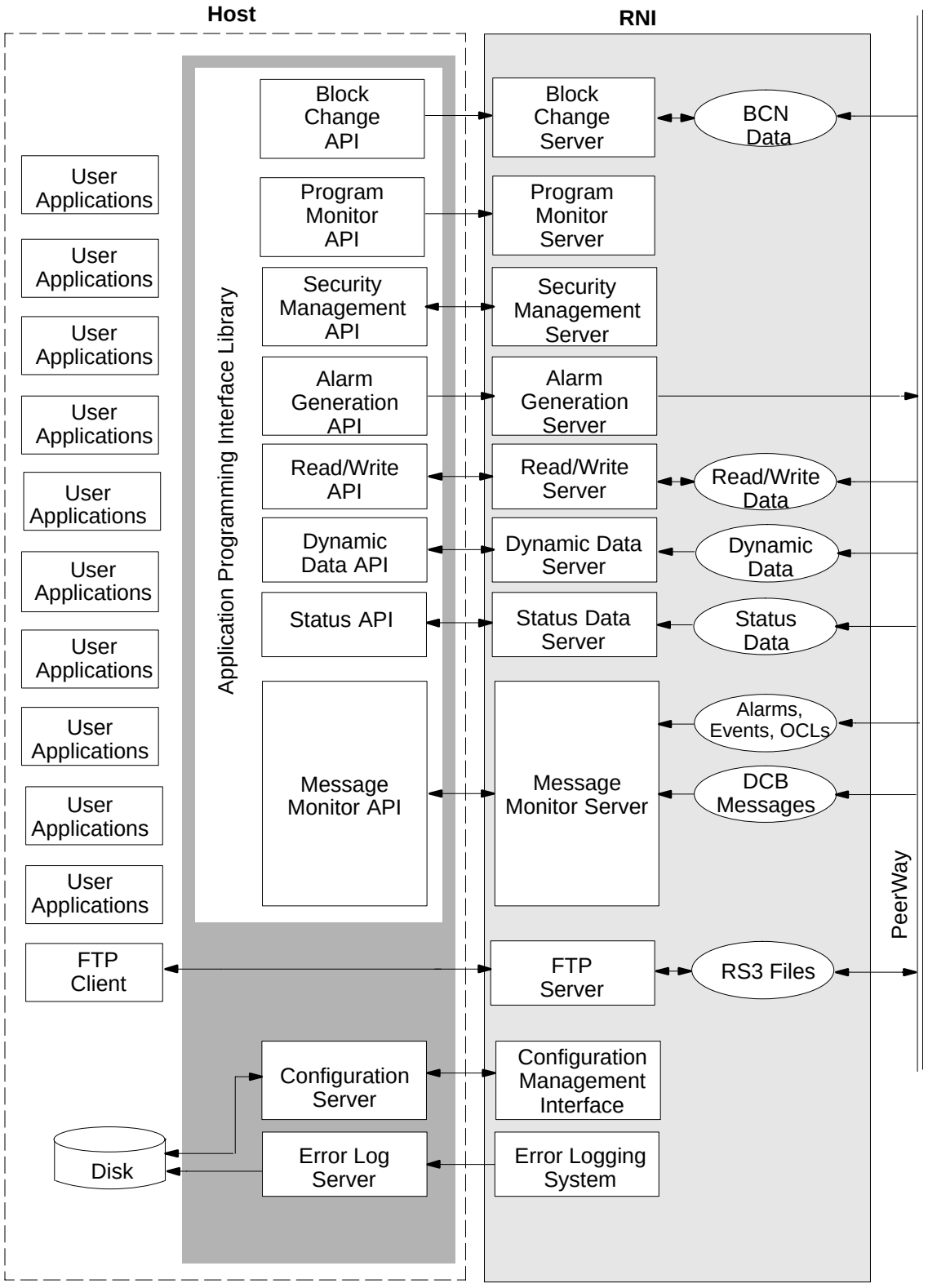


Figure 1.3.1. RNI Software Overview

Host-Based Software

The host-based software includes the Applications Programming Interface (API) library, consisting of:

- Program Monitor API
- Security Management API
- Alarm Generation API
- Read/Write API (RW)
- Dynamic Data Services API (DDS)
- Status API
- Message Monitor API (MM)
- Block Change Notification API (BCN)

Host software for configuration and error logging includes:

- Configuration server − RNI uses the Configuration server to access configuration information for each of the RNI services, and username/password information for the Security server.
- Error Log server − The Error Log server provides an alternate place to log RNI errors. The RNI can be configured to log errors to the serial port, the Error Log server, or both.

Other required host software includes:

• bootp	Accepts MOP requests from RNI to determine if RNI requires booting.
• tftp	Used to boot the RNI.
• XDR (external data representation)	Required by the API library. Provides conversions in data representation between different machine architectures.
• RPC (remote procedure call)	Required by the API library. Provides a mechanism that allows a subroutine call made on one host to be executed on another.

Location of tftp, bootp, and RNI Program

The RNI program is stored in a file on your computer. When the RNI is powered up, it uses bootp and tftp to find and load the RNI program into memory. The tftp server on your host dictates the location for the files to be loaded. This location differs for each type of host computer and operating system. You must install the RNI program in the directory that is appropriate for your platform, based on the requirements of tftp. Then, you must configure bootp to indicate that same location.

Sample Functions

The API Application Kit software includes an examples directory that contains sample functions and programs illustrating the use of each API function.

The examples in this directory use the ANSI C format. To compile these programs you must either use an ANSI C compiler or you must revise the existing functions in the examples directory.

NOTE: The example programs are not intended to be used as production programs. They are provided as a training tool to help software developers understand the RNI's API.

The sample functions show what inputs are required by the API function and what conditions can be returned. All sample functions are described in the *RNI Programmer's Reference Manual* (RP). The last section of each chapter in the RP manual includes one or more examples of *main* programs that use the functions discussed in that chapter.

Table 1.3.1 lists the examples subdirectories and the general organization of their contents.

Table 1.3.1. Examples Subdirectories

Subdirectory	API examples	RP Location
alm_xmpl	Alarm generation	Chapter 4
cmn_xmpl*	Common functions for security management and alarm processing, used by several example programs	Chapter 2 Chapter 3
dds_xmpl	Dynamic Data Services	Chapter 5
mm_xmpl	Message Monitor	Chapter 3, Section 7 and Section 8
rs_xmpl	RNI/RS3 Status	Chapter 7
rw_xmpl	Read/Write	Chapter 6
sm_xmpl	Security Management	Chapter 2
pm_xmpl	Program Monitor	Chapter 8
bcn_xmpl	Block Change Notification	Chapter 9

* Examples in this directory are used by more than one API.

Chapter 2:
Installation Procedures

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Section 1:
Introduction

This chapter of the RNI Installation Guide contains the procedures for installing RNI on your platform.

- RI:2-2 describes the API Application Kit software.
- RI:2-3 provide specific installation procedures.
- RI:2-4 describes procedures for verifying that the RNI has been correctly installed.

Section 2:
API Application Kit

The API Application Kit software contains a number of source files, organized in a directory tree.

Directory trees for each type of application are shown on the following pages of this section.

- Figure 2.2.1 shows the API Application Kit directory tree for Windows and Table 2.2.1 describes the directory tree contents.

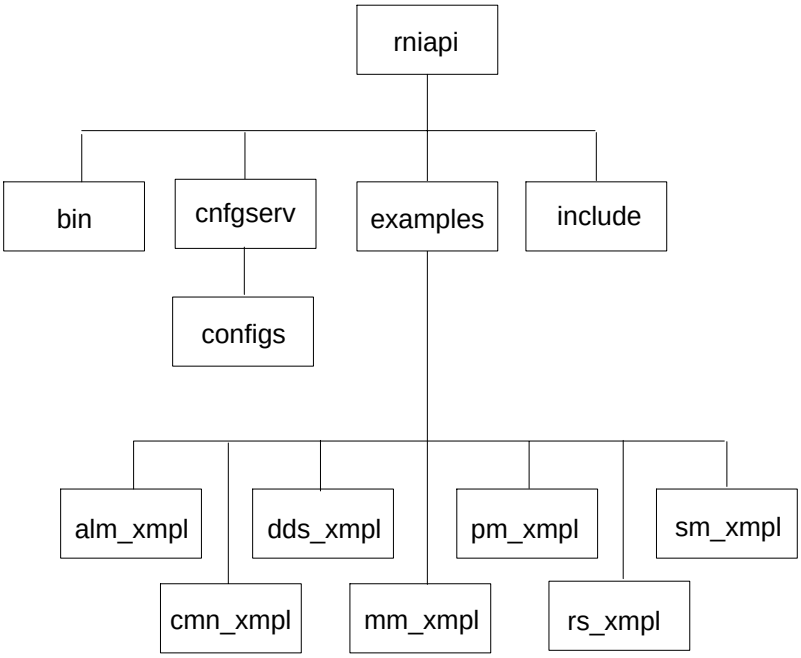


Figure 2.2.1. API Application Kit Directory Tree for Windows

Table 2.2.1. Windows Directory Tree Contents

Directory	Description
C:\RNI	Main directory
\bin	Programs and .dll files
\include	A collection point for header files needed to compile user programs
\cnfgserv	Configuration server
\cnfgserv\cnfigs	Configuration Server source and compile/link command files
\examples	Examples main directory, which contains a number of subdirectories for different examples
\examples\alm_xmpl	Alarm Generation example program
\examples\dds_xmpl	Dynamic Data Service example program
\examples\pm_xmpl	Program Monitor example program
\examples\sm_xmpl	Security Management example program
\examples\cmn_xmpl	Common Libraries example program
\examples\mm_xmpl	Message Monitor example program
\examples\rs_xmpl	RS3 Status example program

Section 3:
Installing RNI Software on a Windows XP Professional System or Windows Server 2003

CAUTION

When the RNI is initially booted, the RNI should not be connected to the PeerWay until it boots up with the correct node number. See RI: 2–3–21.

This section contains the procedures required to install the RNI API and boot software and example software on a Windows system. These procedures include:

1. Load the RNI software from CD-ROM.
2. Run the RNI Configuration utility.
3. Start the RNI Configuration server and RNI utilities as services.
4. Boot the RNI.

NOTE: Other sections and relevant pages of the *RNI Installation Guide* are referenced as appropriate throughout these installation procedures.

NOTE: The information contained in this section applies generally to both Windows XP Professional and Windows Server 2003. Any differences will be described as necessary.

NOTE: If you have an existing RNI installation you are moving to Windows XP Professional or Windows Server 2003 there are several files you should save to a safe directory before you do anything else.

Copy and save the DDS.cfg, userfile.cfg, and TimeZone.cfg files and any other application specific files you want to move the new platform.

Requirements

Before installing the RNI software, make sure your system meets the following requirements.

Software and Hardware Requirements

- RS3 P1R3.4 or later RS3 software
- RNI R5.0 software on CD-ROM for Windows systems
- Microsoft Visual C++ V6.0 SP5 (if development work is being done using the API Developer Kit)
- ASCII terminal connected to the RNI serial port (optional)
- You must have Windows XP Professional with Service Pack 2 or Windows Server 2003 system and TCP/IP services installed.

NOTE: The installer must have system administration privileges.

Information Requirements

- RNI Ethernet hardware (MAC) address (stamped on the RNI). An example RNI MAC address is 000068204321.
- RNI name and IP address as defined in the Windows hosts file (%SystemRoot%\system32\drivers\etc\hosts). An example RNI name is huey and an example IP address is 192.168.1.3. SystemRoot is an environment variable that defines where Windows is installed (for example, C:\WINDOWS).
- IP address of the system. An example system IP address is 192.168.1.4.
- Directory name where you will install the RNI software. The default directory name is C:\RNI.
- PeerWay node number for the RNI. An example node number is 31.

Installation Requirements

Ensure the following before starting the software installation:

- RNI hardware installation is completed.
- Windows system is installed and TCP/IP services have been started.

  NOTE: The RNI host name is an alphanumeric name that is used on the TCP/IP network to reference the RNI. There are restrictions on what characters may be used in this name. While these restrictions vary slightly on different host computers, the following rules generally apply:

  - A host name on a TCP/IP network (including the RNI host name) may consist of letters and digits.
  - The first character must be a letter.
  - Most networks will accept host names up to 8 characters in length − some systems will accept longer names. The maximum allowed is a function of the host computer and the name resolution protocol being used.
- An installer with system administration privileges is logged on to the system.

Windows XP Professional and Windows Server 2003 Firewall Requirements

When installing RNI 5.0 boot and API software on a Host computer running Windows XP (SP2) or Windows Server 2003 operating system (OS), the OS may prevent the RNI from communicating and/or Host computer from booting the RNI. This is caused by the Windows Firewall being enabled by default on the NIC connections detected by Windows.

There are several possible ways to fix this. The solution to select depends on the OS installed, what the plant's Information Technology group will allow, and the level of network security required.

NOTE: These solutions are only presented as guidelines. Other solutions are possible but they are not covered here.

- No firewall on any NIC connections (quick and easy and no security).
- A firewall on all NIC connections except the RNI NIC (easy and maintainable when dedicated NIC to RNI is used).
- A firewall on all NIC connections with exceptions for the RNI NIC (can be done, but requires adding additional parameters that can make the connection difficult to maintain if new updates are added to Windows. This solution is not covered in the documentation.)

No Firewall on Any NIC Connections

This is the quickest and easiest way to setup a system that is already behind a secure firewall system in a plant environment. All that is needed is to disable the Windows Firewall completely for all NICs on the Host PC.

This can be done as follows:

Select Start | Settings | Control Panel |Windows Firewall.

The Windows Firewall dialog appears.

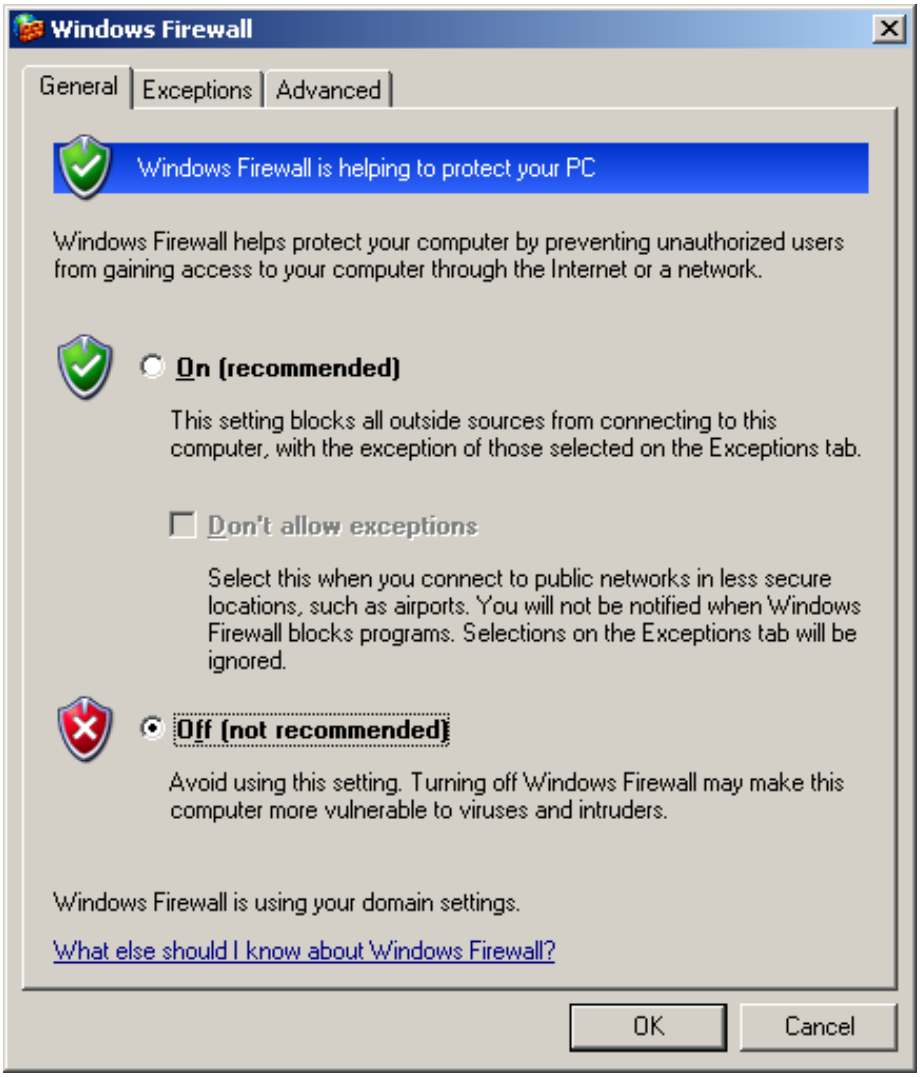


Figure 2.3.1. Windows Firewall Dialog

Under the General tab select Off for the firewall and click OK.

This turns off the whole firewall. If you get an icon in the system tray that indicates that the firewall is off you can remove it by doing the following:

Right click or double left click to get the Windows Security Center window. Under the resources heading select the “Change the way Security Center alerts me.”

Figure 2.3.2. Windows Security Center

The Alert Settings dialog appears.

Figure 2.3.3. Alert Settings Dialog

Deselect the Alert Settings “Firewall.” That way the red shield will not continuously popup and complain to you about the settings.

NOTE: This method is not recommended if your plant LAN is not protected by other firewalls or isolated from the Internet.

A Firewall on all NIC Connections Except the RNI NIC

This is a more protective way to setup a system that is already behind a secure firewall system in a plant environment. By disabling only the protection on the NIC that is directly connected to the RNI you will still have the protection of the Firewall on all of the other non-dedicated NIC connections on the Host PC.

This can be done as follows:

Select Start|Settings|Control Panel|Windows Firewall.

The Windows Firewall dialog opens.

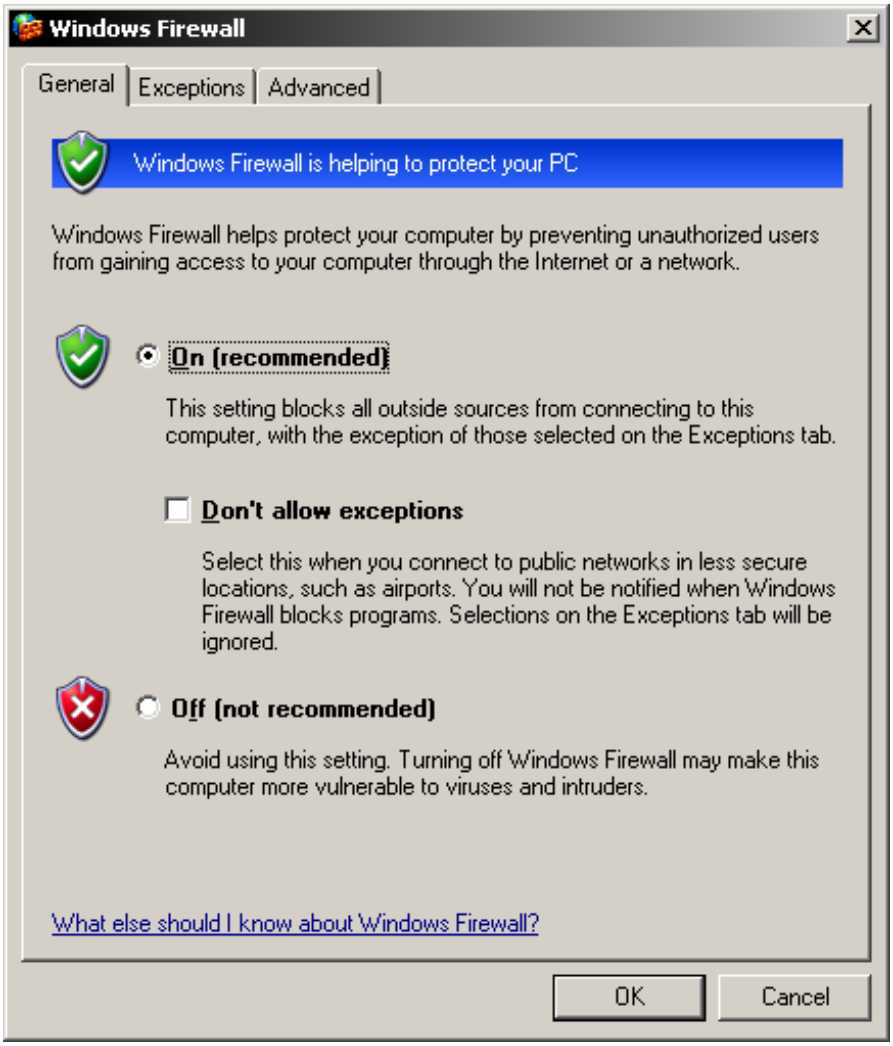


Figure 2.3.4. Windows Firewall Dialog

Select the Advanced tab to open the following dialog.

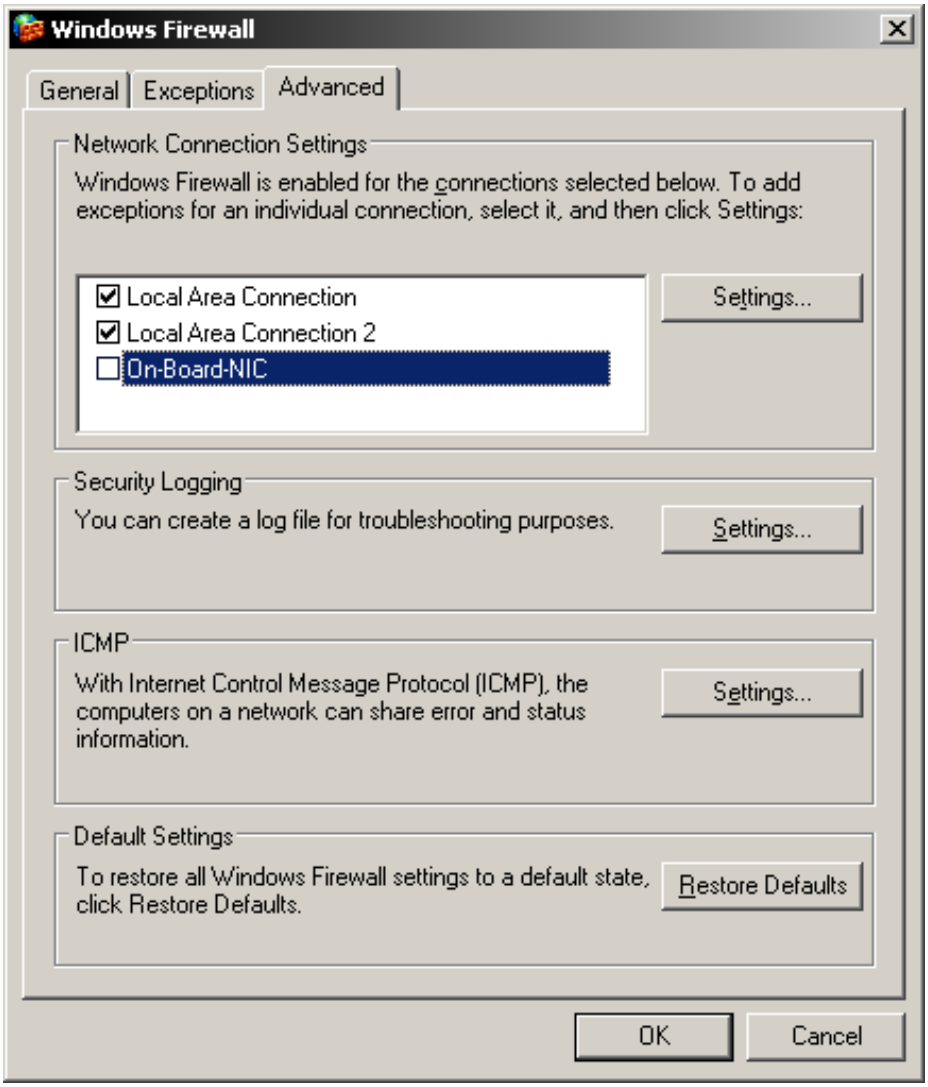


Figure 2.3.5. Windows Firewall Dialog−Advanced Tab

The NIC connections that are available to the system are listed. Uncheck the one that applies to the RNI connection and then select OK. This stops the Firewall from monitoring the RNI to NIC activity and flagging it as an attack.

Procedure 1: Load the RNI Software from CD-ROM

The RNI API software, example programs, RNI boot software, and RNI utility software for Windows are supplied on CD-ROM.

Install RNI Boot Software and API Toolkit

This procedure copies the RNI software from the CD-ROM and installs RNI configuration and boot image files. The files on this CD-ROM update the RNI image to V5.0 and installs RNI API, RNI Services, and RNI Support files.

- The RNI API contains RNI include files and examples.
- RNI Services allows remote booting of an RNI from a PC.
- RNI Support contains support files for the RNI boot services, API, and host applications.
- The Dynamic Link Library (DLL) files found in RNI Support are copied because they are required for the RNI API and RNI Services.

NOTE: Exit all Windows programs before running the setup program.

1. Log onto the station as Administrator.
2. Place the RNI 5.0 software CD-ROM in the D: drive (or the appropriate letter for your CD-ROM drive).
3. Click Start → Run
4. In the Open box, enter D:SETUP and click OK.
5. In the RS3 Network Interface Setup Welcome dialog, click Next.
6. In the License Agreement dialog, read the contents and click Yes to confirm that you agree with the license.

   (If you click No, the Exit Setup dialog box is displayed and you must choose whether to exit or resume the Setup program. You cannot continue unless you confirm the software license agreement.)
7. A default destination path is displayed In the Choose Destination Location dialog. If this destination is acceptable, click Next.

   If you want to specify a different directory, enter the appropriate destination path (use the Browse button to locate the destination directory, if necessary). After you have specified the directory destination, click OK, then click Next.

Install RNI Boot Software and API Toolkit (continued)

8. If the directory you specify does not exist a confirmation dialog appears. Click Yes to continue.

   The Setup Type dialog appears

9. To install all software components select API Toolkit/Boot Software in the Setup Type dialog box, then click Next.

   If you want to customize the installation, you use the Select Components dialog that appears to select and clear components as desired.

   After you have made your selections, click Next.

10. The Start Copying Files dialog box is displayed, showing the current settings to install the RNI software.

    a. Click Back to review or change the settings

    b. Click Next to accept the settings.

    The installation copies files to the hard disk and displays a % Progress screen. Upon completion, a Setup Complete dialog box is displayed, indicating that the RNI Boot setup is finished.

The RNI Configuration Utility window opens. (See Figure 2.3.6.) With this window you can configure the RNI using the following procedure.

Running the RNI Configuration Utility

Use the RNI Configuration Utility to configure the Hosts file, the bootptab file, and some of the necessary RNI configuration files.

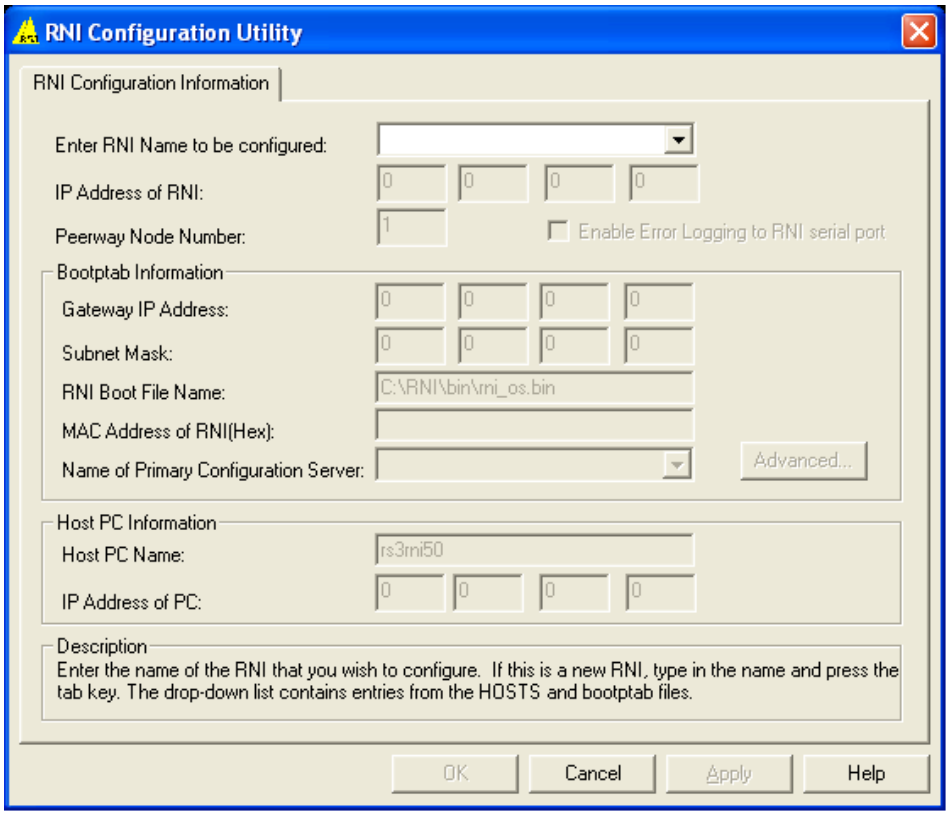


Figure 2.3.6. RNI Configuration Utility Window

NOTE: Fields in this window that are white need to have values entered. Fields that are grey have values assigned and cannot be changed.

In the RNI Configuration Utility window:

1. In the Enter RNI Name to be configured field, enter the name of the RNI you want to configure.

NOTE: Press the Tab key to move from field to field.

   a. If you are updating an existing RNI, type in the name or use the drop-down list to select a name. The Configuration Utility will fill in many of the additional information fields in this window.

   b. If this is a new RNI not previously on the network, type in the name. The Configuration Utility will look for this name on the system and fill in as much information as it can.

2. In the IP Address of RNI field, enter the IP address of the RNI, if the correct number is not already filled in. Obtain this address from your system administrator. The IP address must be on the same subnet as the host PC.
3. In the Peerway Node Number field, enter a value between 1 and 992, which you have obtained from your RS3 system administrator.
4. Check the box (Enable Error Logging to RNI serial port) if you want the RNI to write all of its error messages to the RNI's serial port in addition to the Error Log server. The default is unchecked. Note that this checkbox is available only after you enter an RNI name.

NOTE: The next five fields (steps 5 through 9) are in the Bootptab Information group, and apply only to bootptab.

5. In the Gateway IP Address field, accept the default obtained from the PC you are working from), or enter all zeros if you do not want a gateway.
6. Tab past the Subnet Mask field, which is provided for information only; you cannot change the values in this field.
7. In the RNI Boot File Name field, accept the default shown, which is default location for the installation file; or enter the full path name, including drive letter, path, and file name where you installed RNI if you changed the default location.

   An error message appears if you provide a file name that does not exist.
8. In the MAC Address of RNI (Hex) field, enter the MAC address shown on the back of the RNI (see the diagram in Figure 1.2.3).

   This field is required. An error message appears if you do not enter 12 hexadecimal digits.
9. In the Name of Primary Configuration Server field, you can accept the default (normally the same as the PC the Configuration Utility is being run on) or select a different server from the drop-down box.
10. To change the name of the secondary Configuration Server or the port number of the primary Configuration Server, click the Advanced button. (Normally, you will not need to use this button.)

NOTE: The two fields in the Host PC Information group are provided for informational purposes only. Emerson Process Management Support Services may request this information when troubleshooting a problem.

11. To apply the information and close the window, click OK after you have reviewed and approved the settings. To apply the the information and keep the window open (to configure additional RNIs) click Apply.

12. If you click OK, the RNI Setup dialog appears. On this dialog select the box to restart the machine. Optionally, select the box to view the readme file. After you have made your selections, click Finish.

Host PC with Multiple Network Cards

If your Host PC contains multiple network interface connections the BOOTPD program may incorrectly identify which network card boots the RNI. After you identify the network interface connection that is connected to the same subnet as the RNI, perform the following tasks:

1. Obtain the IP address for that network interface.
2. Make sure that the IP address in entered in the registry correctly.

To obtain the IP address of the RNI network connection:

1. Select Start | Settings | Control Panel | Network Connections.
2. From the sub-menu, select the network interface connected to the RNI.
3. Click Properties

   The Local Area Connection Properties dialog appears.
4. Select Internet Protocol in the list and click Properties.

   The Internet Protocol (TCP/IP) Properties dialog appears as shown in Figure 2.3.7.

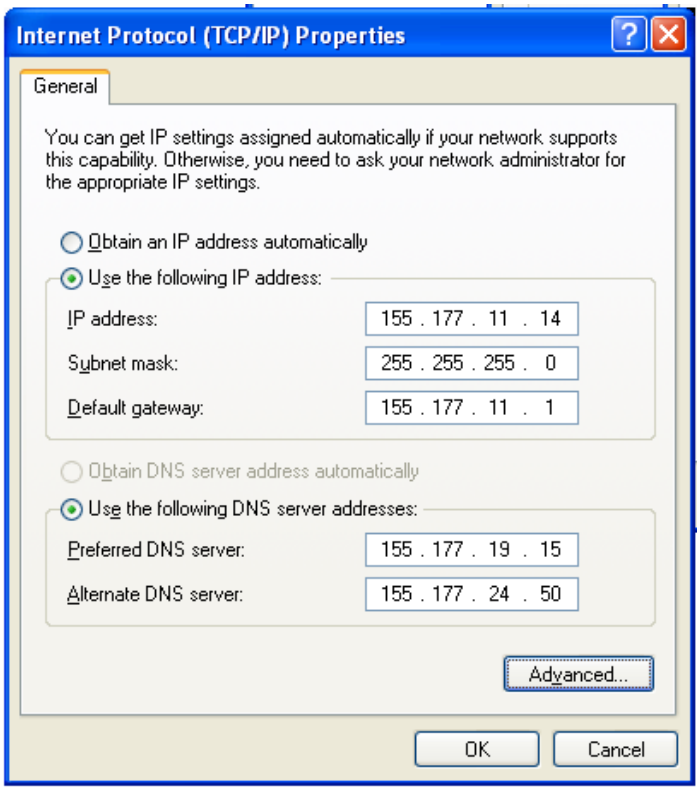


Figure 2.3.7. TCP/IP Properties Dialog

5. Note the IP address of the connection

Now you can verify that the correct IP address is entered in the Registry:

1. Click Start → Run
2. In the Open box, enter “regedit”
3. Press Enter to start the Registry Editor
4. On the left side of the Registry Editor, open the following directory structure path:

   `My Computer|HKEY_LOCAL_MACHINE|SOFTWARE|Fisher-Rosemount Systems|RNI|BOOTPD`

   The BOOTPD folder opens as shown in Figure 2.3.8.

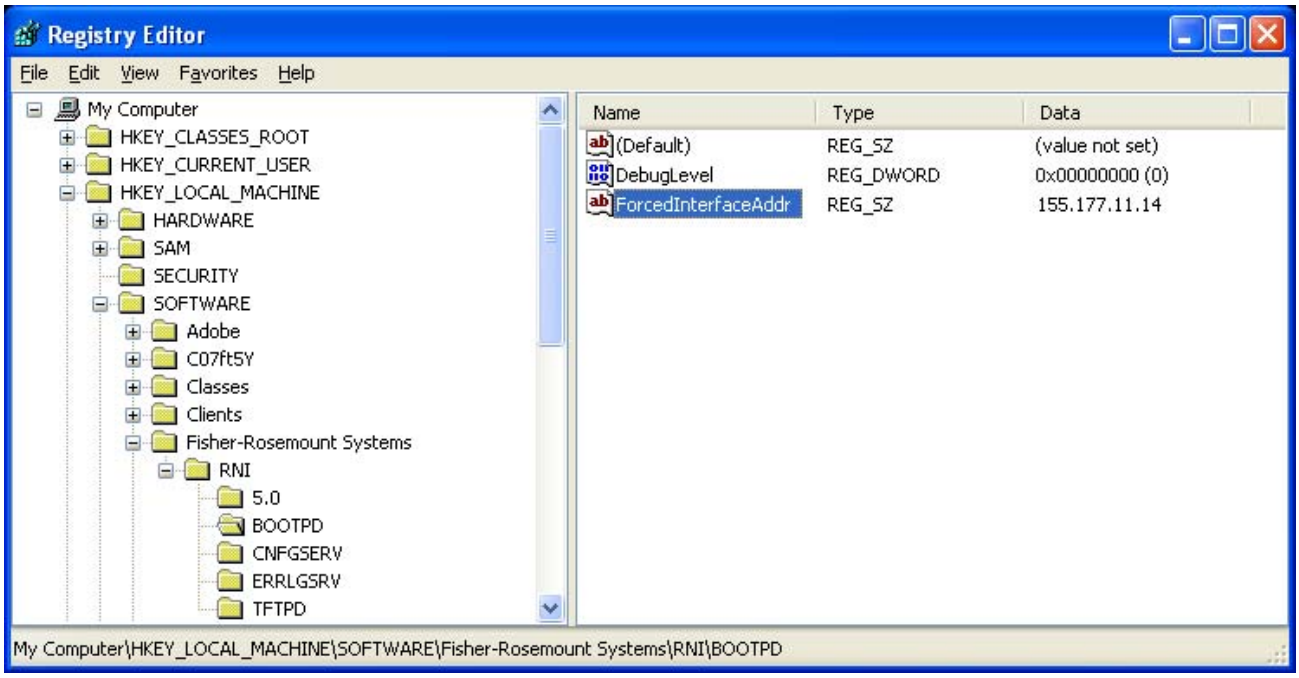


Figure 2.3.8. Windows Registry Hierarchy for RNI Information

5. On the right side of the Registry Editor window, double click “ForcedInterfaceAddr”.
6. In the dialog box, verify that the IP address shown is the address of the Network Interface Connection that is connected to the RNI that you noted previously.
7. After you verify or change the IP address, click OK.
8. Select File | Exit to close the Registry Editor.

Host PC with Multiple Network Cards (continued)

If you changed the IP address you must restart the BOOTPD service. This can be done either by rebooting the PC or by using the following procedure:

1. Select Start | Settings | Control Panel | Administrative Tools | Services.
2. Click the BOOTPD service.
3. Click Stop on the left side of the pane.
4. When the message box indicates that the service has been successfully stopped, restart the service by clicking Start.
5. Close Services.
6. Close Control Panel.

Procedure 2: Edit Other RNI Configuration Files and bootp Configuration File

This procedure describes the configuration files you may need to edit to use process historian applications.

The C:\rni\cnfgserv\configs directory contains the RNI configuration files. Use Windows Notepad to view and edit these files.

NOTE:

- The field values selected in the Configure RNI utility are automatically assigned to the appropriate fields in the RNI configuration files (see Procedure 1, RI: 2-3-10).
- Alphabetic text in the configuration files is case-sensitive. Values must be enclosed in the < > characters.

DDS.cfg

The DDS.cfg file specifies the maximum number of sessions, subscriptions, blocks, data points and controllers.

- You must specify the four scan (update) rates (see RI: 3-2-37).

In the following example of a DDS.cfg file, the scan rates are typical of process historian applications.

```
< MaxSessions 5 >
< DatabaseSizing
  < MaxSubscriptions  1000 >
  < MaxDataPoints     1000 >
  < MaxControllers      30 >
>
< UpdateRate1
  < Seconds           1 >
  < Milliseconds      0 >
>
< UpdateRate2
  < Seconds           5 >
  < Milliseconds      0 >
>
< UpdateRate3
  < Seconds          15 >
  < Milliseconds      0 >
>
< UpdateRate4
  < Seconds          60 >
  < Milliseconds      0 >
>
```

DDS.cfg (continued)

NOTE: If you subscribe to more than 1250 blocks or 4000 points, update the configuration of the SB.cfg file (see RI:3-2-44).

userfile.cfg

Edit the userfile.cfg file to specify the user's username, password, security key level, and user attributes (see RI: 3-2-14).

In the following example, the user rni has OPERATOR access.

```
<User
     <Name rni >
     <Password xyzzy>
     <KeyLevel OPERATOR>
     <Attributes
          <ReadUsers ON>
     >
<User
     <KeyLevel VIEW>
     >
```

TimeZone.cfg

Edit the TimeZone.cfg file to specify the local time relative to GMT.

The time is used to assign a timestamp to the Error Log information. The default timestamp is GMT−6 (USA Central Standard Time) (see RI: 3-2-22).

The following example shows a TimeZone.cfg file with a default timestamp:

```
< MyZone        GMT-6 >
< MyDstArea       USA >
```

Procedure 3: Start the BOOTPD, TFTPD, Configuration Server, and Error Log Server as Services

This procedure describes how to start the Windows services that must be active before you can boot the RNI.

1. From the Windows Control Panel, select the Services menu.

   BOOTPD, CNFGSERV, ERRLGSRV, and TFTPD should appear in the Service list with a “Started” status.

2. After the RNI directory is loaded and the key files are set up, boot the RNI.

Procedure 4: Booting the RNI

After the boot completes, verify the installation (see RI: 2-4).

CAUTION

Do not connect the RNI to the PeerWay until it boots up with the correct node number. (See the following boot sequence.)

Monitoring the RNI Boot

After a successful boot, the terminal or printer display should show information similar to the following:

```
Copyright (c) 1995-1996, Fisher*Rosemount
RNI Diagnostics. Press a key to change parameters.
CPU Test
ROM Memory CRC Test
Memory Controller
Memory Controller
Memory Controller
Main Memory
68302 Static Memory
Main Memory Size
TRAP Exception Tests
TEA Exception Test
Read/Write Latch Test
Real Time Clock Test
Watchdog Interrupt
Ethernet Loopback
RNI Diagnostics passed!
RNI Boot ROM version:  1.6  Date:  06/16/96
Getting the BOOTP message.

Server IP:               192.168.1.4
Client IP Address        192.168.1.3
Subnet Mask              255.255.255.0
Boot File Name:          c:/rni/bin/rni_os.bin

Starting the TFTP download...
.....................................................
nnnnnnn bytes transferred.

TFTP download completed.
Transferring control to the downloaded code.
```

Monitoring the RNI Boot (continued)

```
Copyright  (c)  1995-2001, Fisher*Rosemount

    Network Boot Information:
    -------------------------
    Client IP Address           0xC0A80103
    Server IP Address           0xC0A80104
    Gateway IP Address          0xC0A80101
    Subnet IP Address Mask      0xffffff00

    free_memory_start           0x4573fc

Standard output device initialized...
        Real-time clock initialized...
RTC RAM DD initialized...

* Access Test -- PASSED
* Start/Stop Test -- PASSED
* Tests running:  Bus Error, SRAM Operand, Marching Bit ...
 ... running test #5 ...
 ... running test #5 ...
 ... running test #5 ...
 ... running test #5 ...
 ... running test #5 ...
 ... running test #5 ...
 ... running test #5 ...
* Bus Error Test -- PASSED
* 68302 SRAM Operand Test -- PASSED
* Marching Bit Test -- PASSED
* Exception Handling Test -- PASSED
* Watchdog Test -- PASSED

PeerWay DD initialized:  Node:31 Year:2001 Month:04 Day:23
Hour:18 Min:31 Sec:24

04/23/2001 18:31:38.445 CDT    192.168.1.3
    ErrorLogger generateStartupMsg 143 0
    RNI started  -- Version R5.0-xxx
```

Diagnosing Boot Problems

- If the RNI does not boot, recheck the BOOTPTAB file. Check for correct IP addresses. Use the following utility to verify the correct IP addresses and names:

  C:\RNI\BIN\HOSTTEST.exe

  This utility requires the IP address and returns the host name from the active name resolution system.
- Verify that bootptab and Hosts files are in the WINDOWS\SYSTEMS32\DRIVERS\ETC\HOSTS file.
- If the bootptab file was edited with a text editor, verify that the “hd” parameter entry in the BOOTP Configuration uses the forward slash. The entry must look like the following:

  hd=“C:/rni/bin”:\
- Verify that the following services are started in the Control Panel Services application:
  - TFTPD
  - BOOTPD
  - CNFGSERV
  - ERRLGSRV
- If any changes are made to the RNI .cfg files, you must stop and restart the CNFGSERV service (at the Control Panel).
- The Host PC and the RNI must both be on the same subnet.
- If boot is not successful, check the cfg.log file and rnierr.log in the following directory:

  C:\RNI\Log

  Use the configuration utility program to check the directory. The RNI boot file is installed in the “/bin” subdirectory of the same directory the “~log” subdirectory is in (e.g., if the RNI boot file is C:/programs/RNI/BIN/rni_as.bin, then the log directory is C:/Programs/RNI/LOG.

Procedure 5: Uninstall the RNI API Developer Kit and RNI Boot Software (Automatically)

To uninstall earlier versions the RNI API Developer Kit and RNI Boot software, use the following steps while in an 'administrator' account:

1. Select Start | Settings | Control Panel.
2. Double-click Add/Remove Programs.
3. From the list that appears, select RNI.
4. Click the Add/Remove button.
5. Follow the instructions in the wizard to uninstall the software.

Procedure 6: Remove Registry Entries for Installed RNI Services (Manually)

To uninstall earlier version or to remove the services from windows, do the following steps while logged in with administrative privileges:

```
cd c:\rni\bin

C:\rni\bin\instsrv BOOTPD remove
C:\rni\bin\instsrv TFTPD remove
C:\rni\bin\instsrv CNFGSERV remove
C:\rni\bin\instsrv ERRLGSRV remove
```

Reboot the computer to complete the removal of the services.

Procedure 7: Uninstall the RNI API Developer Kit and RNI Boot Software (Manually)

To uninstall earlier version or to remove the services from windows, do the following steps while logged in with administrative privileges:

Stop the services that are running first using the following steps:

```
cd c:\rni\bin

C:\rni\bin\instsrv BOOTPD remove
C:\rni\bin\instsrv TFTPD remove
C:\rni\bin\instsrv CNFGSERV remove
C:\rni\bin\instsrv ERRLGSRV remove
```

Click Control Panel.

Delete the four environmental variables in the System environment applet as listed below.

− BOOTPDARGS
− CNFGSERVARGS
− ERRLGSRVARGS
− TFTPDARGS

Reboot the Windows PC and log on.
Delete all files in the RNI directory structure. The default directory is C:\RNI.

Delete the following files from the Winnt directory:

```
C:\Winnt\system32\ct13d32.dll
C:\Winnt\system32\rni.dll
C:\Winnt\system32\rni.lib
C:\Winnt\system32\rpc.dll
C:\Winnt\system32\rpc.lib
C:\Winnt\system32\msvcrt20.dll
```

Delete the following if no longer required. If you are planning to re-install RNI BOOT and API, then you will want to rename this file instead of deleting it in case you need the information within the file for reference.

```
C:\Winnt\system32\drivers\etc\bootptab
```

Section 4:
Verifying the RNI Installation

This section describes the programs you can use to verify your RNI installation. These programs show examples of the interactive commands and the data types you will see when you run these programs.

The examples directory contains several programs you can use to verify RNI operation. These programs include:

Directory	Verifies
examples\sm_xmpl	Communication with the RNI Security Manager
examples\rw_xmpl	RNI read of RNI Read/Write server
examples\dds_xmpl	Operation of RNI Dynamic Data server
examples\rs_xmpl	Operation of RNI Status server

Each program includes the directory path and program call.

NOTE: The example programs are not compiled for Windows XP or Server 2003.

rnireg Program

The rnireg program verifies communication with the RNI Security Manager server.

```
cd c:\rni\examples\sm_xmpl
rnireg


Enter the RNI name:
 huey
Enter your user name:
 User1
Enter your password:
 User1PW
Enter timeout period in minutes:
 1
You have VIEW permissions.
User: User1, Host: nttest, Access: VIEW
You have reached the end of the user list.
You have been logged out.
```

rdwrite Program

The rdwrite verifies RNI read of RNI Read/Write server.

```
cd c:\rni\examples\rw_xmpl
rdwrite

Enter the RNI name:
 huey
Enter your user name:
 User1
Enter your password:
 User1PW
Enter timeout period in minutes:
 1
You have VIEW permissions.
The Read/Write handle has been established.
Do you want to enter data from a file (Y/N)?n
Enter the number of items that you want to read.
 1
Enter a tag name (up to 16 characters);
  or enter an address in the format =###X-##
    where # is a number; X is a letter.
 LIC-301
Select the value that you want to read for this block:
 and enter one of the following letters:
A. Register fields...
B. PID fields...     G. Process Variable     L. Analog output
C. Block tag name    H. Digital state        M. Digital output
D. Block address     I. Digital Input Flags  N. Update code
E. Block descriptor  J. User modes
F. Block type        K. Mode
 a
Select one of the following fields:
A. Register value        H. Engineering Zero
B. Hi Critical Alarm     I. Engineering Max
C. Hi Advisory Alarm     J. Engineering Units
D. Lo Critical Alarm     K. Analog Source Type
E. Lo Advisory Alarm     L. System Flags
F. Alarm Deadband        M. User Flags
G. Rate Limit
 a
Enter an rwRegister, A - O, or the output, Q.
 b
Do you want scaled values (Y or N)?
 y
Data was read successfully.
(1)block=”LIC-301”  status=0  command=6  register=2  scaled=0
value type=4
    value=55.000000

Enter the number of items that you want to write.
 0
The Read/Write handle has been deleted.
You have been logged out.
```

rundds Program

The rundds Program verifies operation of the RNI Dynamic Data Server.

```
cd c:\rni\examples\dds_xmpl
rundds


Enter the RNI name:
 huey
Enter your user name:
 User1
Enter your password:
 User1PW
Enter timeout period in minutes:
 1
You have View permissions.
User: User1, Host: AXP1, Access: VIEW
You have reached the end of the user list.
Indicate how you want to receive dynamic data:
1 = upon request (polled);  2 = periodically
 2
Indicate your scaling preference:
1 = scaled values;          2 = unscaled values
 1
DDS session is started
Select Timeout Option
Default Option is WAITFOREVER

   1       WAITSPECIFIEDTIME
   2       NOWAIT
   3       WAITFOREVER
   4       LEAVE DEFAULT
   => 3
File descriptor = 6
Enter number of dynamic data subscriptions you need.
 1
Enter a tag name (up to 16 characters);
  or enter an address in the format =###X-##
    where # is a number; X is a letter.
 LIC-301
Enter one of the following periodic modes:
N = normal (get data at update rate)
C = on Change (get data only on changes)
 c
```

rundds Program (continued)

```
Select the data types to which you want to subscribe:
 and enter one of the following letters:
A. Block mode        G. Q.u logic step user flags
B. Output value      H. User flags for inputs...
C. Input values      I. System flags for inputs...
D. Discrete inputs   J. Q.v system flags
E. ATPID options...  K. Q.t.x system flags
F. Logic step modes
 c

Enter an input register A - O.
 a
Enter a deadband value in the format ##.##.
 0.01
Deadband was set to 0.01.

Select Demand Update Mode
Default Option is None
1  UPDATE THIS SESSION
2  UPDATE ALL SESSIONS
3  LEAVE DEFAULT
=> 3

Tag=LIC-301
    INPUT_VALUEA,  34,   0,  COMPSETP, 17-Jan-95 10:03:16
57.633728
                  Status 0 indicates Value OK.
Tag=LIC-301
    INPUT_VALUEA,  34,   0,  COMPSETP, 17-Jan-95 10:03:17
57.619267
                  Status 0 indicates Value OK.

Tag=LIC-301
    INPUT_VALUEA,  34,   0,  COMPSETP, 17-Jan-95 10:03:19
57.602997
                  Status 0 indicates Value OK.
Tag=LIC-301
    INPUT_VALUEA,  34,   0,  COMPSETP, 17-Jan-95 10:03:20
57.584911
                  Status 0 indicates Value OK.
Tag=LIC-301
    INPUT_VALUEA,  34,   0,  COMPSETP, 17-Jan-95 10:03:21
57.565010
                  Status 0 indicates Value OK.
Tag=LIC-301
    INPUT_VALUEA,  34,   0,  COMPSETP, 17-Jan-95 10:03:21
57.543289
                  Status 0 indicates Value OK.
Tag=LIC-301
    INPUT_VALUEA,  34,   0,  COMPSETP, 17-Jan-95 10:03:22
57.519753
                  Status 0 indicates Value OK.
Tag=LIC-301
    INPUT_VALUEA,  34,   0,  COMPSETP, 17-Jan-95 10:03:23
57.494396
                  Status 0 indicates Value OK.
```

rundds Program (continued)

```
Tag=LIC-301
    INPUT_VALUEA,  34,   0,  COMPSETP, 17-Jan-95 10:03:24
57.467224
                  Status 0 indicates Value OK.
Tag=LIC-301
    INPUT_VALUEA,  34,   0,  COMPSETP, 17-Jan-95 10:03:25
57.438236
                  Status 0 indicates Value OK.

Do you want to continue to receive messages? (Y or N)
 n
Subscription has been removed.
Session ended.
You have been logged out.
```

statapi Program

The statapi program verifies the operation of the RNI Status server.

```
cd c:\rni\examples\rs_xmpl
statapi
```

```
cd c:\rni\examples\rs_xmpl
statapi

Enter the RNI name:
   huey
Enter your user name:
   User1
Enter your password:
   User1PW
Enter timeout period in minutes:
   1
You have OPERATOR permissions.
The Read handle has been established.

RNI Status Read Function Selection

Enter 1 for the RNI Status

Enter 2 for the Control File Status

Enter 3 for the Plant Status

Enter 4 for the RS3 Time

Enter 5 for the Block Directory

ENTER 6 to terminate program

     > 3


Enter the start node for Plant Status
   1
Enter the end node for Plant Status
   1
Enter the flag for controller states
   1
RNI message was successfully copied.

------------------------------------------------------------
```

statapi Program (continued)

```
Plant Status for Nodes 1 to 31

Node Number 1
Node Type QBUS
Node State 0

Node Number 2
Node Type ControlFile
Node State 0
Node Number 3
Node Type ControlFile
Node State 0
Node Number 22
Node Type Multitube Console
Node State 0

Node Number 31
Node Type RNI
Node State 0

The Read handle has been deleted.
```

Chapter 3:
Configuring the RNI

List of Figures

List of Tables

Section 1:
Introduction

Certain software files that RNI uses must be appropriately configured before RNI can be installed and run successfully. These files include:

- RNI configuration files (.cfg)
- BOOTPD

This chapter explains how to:

- Configure the Configuration Server
- Install, configure, and start up BOOTPD
- Configure RNI services

Section 2:
Configuring the Configuration Server

This section includes these topics:

- General information about the configuration files
- Specific explanations for each category of configuration information needed by the RNI, including:
  - PeerWay node number
  - Security management
  - Message pairs
  - Time zone
  - Message Monitor
  - Alarm generation
  - Configure Alarm Broadcast (CAB)
  - Dynamic Data Services
  - File Transfer Protocol (FTP) session
  - Translation Tables
  - Static Block Cache
  - Block Change Notification

General Information on Configuration Files

To configure the Configuration Server, you must:

- Edit the Configuration Server's own configuration file (cnfgsvr.cfg).
- Edit the default RNI configuration files (.cfg) as needed.

Configuration Server Configuration File (cnfgsvr.cfg)

The Configuration Server has its own configuration file, called cnfgsvr.cfg. This file provides mapping between RNIs and the configuration files they use. For each RNI configuration file, cnfgsvr.cfg contains:

- Application name
- RNI host name
- Name of an associated file

The individual RNI configuration files contain:

- Type
- Version
- Service-specific configuration data

NOTE: The version number in the cnfgsvr.cfg file is the version of the configuration file, not the version of the RNI.

Transfer of Configuration Information

When the Configuration Server running on a host starts up, it reads cnfgsvr.cfg and stores all of that information in memory. When an RNI is restarted, the RNI requests configuration information from the Configuration Server. The Configuration Server responds with the configuration for that RNI.

The RNI requests configuration information only when it first starts up. Therefore, if you change configuration information after you have started an RNI (except for security information, such as adding users or changing permissions), you must restart the RNI for it to receive the new information.

cnfgsvr.cfg Format

The configuration file is made up of one or more “Map” blocks for each individual configuration file. Each Map block identifies a configuration and has the following format:

```
<Map
   <App application_name>
   <Node node_name>
   <Filename filename>
>
```

NOTE: Items in bold in the above format are keywords that must appear exactly as listed; items in italics are names that you supply based on your application. The indentation shown in the example is not required, nor is it required for each item to be placed on a separate line.

cnfgsvr.cfg Format (continued)

The keyword parameters are:

- **App** − Specifies the application. The various services on the RNI determine the appropriate values for this keyword, such as:
  - Security
  - MsgPrServer
  - DateAndTime
  - MsgMonitor
  - DynamicDataService
  - AlarmGenServer

  You can also use a wildcard value (*) to indicate that the configuration applies to any RNI application.
- **Node** − Allows different configuration files to be supplied to different RNIs. The value for this keyword is the name of the RNI on the network. You can also use a wildcard value (*) to indicate that the configuration applies to any RNI.
- **Filename** − Specifies the configuration file. The filename must be valid on the system running the Configuration Server.

Configuration File Security

The cnfgsvr.cfg file and user file contain information to enforce security on the RNI and on the PeerWay. To ensure this security, these files should not be writable; in some cases, they should also not be readable by the general user.

The RNI configuration files affect RNI operation, therefore, they should also have restricted access.

RNI Configuration Files

The RNI configuration files provide configuration information for RNI services. The following sections explain how to edit specific files.

Configuration File Conventions

All files used by the Configuration Server follow a format based on SGML (Standard Generalized Markup Language), an ISO standard for document and data interchange. In general, this format consists of a keyword followed by a value or block of values, enclosed in “< >”.

The first line in each file is an identifier that tells the RNI which type of configuration it is reading and specifies the current version number. The version number specifies the version of the file format and content.

Any text in an RNI configuration file that is not inside a pair of < > characters is considered a comment. No special leading character is required, and there is no special leading character that causes a line to be a comment. (Example configuration files in this document have a “#” at the beginning of a comment line, but the “#” is not significant. It only makes it more obvious to users that it is a comment.) Comment text must not contain the characters “<” or “>”.

Adding an RNI Configuration File

You must create a new file when you want another set of configurations for a different RNI.

❑ **To add a configuration file:**

1. Place the configuration file in the Configuration Server directory.
2. Edit the cnfgsvr.cfg file (in the same directory) to specify the application name and RNI hosts that use the configuration file.

   When you edit the file, remember these guidelines:

   - If the configuration is not specific to any RNI node, the node_name can be specified as *.
   - If the configuration is not specific to any particular application, the application_name can be specified as *.
   - When an application requests a configuration, configurations that are specific override those that use a wildcard.
3. Stop and restart the configuration server with the same parameters as on the command line.

Using Memory Wisely

As you configure cnfgsvr.cfg and the related RNI configuration files, be careful not to set all parameters at their maximums. Memory for the Message Monitor (MM), Dynamic Data Services (DDS), and number of sessions configured is allocated at boot time. If you set these three at their maximums, you will not have enough memory. Instead, you must make tradeoffs among these three to use the available memory wisely.

Hints:

- Initially, configure low values for parameters, and raise the values later if you determine that more space is needed.
- Disable a queue for MM or an update rate for DDS if it is not needed, to free up some memory.
- Disable an entire service by setting the number of sessions for that service to zero.
- Parameter changes require an RNI reboot.

Sample configurations are shipped with the RNI program image in the RNI Boot software.

Default Values

If the RNI is unable to read a configuration value, either because the file cannot be found, or because that particular value is not listed in the files, the RNI will use a default value that is coded into the software.

The RNI software is shipped with a set of sample configuration files that are installed in the configuration directory during the install process. Unless these files are edited, they will determine the initial configuration settings.

In the following paragraphs, both the program defaults and the example file settings are defined.

PeerWay Node Number (PwNode.cfg)

The RNI uses the Configuration Server as the primary source for its PeerWay node number. If the RNI cannot get its node number from the server, it reads a node number from NVRAM.

NOTE: The RNI should never be connected to the PeerWay until the correct node number is configured. This will prevent the RNI from conflicting with existing nodes and causing a PeerWay disruption.

The PeerWay device driver compares the node number from the Configuration Server with its node number stored in NVRAM. If the two numbers are different, it updates the node number in NVRAM to the value from the Configuration Server and sends a notice to the error log device to indicate that the node number has changed.

Configuration File Entry for PeerWay Node Number

The main Configuration Server file, cnfgsvr.cfg, contains an entry for each RNI node, as shown in Figure 3.2.1. This entry specifies:

- An application identifier (* indicates any application)
- Node name of the RNI. In this case, you may not use the wild card.

  NOTE: Some systems that use a DNS server may require that you enter the full DNS name in the Node field.
- Name of the file that contains information for this node.

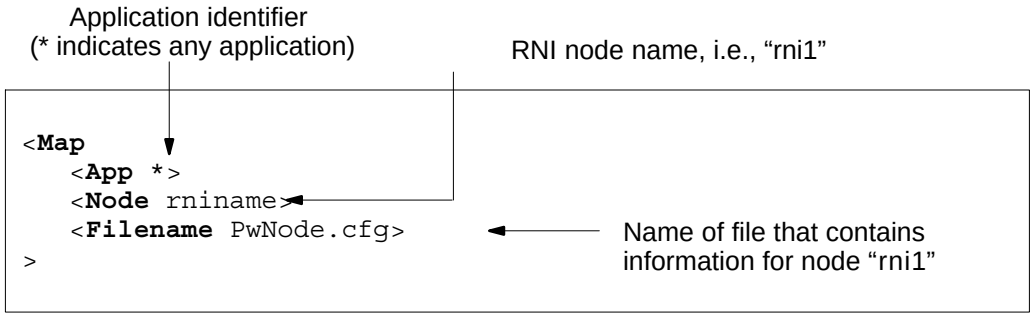


Figure 3.2.1. cnfgsvr.cfg Entries for RNI Node

PeerWay Node File Entries

The file for each RNI node contains two items, as shown in Figure 3.2.2:

- The file identifier and version number
- The actual node number

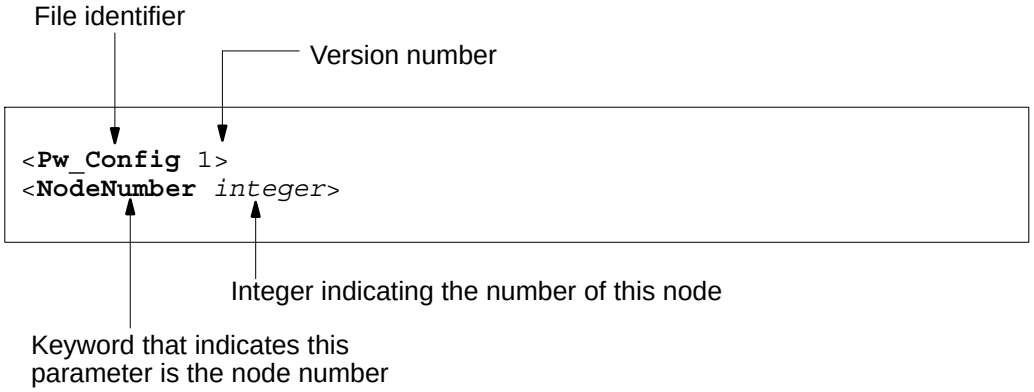


Figure 3.2.2. Entries in PeerWay Configuration File

NOTE: The example PwNode.cfg file sets Node Number to 31. There is no program default for this value.

PeerWay Node File Entries (continued)

The node number you use must be:

- A value from 1 to 992, inclusive.
- Not already in use by another PeerWay device.
- An appropriate number for the PeerWay to which the RNI is connected.

  Table 3.2.1 lists PeerWay numbers and the appropriate corresponding node numbers. For example, if the RNI is connected to PeerWay 5, the appropriate range of numbers is 129 through 160.

Table 3.2.1. PeerWay and Corresponding Node Numbers

PeerWay Number	Node Numbers	PeerWay Number	Node Numbers
1	1 − 32	17	513 − 544
2	33 − 64	18	545 − 576
3	65 − 96	19	577 − 608
4	97 − 128	20	609 − 640
5	129 − 160	21	641 − 672
6	161 − 192	22	673 − 704
7	193 − 224	23	705 − 736
8	225 − 256	24	737 − 768
9	257 − 288	25	769 − 800
10	289 − 320	26	801 − 832
11	321 − 352	27	833 − 864
12	353 − 384	28	865 − 896
13	385 − 416	29	897 − 928
14	417 − 448	30	929 − 960
15	449 − 480	31	961 − 992
16	481 − 512		

Security Configuration (userfile.cfg)

RNI user information is stored in a user file on your host computer. Because the Security Management system reads this file through the Configuration Server, the format of this file must be in accordance with the standards defined by the Configuration Server.

The user file identifies potential users by privilege level. Optionally, it can also include a name, host, and password, as well as additional attributes for each user.

Configuring User Privileges

When a user requests RNI access, the Security Management system attempts to match three fields in the user file. It uses the first entry that matches the user name, password, and host. Since any field in the user file can be omitted, an empty field always matches the corresponding input in the registration request. For example, “johndoe” can obtain access from any host or only from certain hosts; in addition, anyone from a particular host can gain access to the RNI. For each type of access, the password requirement can be optional.

Table 3.2.2 shows the possible combinations of field matches; “X” indicates that the user file has a definition in that field.

Table 3.2.2. User File Options

User Name	Pass-word	Host	Specified privileges and attributes are assigned to user who logs on to the RNI with ...
X	X	X	this name and this password from this host.
X	X		this name and this password from any host.
	X	X	this password and any name from this host.
X		X	this name and any password from this host. **NOTE**: Assuming that the host has already validated the user, this option works well when you are operating from a secure host.
		X	any name and any password from this host.
X			this name and any password from any host.
	X		this password and any name from any host. **NOTE**: If you have only one entry, you have a single-password system.
			any name and any password from any host. **NOTE**: This is the least secure option but can be useful for an RNI configured as read-only. If this option is used with other entries, it must be the last one in the file and should be set as view-only.

Configuration File Entry for Security

The main Configuration Server file, cnfgsvr.cfg, contains an entry for the security application, as shown in Figure 3.2.3. This entry specifies:

- Application identifier (Security)
- Node name
- Name of file that contains the security information

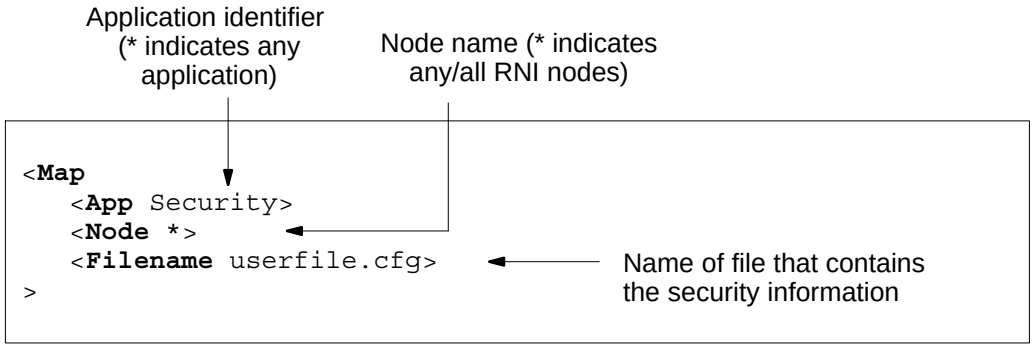


Figure 3.2.3. cnfgsvr.cfg Entries for Security Management

The user file that contains the security information includes three primary sections:

- File identification information
- Configuration section that contains parameters, such as the number of users, for operating the security management system
- User information section that lists records for individual users

File Identification Information

The file identification information includes a file identifier and version number, in the format shown in Figure 3.2.4. The version number must be 3 in order to use features introduced in RNI Release 4.1/5.0

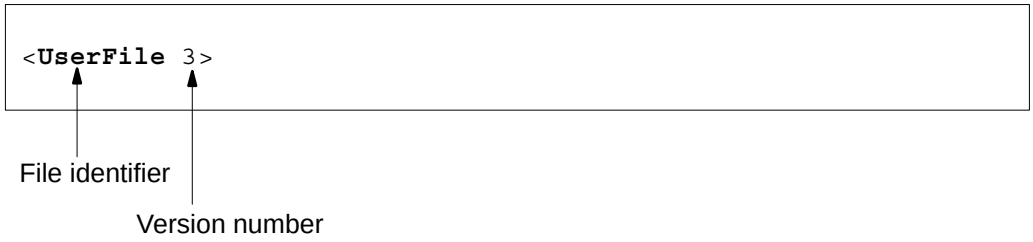


Figure 3.2.4. Security Management File Identification

Configuration Information

The configuration section defines parameters for the operation of the Security Management system. Currently, this section contains only one option: the maximum number of concurrent users of the RNI. No more than 50 people can be connected to the RNI, but any number from 1 to 50 is acceptable.

The configuration format is shown in Figure 3.2.5.

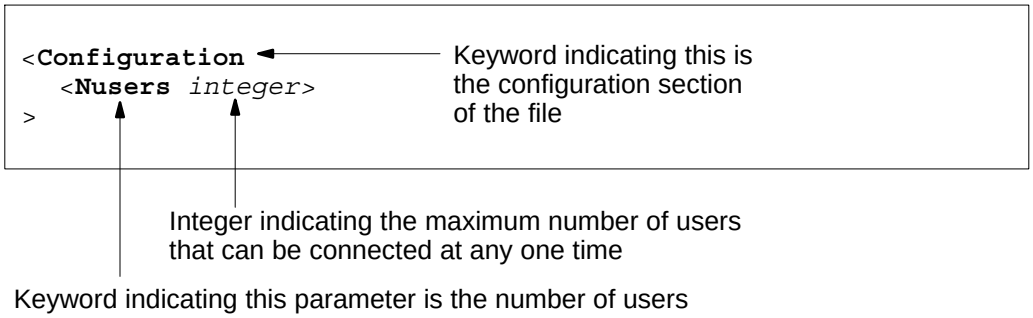


Figure 3.2.5. Configuration Parameters

NOTE: The number of users (*Nusers*) defaults to “5” if you do not specify a value.

User Information Section

The entire user information section is enclosed in a single block, as shown in Figure 3.2.6. The block contains a user record for each authorized RNI user. Table 3.2.3 lists the keywords, parameters, and valid values for each user record.

NOTE: In the Figure 3.2.6 example, the vertical slash symbol (|) is used to separate the available keyword options. You can assign only one of these options at a time to KeyLevel or Attributes. The (|) symbol is not an “or” operator and should not be included in the actual configuration file.

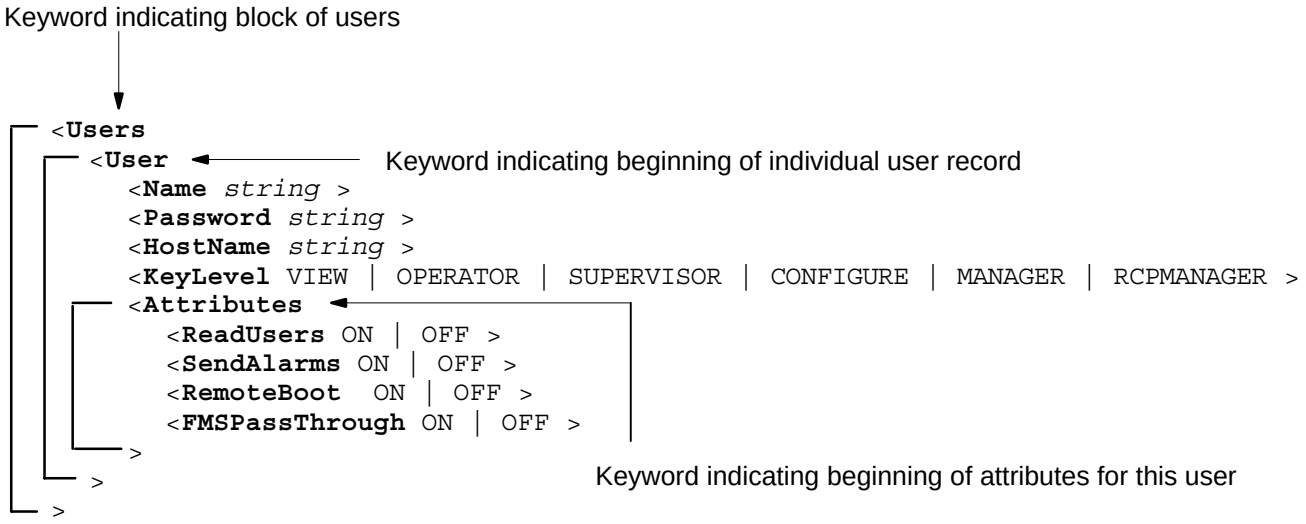


Figure 3.2.6. User Information

Table 3.2.3. User Record

Keyword	Parameter	Valid Values
Name	Name of user	0 to 16 alphanumeric characters; case-sensitive. Defaults to zero-length string. If this field is omitted, the default value is used.
Password	Password for this user	0 to 16 alphanumeric characters; case-sensitive. Defaults to zero-length string. If this field is omitted, the default value is used.
HostName	Name of host node on Ethernet	0 to 8 alphanumeric characters; case-sensitive. Defaults to zero-length string. If this field is omitted, the default value is used.
KeyLevel	RS3 privileges **NOTE:** This parameter is required for every user.	Must be one of the these values: VIEW OPERATOR SUPERVISOR CONFIGURE MANAGER RCPMANAGER

NOTE: If Name, Password, or HostName parameters are left blank as a 'User,' then any set of characters or zero-length name will be matched.

(continued on next page)

Table 3.2.3. User Record (continued)

Keyword	Parameter	Valid Values
Attributes		
ReadUsers	Indicates whether or not this user can read the list of currently registered users from the RNI.	ON OFF (default) If this field is omitted, the default value is used.
SendAlarms	Indicates whether or not this user can generate alarms from an application program.	ON OFF (default) If this field is omitted, the default value is used.
RemoteBoot	Indicates whether or not this user can generate a remote request to reboot the RNI.	ON OFF (default) If this field is omitted, the default value is used.
FMSPassThrough	Indicates whether or not this user can use HART pass-through message service.	ON OFF (default) If this field is omitted, the default value is used.

Security File Entries

The order of the entries in the user file is extremely important. The Configuration Server reads the user file from top to bottom, when it finds the first matching entry, it reads no further. To ensure that users can access specific and generic user privileges as you planned, **place more specific privileges at the beginning of the file, followed by more generic privileges**. See user file example in Figure 3.2.7.

User File Example

Figure 3.2.7 shows a sample user file. Table 3.2.4 lists the results of those entries.

```
<UserFile 2>
<Configuration
   <Nusers 10>
>
<Users
   <User
      <Name joe>
      <Password Secret>
      <HostName pc-joe>
      <KeyLevel OPERATOR>
   >
   <User
      <Name fred>
      <Password Guess>
      <KeyLevel SUPERVISOR>
      <Attributes
         <ReadUsers ON>
      >
   >
   <User
      <Name jill>
      <HostName NTONE>
      <KeyLevel CONFIGURE>
   >
   <User
      <Password private>
      <HostName NTONE>
      <KeyLevel OPERATOR>
   >
   <User
      <HostName NTLAB>
      <KeyLevel VIEW>
   >
>
```

Figure 3.2.7. User File Example

Table 3.2.4. User File Entries

User	Password	Host Node	Key Level	Attribute(s)
joe	Secret	pc−joe	operator	
fred	Guess		super	ReadUsers
jill		NTONE	config	
			recipe manager	
			system manager	
	private	NTONE	operator	
		NTLAB	view−only	

User File Example (continued)

The Security Management system produces the following results when searching a file with the above entries:

- If “joe” runs his application on host “pc−joe” and enters “Secret” as the password, he has operator privileges.
- If “fred” logs on from any host using “Guess” as the password, he has supervisor privileges and the ReadUsers attribute, which means that he can call SM_read to access a list of users who are currently using the RNI.
- If “jill” runs her application on host “NTONE”, she has configuror privileges.
- Anyone on host “NTONE” who enters the password “private” has operator privileges.
- Anyone on host “NTLAB” has read-only access to the control system.

  For example, if “joe” runs an application on “NTLAB” using the password “Secret,” he still has read-only permissions.

  - The host does not match for his operator privilege entry.
  - The password does not match “private” for the other operator entry on host “NTLAB.”

  Because the password for the read-only entry in the user file is blank, any password is accepted as a match for view-only privileges.

NOTE: If the order of the last two entries is reversed, users who enter “private” as the password can never obtain operator privileges. The search for a match finds the read-only entry first.

NOTE: The program default for security will not allow anyone to access any RNI services.

Message Pair Configuration (mPairs.cfg)

Message pairs are numbered representations of discrete states of variables used in the RS3. A message pair consists of one message for the on state (1) and one message for the off state (0) of a discrete variable.

The Message Pair server on the RNI can access the message pairs from RS3 consoles and local clients. It sends requests to the Configuration Server to acquire or update the message pair configuration. Initially, it makes a read request to the Configuration Server to copy the message pair configuration into a local cache. After the message pair configuration is loaded into cache, you can update the configuration from an RS3 console, using the Configure RNI screen.

An RS3 console can write all message pairs to the Message Pair server cache. When this happens, the Message Pair server sends the write requests for user message pairs to the Configuration Server to update the primary and backup configurations of message pairs.

NOTE: Blank message pair strings (either true or false) from an RS3 console are not written to the message pair configuration during a configuration write. This means that if you change one of the default message pair strings to blank and its default is not blank, the string will remain blank only until you cycle power. When you cycle power, the configuration is reread and the default string is again used.

Configuration File Entries for Message Pairs

The main Configuration Server file, cnfgsvr.cfg, contains an entry for the message pair server, as shown in Figure 3.2.8. This entry specifies:

- Application identifier (MsgPrServer)
- Node name
- Name of file that contains message pair information

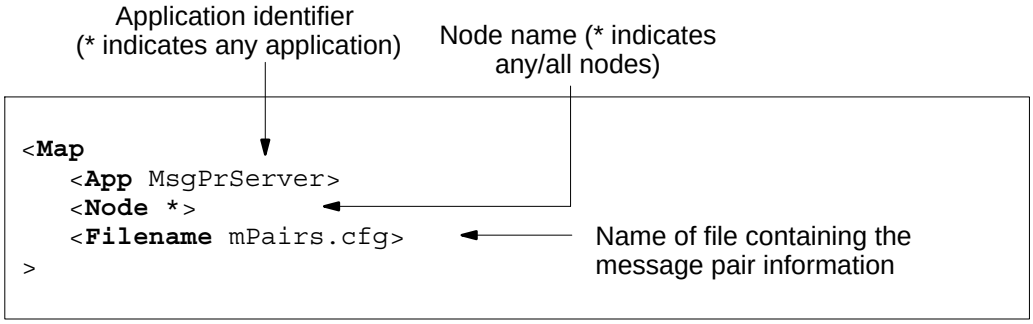


Figure 3.2.8. cnfgsvr.cfg Entries for Message Pairs

Message Pair File Entries

The Message Pair server has a default set of message pairs compiled into the program; these are identical to the RS3 console default message pairs.

In addition, the Message Pair server attempts to read a user configurable set of message pairs from the Configuration Server. Message pairs downloaded from a console to the Message Pair server are written to the Configuration Server.

The format of the message pair configuration file is shown in Figure 3.2.9. Table 3.2.5 lists details about the message pair parameters.

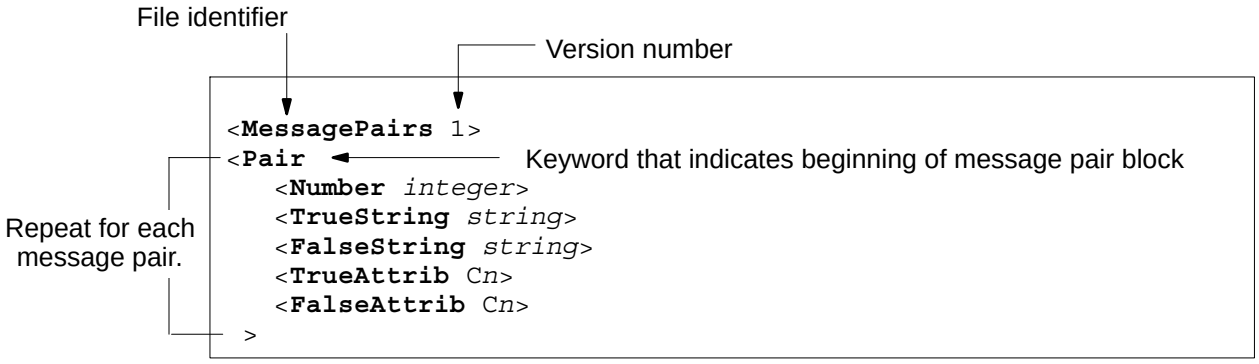


Figure 3.2.9. Message Pair Configuration File

Table 3.2.5. Message Pair Information

Keyword	Parameter	Valid Values
Number	Indicates which pair is being defined	1 to 100 for standard message pairs (*1 to *100) 101 to 255 for user message pairs (1 to 155)
TrueString	Indicates character string to appear when value is in TRUE state	Up to 8 characters
FalseString	Indicates character string to appear when value is in FALSE state.	Up to 8 characters
TrueAttrib	Indicates color combination (foreground and background) for TrueString	C1, C2, C3, C4, C5, C6 (see note below)
FalseAttrib	Indicates color combination (foreground and background) for FalseString	C1, C2, C3, C4, C5, C6 (see note below)

NOTE: These are the same attributes that you assign on the Color Configuration screen from an RS3 console.

NOTE: The program defaults are the same as the default message pairs in an English MTCC. The example configuration file is empty.

Downloading Message Pairs

Using the Configure RNI screen on an RS3 console, you can send message pairs to the RNI and change the default message pair configuration file on the host.

❑ **To send message pairs from the console to the RNI:**

1. Type CRN *node_number* on the command line to call up the screen.
2. Cursor to the Send Message Prs field (see Figure 3.2.10).
3. Press [ENTER].

   "Sent Successfully" appears on the screen when the operation is complete.

```
                              CONFIGURE RNI                  04-Sep-05  14:43:52

Node >930 (2 on Pway 30)   IP Addr 10.10.10.10      Booted  04-Sep-05  10:24:51
Program Version R5.0-X       PWDD Version    Vx.x-x       Boot Version 1.60
------------------------- CONFIGURATION INFORMATION -------------------------
Primary Config Server  10.10.10.11      Secondary Config Server

Configure RNI Node #  =>0    Distance Penalty  =>25   Transfer Rate  =>1600000

Time Correction =>.00 Sec/day      Pass Time =yes    =>Send Msg Prs
------------------------------ STATUS INFORMATION ----------------------------
Idle Time    0          Bytes Free Reg0    0           Alm Gen     0
Tasks        0          Max Seg Size Reg0  0           Static Req  0
Threads      0          Bytes Free Reg1    0           Dyn Req     0
Errs Logged  2          Max Seg Size Reg1  0           Unit Msgs   0
Local   .    .    70    Host     2    0    0           Server 0    0    0
        Tot Ses Ses Used +---------------- Message Monitor --------------------+
AlmGen  8       2        |                     MsgCnt Msgs Lost  %QFull  QSize |
RWBlock 4       1        |Tot Ses   4      Alm 0      0           0.0     1000  |
                         |Ses Used  1      Bat 0      0           0.0     0     |
                         |MsgQ Size 1999   DCB 0      0           0.0     100   |
                         |MsgQ Full 0.0    DSS 0      0                         |
--------- DDS ---------- +-------------------------------------------------------+
         Total      In Use
Contrs   1000      1               TimeIntvl  UnitMsgs   Saturation Pts/Msg
Blocks   2750       1            R1 1.000      0          0.0        0
Data Pts 10000      1            R2 2.000      0          0.0        0
Subscrip 10000      1            R3 30.000     1          0.17       1
Sessions 8          2            R4 .000       0          0.0        0
```

Figure 3.2.10. Configure RNI Screen

Time Zone Configuration (TimeZone.cfg)

In order for the error log to record correct time stamps, you must set the RNI to match the time zone at your location. The time zone configuration file allows you to specify time zone information for your programming environment and to store that information in the Configuration Server.

NOTE: The default time zone is Greenwich Mean Time (GMT). The example configuration files will set the RNI to use Central Standard Time with daylight saving time enabled.

When you configure the time zone, you specify:

1. The name of the time zone you want to use.
2. A name indicating the daylight saving time area you want to use.
3. A block or blocks of information defining one or more of the 24 time zones. Each block includes:
   - A system zone name for the zone of your RNI system
   - A name for the standard time of the zone
   - A name for daylight saving time of the zone
   - A special block that can be used to define up to two special, non-standard time zones other than the 24 primary zones.
4. A block of daylight saving time information including:
   - An area name
   - The number of rules
   - A block or blocks of rules specifying things such as starting year, day, time, etc.

The following subsections explain these items and the file formats in detail.

Configuration File Entries for Time Zone Information

The main Configuration Server file, cnfgsvr.cfg, contains an entry for the time zone configuration, as shown in Figure 3.2.11. This entry specifies:

- Application identifier (DateAndTime)
- Node name
- Name of file that contains the time zone information

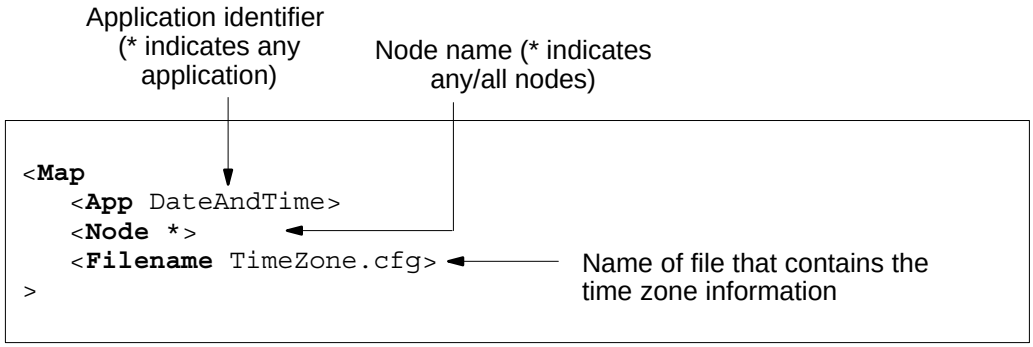


Figure 3.2.11. cnfgsvr.cfg Entries for Time Zone Information

Time Zone File Entries

The time zone file has six entries that specify the time zone for your RNI:

- File specification (do not edit)
- System zone type
- Daylight saving time area
- Zone information
- Daylight saving time information
- Daylight saving time rules

The following sections describe these entries. An example (Figure 3.2.18) follows the descriptions.

File Specification

The first line in the time zone configuration file is the file specification, which includes a file identifier and version number, in the format shown in Figure 3.2.12. **This entry must not be edited.**

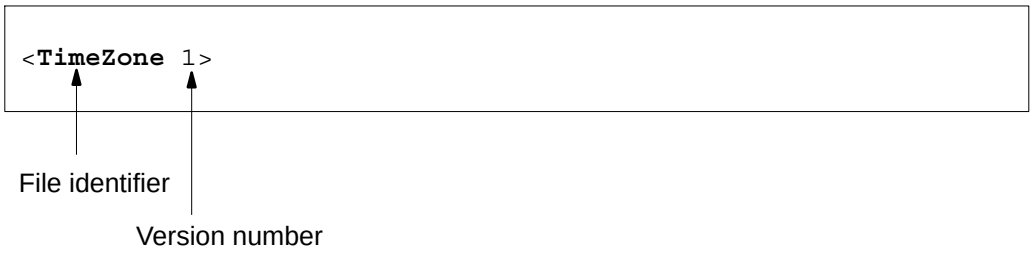


Figure 3.2.12. Time Zone File Specification

System Zone Type

The second item in the time zone configuration file is the name of the zone you want to use for the RNI. Figure 3.2.13 shows the format for this line.

The name of the zone you specify as “MyZone” must be one of those listed in Table 3.2.6. For reference, Table 3.2.7 supplies the GMT equivalents of U.S. standard time zones.

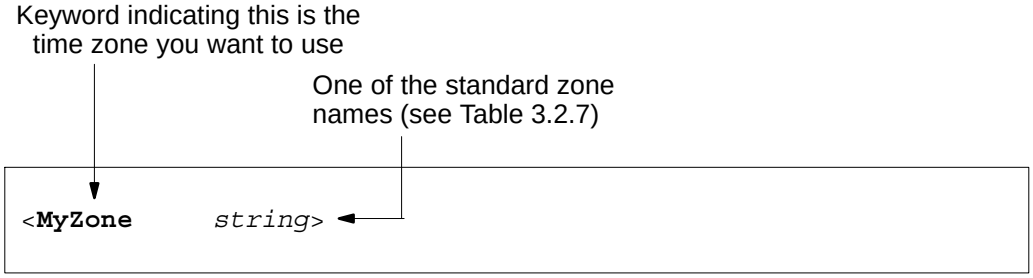


Figure 3.2.13. Zone Names

System Zone Type (continued)

Table 3.2.6. Valid Names for System Time Zones

GMT−11	GMT+1
GMT−10	GMT+2
GMT−9	GMT+3
GMT−8	GMT+4
GMT−7	GMT+5
GMT−6	GMT+6
GMT−5	GMT+7
GMT−4	GMT+8
GMT−3	GMT+9
GMT−2	GMT+10
GMT−1	GMT+11
GMT	GMT+12
GMT_SPECIAL_1	GMT_SPECIAL_2
	NONE

Table 3.2.7. GMT Equivalents of U.S. Standard Time Zones

U.S. Standard Time Zone	GMT
Eastern (EST)	GMT−5
Central (CST)	GMT−6
Mountain (MST)	GMT−7
Pacific (PST)	GMT−8

Daylight Saving Time Area Name

The third item in the time zone configuration file is the name of the daylight saving time area that you want to use.

You can use up to seven characters to specify the daylight saving time area name, but this name must match one listed in the DST information section later in the file. Typically, this might be the name of a geographical area, such as USA. (See RI: 3−2−25 for Daylight Saving Time information.)

NOTE: If daylight saving time is not observed in your area, you can specify “NONE”. If you do not specify a daylight saving time area name, the system will always operate on standard time.

Figure 3.2.14 shows the format for specifying the daylight saving time area.

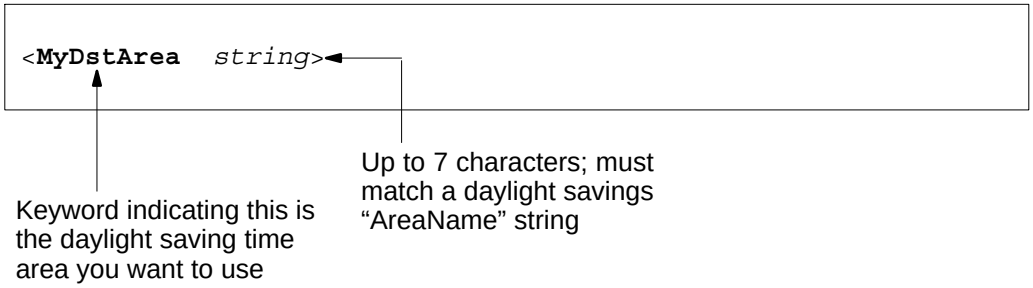


Figure 3.2.14. Daylight Saving Time Area Name

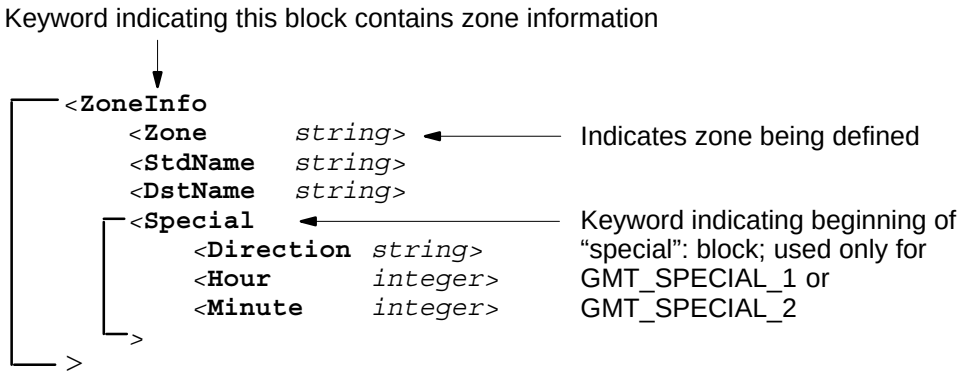
Zone Information

The zone information section lets you define names that are used with time stamps in error log messages. Figure 3.2.15 shows the format for this section. Table 3.2.8 lists details about the items in the ZoneInfo block.

If you do not specify strings for StdName and DstName, the system uses default labels with the time stamps in the error log messages.

NOTE: The Special block of information is required only to define the GMT_SPECIAL_1 and GMT_SPECIAL_2. These two zones allow you to configure a special, non-standard time zone by specifying a time MORE or LESS than Greenwich Mean Time (GMT). You must define the Zone block before you define the Special block.

Zone Information (continued)



Indicates zone being defined

Keyword indicating beginning of "special": block; used only for GMT_SPECIAL_1 or GMT_SPECIAL_2

Figure 3.2.15. Time Zone Information Section

Table 3.2.8. Time Zone Information Section

Keyword	Parameter	Valid Values
Zone	Zone you are defining	GMT−11, GMT−10, GMT−9, GMT−8, GMT−7, GMT−6, GMT−5, GMT−4, GMT−3, GMT−2, GMT−1, GMT, GMT+1, GMT+2, GMT+3, GMT+4, GMT+5, GMT+6, GMT+7, GMT+8, GMT+9, GMT+10, GMT+11, GMT+12, GMT_SPECIAL_1, GMT_SPECIAL_2, NONE
StdName	Name you want to appear for standard time stamps in the error log messages	0 to 7 alphanumeric characters Defaults= GMT−11, GMT−10, GMT−9, GMT−8, GMT−7, GMT−6, GMT−5, GMT−4, GMT−3, GMT−2, GMT−1, GMT, GMT+1, GMT+2, GMT+3, GMT+4, GMT+5, GMT+6, GMT+7, GMT+8, GMT+9, GMT+10, GMT+11, GMT+12, Special, Special
DstName	Name you want to appear for daylight saving time stamps in the error log messages	0 to 7 alphanumeric characters Defaults= GMT−11D, GMT−10D, GMT−9D, GMT−8D, GMT−7D, GMT−6D, GMT−5D, GMT−4D, GMT−3D, GMT−2D, GMT−1D, GMT, GMT+1D, GMT+2D, GMT+3D, GMT+4D, GMT+5D, GMT+6D, GMT+7D, GMT+8D, GMT+9D, GMT+10D, GMT+11D, GMT+12D, Special, Special
Special		
Direction	Indicates whether this time is more or less than GMT	MORE or LESS
Hour	Indicates number of hours more or less than GMT	0 to 23
Minute	Indicates number of minutes more or less than GMT	0 to 59

Daylight Saving Time Information

The daylight saving time information section allows you to define specific rules for when daylight saving time starts and stops in your area of the country. You can define up to 5 daylight saving areas, each with up to 10 rules.

Figure 3.2.16 shows the format of the first part of the daylight saving time information. Table 3.2.9 lists details about the parameters in this section. See RI: 3−2−26 for the format of the Rule section.

NOTE: If you configure more than one daylight saving time area, you should identify the most often used area last, because the last area is searched first at run time.

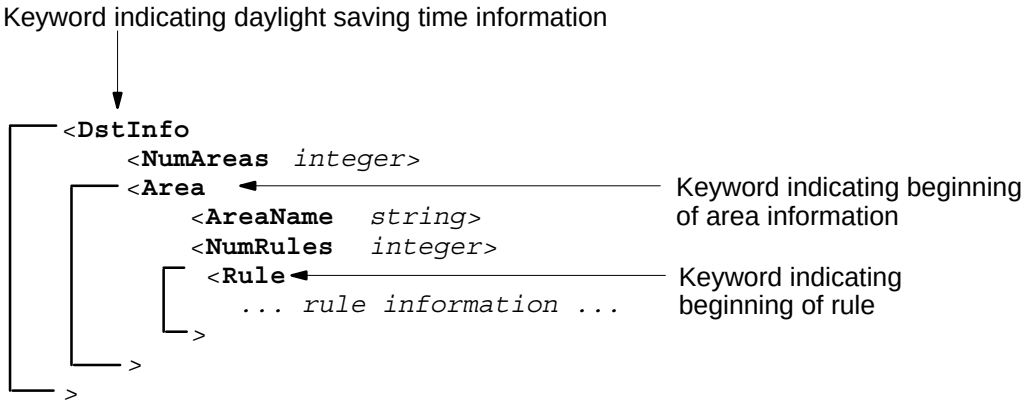


Figure 3.2.16. Daylight Saving Time Information

Table 3.2.9. Daylight Saving Time Information Section

Keyword	Parameter	Valid Values
NumArea	Indicates how many daylight saving areas you are defining in this file. **NOTE:** You must define this field before the “Area” blocks.	1 to 5
Area		
AreaName	Indicates name for this set of rules; can be a geographical area, such as USA. **NOTE:** One of these “AreaName” strings must match the string in “MyDstArea” (see *RI: 3−2−23*).	Up to 7 characters
NumRules	Indicates the number of rules in the configuration for this area. **NOTE:** You must define this field before the “Rule” block.	1 to 10

Daylight Saving Time Rules

For each daylight saving time area you define, you must include a Rule block of information that identifies the starting and ending points for daylight saving time. Figure 3.2.17 shows the format of this section, and Table 3.2.10 lists details about each parameter.

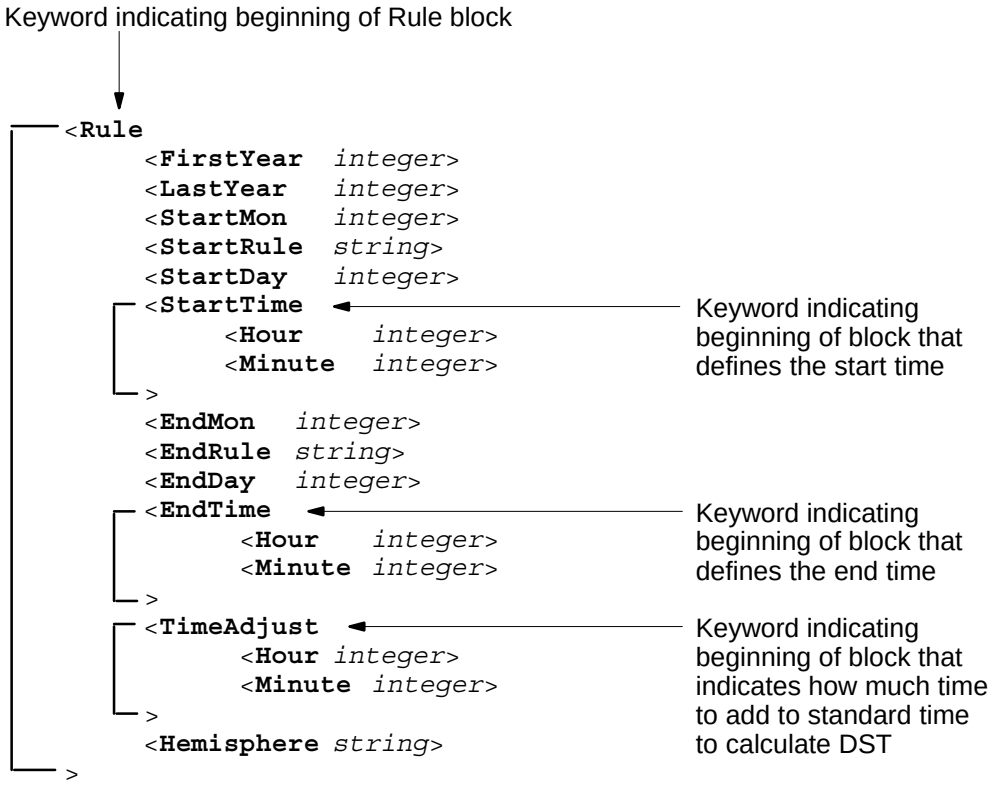


Figure 3.2.17. Daylight Saving Time Rules

Daylight Saving TIme Rules (continued)

Table 3.2.10. Daylight Saving Time Rules Section

Keyword	Parameter	Valid Values	
FirstYear	The first year that this rule applies	1 to 9999	
LastYear	The last year that this rule applies	1 to 9999	
StartMon	The month to start daylight saving time in the northern hemisphere or the month to start standard time in the southern hemisphere	1 (January) to 12 (December)	
StartRule	Values needed to construct the rule for starting daylight saving time	ABSOLUTEDAY	Specify a StartDay for day of month
		LASTSUN	Last Sunday of month
		LASTSUNBEFORE	Specify a StartDay for last Sunday on or before a specific day of the month
		FIRSTSUN	First Sunday of month
		FIRSTSUNAFTER	Specify a StartDay for first Sunday on or after a specific day of the month
		LASTSAT	Last Saturday of month
		LASTSATBEFORE	Specify a StartDay for last Saturday on or before a specific day of the month
		FIRSTSAT	First Saturday of month
		FIRSTSATAFTER	Specify a StartDay for first Saturday on or after a specific day of the month
StartDay	The day of the month to start daylight saving time in the northern hemisphere or the day to start standard time in the southern hemisphere	0 (when no day needed) to 31	
StartTime			
Hour	The hour to start daylight saving time in the northern hemisphere or the hour to start standard time in the southern hemisphere	0 to 23	
Minute	The minute to start daylight saving time in the northern hemisphere or the minute to start standard time in the southern hemisphere	0 to 59	

(continued on next page)

Table 3.2.10. Daylight Saving Time Rules Section (continued)

Keyword	Parameter	Valid Values	
EndMon	The month to end daylight saving time in the northern hemisphere or the month to end standard time in the southern hemisphere	1 (January) to 12 (December)	
EndRule	Values needed to construct the rule for ending daylight saving time	ABSOLUTEDAY	Specify an EndDay for day of month
		LASTSUN	Last Sunday of month
		LASTSUNBEFORE	Specify an EndDay for last Sunday on or before a specific day of the month
		FIRSTSUN	First Sunday of month
		FIRSTSUNAFTER	Specify an EndDay for first Sunday on or after a specific day of the month
		LASTSAT	Last Saturday of month
		LASTSATBEFORE	Specify an EndDay for last Saturday on or before a specific day of the month
		FIRSTSAT	First Saturday of month
		FIRSTSATAFTER	Specify an EndDay for first Saturday on or after a specific day of the month
EndDay	The day of the month to end daylight saving time in the northern hemisphere or the day to end standard time in the southern hemisphere	0 (when no day needed) to 31	
EndTime			
Hour	The hour to end daylight saving time in the northern hemisphere or the hour to end standard time in the southern hemisphere	0 to 23	
Minute	The minute to end daylight saving time in the northern hemisphere or the minute to end standard time in the southern hemisphere	0 to 59	
TimeAdjust			
Hour	Number of hours to add to standard time during daylight saving time	0 to 23	
Minute	Number of minutes to add to standard time during daylight saving time	0 to 59	
Hemisphere	Hemisphere designation, needed to construct the rule	NORTHERN or SOUTHERN; default is NORTHERN	

Time Zone Configuration Example

Figure 3.2.18 shows an example of a time zone configuration file.

```
<TimeZone   1>
<MyZone     GMT-6>
<MyDstArea  USA>
<ZoneInfo
   <Zone    GMT-8>
   <StdName PST>
   <DstName PDT>
>
<ZoneInfo
   <Zone    GMT-7>
   <StdName MST>
   <DstName MDT>
>
<ZoneInfo
   <Zone    GMT-6>
   <StdName CST>
   <DstName CDT>
>
<ZoneInfo
   <Zone    GMT-5>
   <StdName EST>
   <DstName EDT>
>
<ZoneInfo
   <Zone    GMT-4>
   <StdName AST>
   <DstName ADT>
>
<ZoneInfo
   <Zone    GMT_SPECIAL_1>
   <StdName STD1>
   <DstName DST1>
   <Special
      <Direction LESS>
      <Hour    6>
      <Minute    30>
   >
>
```

```
<ZoneInfo
    <Zone   GMT_SPECIAL_2>
    <StdName   STD2>
    <DstName   DST2>
    <Special
        < Direction   MORE>
        < Hour   6>
        < Minute 30>
    >
>
<DstInfo
   <NumAreas  1>
   <Area
      <AreaName  USA>
      <NumRules  5>
      <Rule
         <FirstYear   1967>
         <LastYear    1973>
         <StartMon    4>
         <StartRule   LASTSUN>
         <StartDay    0>
         <StartTime
            <Hour     2>
            <Minute   0>
         >
         <EndMon    10>
         <EndRule   LASTSUN>
         <EndDay    0>
         <EndTime
            <Hour   2>
            <Minute 0>
         >
         <TimeAdjust
            <Hour     1>
            <Minute   0>
         >
         <Hemisphere  NORTHERN>
      >
```

Figure 3.2.18. Zone Information Example

Time Zone Configuration Example (continued)

```
        <Rule
           <FirstYear   1974>
           <LastYear    1974>
           <StartMon    1>
           <StartRule   ABSOLUTEDAY>
           <StartDay    6>
           <StartTime
              <Hour     2>
              <Minute   0>
           >
           <EndMon    10>
           <EndRule   LASTSUN>
           <EndDay    0>
           <EndTime
              <Hour     2>
              <Minute   0>
           >
           <TimeAdjust
              <Hour     1>
              <Minute   0>
           >
          <Hemisphere   NORTHERN>
        >
        <Rule
           <FirstYear   1975>
           <LastYear    1975>
           <StartMon    2>
           <StartRule   ABSOLUTEDAY>
           <StartDay    23>
           <StartTime
              <Hour     2>
              <Minute   0>
           >
           <EndMon    10>
           <EndRule   LASTSUN>
           <EndDay    0>
           <EndTime
              <Hour     2>
              <Minute   0>
           >
           <TimeAdjust
              <Hour     1>
              <Minute   0>
           >
           <Hemisphere  NORTHERN>
        >
```

```
        <Rule
           <FirstYear   1976>
           <LastYear    1986>
           <StartMon    4>
           <StartRule   LASTSUN>
           <StartDay    0>
           <StartTime
              <Hour     2>
              <Minute   0>
           >
           <EndMon    10>
           <EndRule   LASTSUN>
           <EndDay    0>
           <EndTime
              <Hour     2>
              <Minute   0>
           >
           <TimeAdjust
              <Hour     1>
              <Minute   0>
           >
           <Hemisphere  NORTHERN>
        >
        <Rule
           <FirstYear   1987>
           <LastYear    9999>
           <StartMon    4>
           <StartRule   FIRSTSUNAFTER>
           <StartDay    1>
           <StartTime
              <Hour     2>
              <Minute   0>
           >
           <EndMon    10>
           <EndRule   LASTSUN>
           <EndDay    0>
           <EndTime
              <Hour     2>
              <Minute   0>
           >
           <TimeAdjust
              <Hour     1>
              <Minute   0>
           >
           <Hemisphere  NORTHERN>
        >
     >
  >
```

Figure 3.2.18. Zone Information Example (continued)

Message Monitor Configuration (MM.cfg)

The Message Monitor interfaces with the Configuration Server at boot-up to specify the following:

- Queue sizes: alarm, batch, data compression block (DCB), and message
- Maximum number of sessions
- Maximum number of retries
- Timeout period to wait for acknowledgments in synchronous transmissions
- Maximum number of DCB controller subscriptions
- Maximum number of DCB tag subscriptions
- Amount of memory allocated for converting messages into XDR format

Determining Queue Sizes

In the Message Monitor configuration file, you must specify queue sizes for the following:

- Alarms, events, and operator changes (alarm queue)
- Data compression blocks (DCB queue)
- Combined messages from the above queues (message queue)

The queue sizes determine the number of messages that can be queued up between the PeerWay and the application, as shown in Figure 3.2.19.

NOTE: The message queue for each session receives messages from the alarm, batch, and DCB processors, and therefore must be sized appropriately.

Determining Queue Sizes (continued)

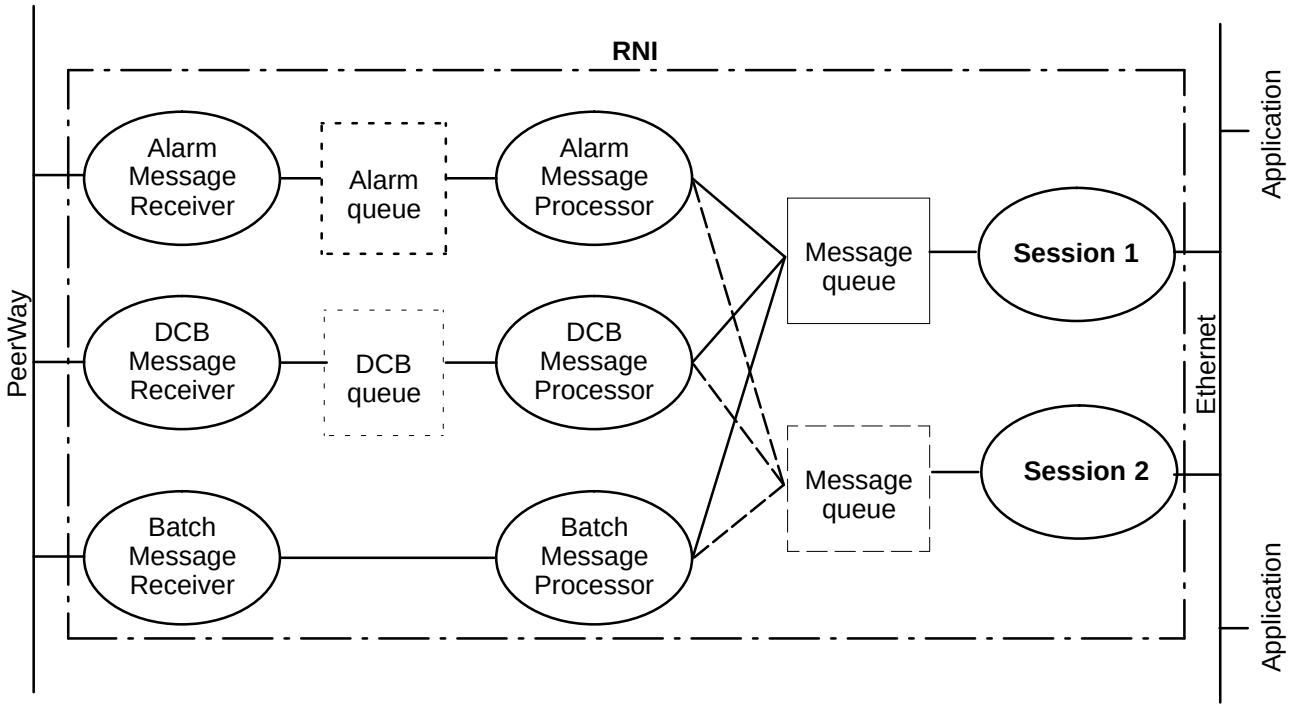


Figure 3.2.19. Determining Queue Sizes

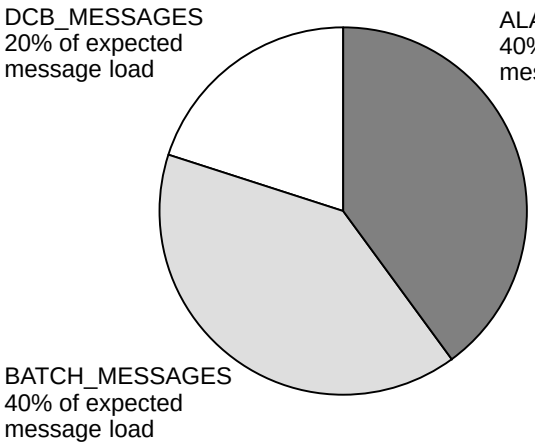
Determining Message Load

To optimize allocation of XDR buffer memory in the Message Monitor configuration file, you must specify message load sizes to match the expected message load from the RS3 for these types of messages:

- Alarms, events, and operator changes (ALARM_EVENT_MESSAGES)
- Data compression blocks (DCB_MESSAGES)
- ABC batch messages (BATCH_MESSAGES)

You configure the distribution of message types within the overall message load by giving each message type a weight. The weight of one message type versus the other forms a ratio that the Message Monitor uses in allocating memory. The three types of messages can be assigned any three numbers that maintain the desired ratio. For an example, see Figure 3.2.20.

Determining Message Load (continued)



The table below shows four ways to achieve the ratio shown in the chart at left.

Message Weights

DCB	ALARM_EVENT	BATCH
20	40	40
2	4	4
1	2	2
10	20	20

Figure 3.2.20. Example of Message Load Ratio

NOTES:

1. If you do not assign a weight to one of the message types in the configuration file, the weight is assumed to be zero.
2. If you assign no weights for any type, all XDR buffer memory is allocated to ALARM_EVENT_MESSAGES.

Configuration File Entries for the Message Monitor

The main Configuration Server file, cnfgsvr.cfg, contains an entry for the Message Monitor, as shown in Figure 3.2.21. This entry specifies:

- Application identifier (MsgMonitor)
- Node name
- Name of file that contains the Message Monitor configuration information.

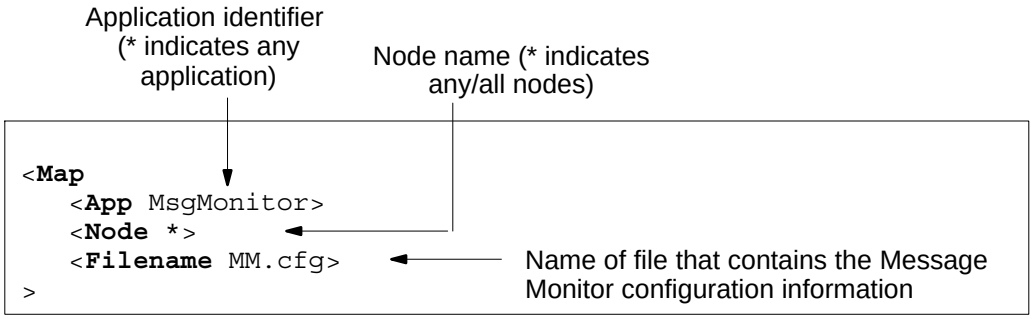


Figure 3.2.21. cnfgsvr.cfg Entries for Message Monitor

Message Monitor File Entries

Figure 3.2.22 shows the format of the Message Monitor configuration file. Table 3.2.11 lists details about the parameters.

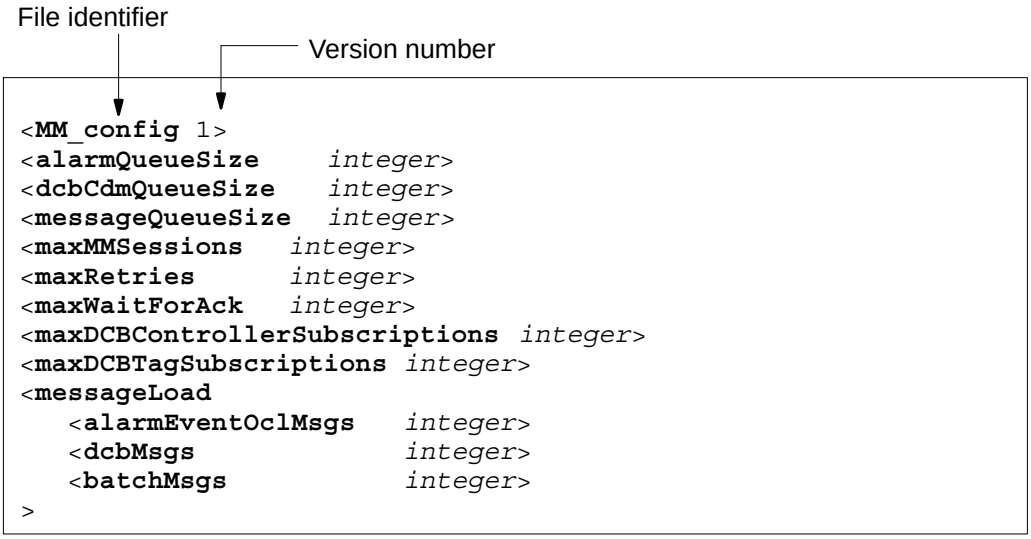


Figure 3.2.22. Message Monitor Configuration File

Table 3.2.11. Message Monitor Information

Keyword	Meaning	Valid Values (program default is in bold)	Example Configuration File
alarmQueueSize	Size of queue for alarm messages. **NOTE:** A queue size of 0 means the MM receives no alarm, event, or operator change log messages.	0 to 2000 Default = **100**	100
dcbCdmQueueSize	Size of queue for DCB messages. **NOTE:** A queue size of 0 means that the MM receives no DCB messages.	0 to 2000 Default = **10**	4
messageQueueSize	Total queues size for both alarm and DCB messages. **NOTE:** A queue size of 0 means that the host application receives no messages of any type, regardless of what the MM receives.	0 to 2000 Default = **200**	300
maxMMSessions	Maximum number of MM sessions that can run at any one time.	0 to 100 Default = **6**	5

Table 3.2.11. Message Monitor Information (continued)

Keyword	Meaning	Valid Values (program default is in bold)	Example Configuration File
maxRetries	Maximum number of times the MM resends a message for which it has not received an acknowledgment; this parameter only applies to synchronous sessions.	0 to 100 Default = **5**	3
maxWaitForAck	Amount of time the MM waits for an acknowledgment before resending the message; this parameter only applies to synchronous sessions.	0 to 100 sec Default = **5**	3
maxDCBControllerSubscriptions	Maximum number of DCB controllers a single MM session may subscribe to using DCBInterestsStruct controller-based subscriptions.	0 to 100,000 Default = **64**	64
maxDCBTagSubscriptions	Maximum number of DCB tags a single MM session may subscribe to using DCBInterestsStruct tag-based subscriptions.	0 to 100,000 Default = **200**	100
messageLoad			
alarmEventOclMsgs	Amount of memory to allocate for the XDR buffer for alarms, events, and OCL messages combined. This number is a weight that forms a ratio along with the weight you assign to the DCB and Batch messages. The ratio determines the memory allocation. **NOTE:** If either alarmEventOclMsgs, dcbMsgs, or batchMsgs is specified alone, it is assumed to be the total load.	Minimum = 0 Default = **0**	Not configured
dcbMsgs	Amount of memory to allocate for the XDR buffer for DCB messages. This number is a weight that forms a ratio along with the weight you assign to the ALARM_EVENT and Batch messages. The ratio determines the memory allocation. **NOTE:** If either alarmEventOclMsgs, dcbMsgs, or batchMsgs is specified alone, it is assumed to be the total load.	Minimum = 0 Default = **100**	Not configured
batchMsgs	Amount of memory to allocate for the XDR buffer for batch messages. This number is a weight that forms a ratio along with the weight you assign to the DCB and ALARM_EVENT and batch messages. The ratio determines the memory allocation. **NOTE:** If either alarmEventOclMsgs, dcbMsgs, or batch is specified alone, it is assumed to be the total load.	Minimum = 0 Default = **0**	Not configured

RS3 Configure Alarm Broadcast (CAB) Configuration

The RNI node must be configured on Configure Alarm Broadcast (CAB) screens for all RS3 nodes from which you want to receive alarm data.

The CAB screen is used to control alarm message traffic on the RS3 PeerWay. Each ControlFile, SRU, and console node on the PeerWay has a CAB screen. Only those nodes that are configured on the CAB will receive alarm messages generated by that node.

For more information on configuring the CAB screen, see CC: 6−1.

Dynamic Data Services Configuration (DDS.cfg)

The Dynamic Data Services require that you define the following parameters in a configuration file:

- Maximum number of sessions
- Database size, including maximum numbers for:
  - Subscriptions
  - Data points
  - Blocks (optional)
  - Controllers
- Update rates that specify how often data is gathered from the RS3. The UpdateRate consists of:
  - Seconds: The number of seconds in the update rate.
  - Milliseconds: The number of milliseconds in the update rate.
  - Advance requests: The number of simultaneous PeerWay requests per scan rate.

Configuration File Entries for Dynamic Data Services

The main Configuration Server file, cnfgsvr.cfg, contains an entry for the Dynamic Data Services, as shown in Figure 3.2.23. This entry specifies:

- Application identifier (DynamicDataService).
- Node name
- Name of file that contains the Dynamic Data Services configuration information.

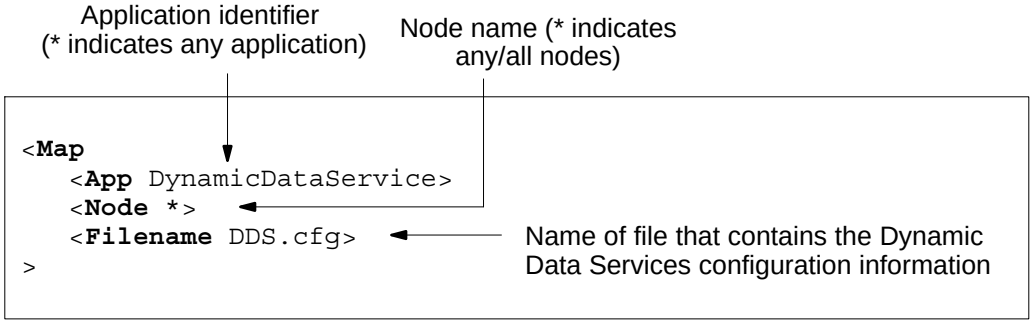


Figure 3.2.23. cnfgsvr.cfg Entries for Dynamic Data Services

Determining Update Rates

The configuration file for Dynamic Data Services contains definitions for the four update rates at which dynamic data can be gathered from the RS3:

- DDS_UR_RATE1
- DDS_UR_RATE2
- DDS_UR_RATE3
- DDS_UR_RATE4

If you want to use all four update rates, you must configure them so that the following relationship occurs:

DDS_UR_RATE1 < DDS_UR_RATE2 < DDS_UR_RATE3 < DDS_UR_RATE4

If this relationship does not exist, the system sets all update rates to 0 seconds, 0 milliseconds, and gathers no data from the RS3.

The minimum update rate is 0 seconds, 500 milliseconds and the maximum rate is 100,000 seconds, 0 milliseconds.

If you do not want to use all four update rates, you can configure one or more to 0 seconds, 0 milliseconds. This configuration indicates that the Dynamic Data Services does not use this update rate.

Dynamic Data Services File Entries

Figure 3.2.24 shows the format of the Dynamic Data Services configuration file. Table 3.2.12 lists details about the Dynamic Data Services parameters.

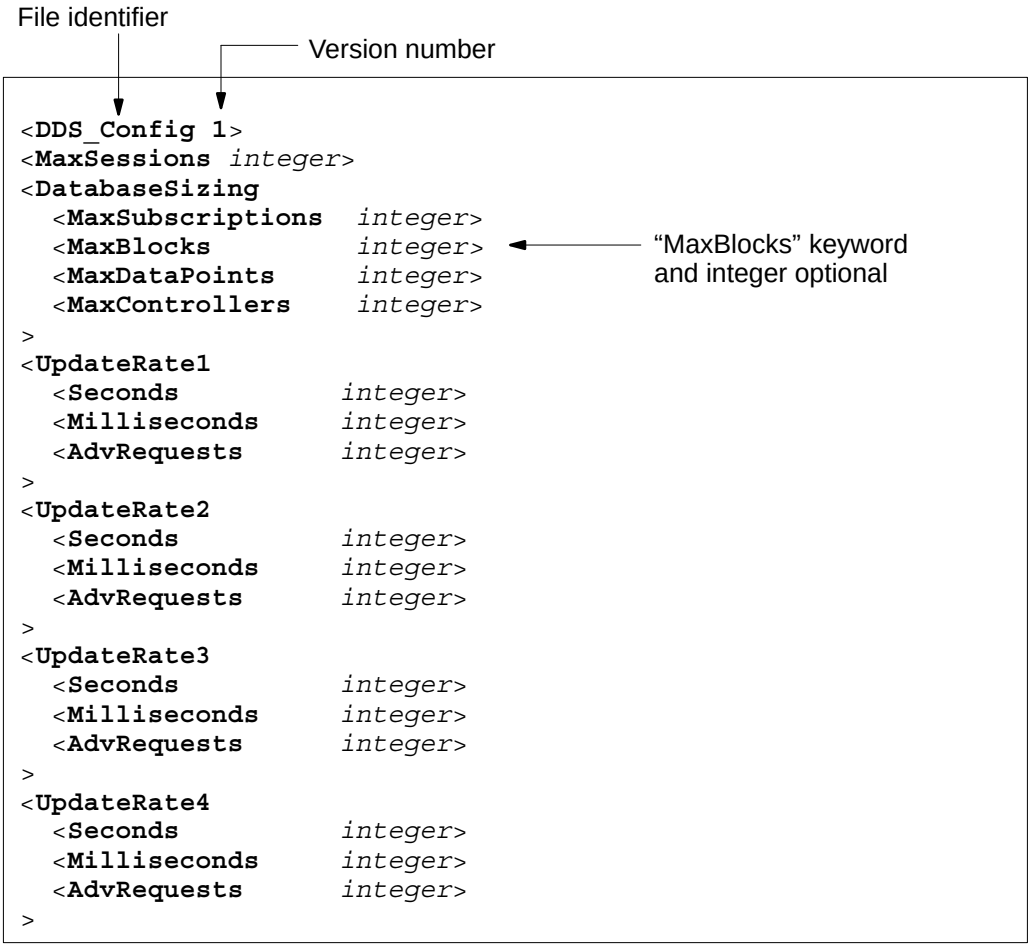


Figure 3.2.24. Dynamic Data Services Configuration File

Table 3.2.12. Dynamic Data Services Information

Keyword	Parameter indicates ...	Valid Values (program default is in bold)	Example Configuration
MaxSessions	Maximum number of Dynamic Data Services sessions that can run at any one time.	0 to 100 Default = **5**	5
DatabaseSizing			
MaxControllers	Maximum number of controllers you can subscribe to at any one time from all sessions combined; should be set to total number of controllers on your PeerWay.	Minimum = 1 Default = **30** Max = 8,000	30
MaxBlocks	Maximum number of RS3 blocks to which all DDS sessions can subscribe at any one time. Keyword and integer are optional.	Minimum = 1 Default = **MaxDataPoints/4** Max = 10,000	Not configured
MaxSubscriptions	Maximum number of Dynamic Data Services subscriptions that you can request at any one time from all sessions combined.	Minimum = 1 Default = **1000** Max = 20,000	1,000
MaxDataPoints	Maximum number of data points to which you can subscribe at any one time from all sessions combined.	Minimum = 1 Default = **1000** Max = 20,000	1,000
UpdateRate1 (must be less than UpdateRate 2)1			
Seconds	Number of seconds in the 0most frequent update rate (DDS_UR_RATE1).	**0** to 100000 Default = **0**	5
Milliseconds	Number of milliseconds in the most frequent update rate (DDS_UR_RATE1).	**0** to 999 if Seconds > 0 500 to 999 if Seconds = 0	0
AdvRequests	Number of advance requests per scan rate.	Minimum = 1 Default = **6** Maximum = 10	Not configured
UpdateRate2 (must be less than UpdateRate 3)			
Seconds	Number of seconds in the next-to-most frequent update rate (DDS_UR_RATE2).	**0** to 100000 Default = **0**	15
Milliseconds	Number of milliseconds in the next-to-most frequent update rate (DDS_UR_RATE2).	**0** to 999 if Seconds > 0 500 to 999 if Seconds = 0	0
AdvRequests	Number of advance requests per scan rate.	Minimum = 1 Default = **4** Maximum = 10	Not configured
UpdateRate3 (must be less than UpdateRate 4)			

NOTE: The lower the number of AdvRequests, the lower the PeerWay load and the higher the saturation level will be from Dynamic Data Services.

Table 3.2.12. Dynamic Data Services Information (continued)

Keyword	Parameter indicates ...	Valid Values (program default is in bold)	Example Configuration
Seconds	Number of seconds in the next-to-least frequent update rate (DDS_UR_RATE3).	**0** to 100000 Default = **0**	30
Milliseconds	Number of milliseconds in the next-to-least frequent update rate (DDS_UR_RATE3).	**0** to 999 if Seconds > 0 500 to 999 if Seconds = 0 Default = **0**	0
AdvRequests	Number of advance requests per scan rate.	Minimum = 1 Default = **2** Maximum = 10	Not configured
UpdateRate4			
Seconds	Number of seconds in the least frequent update rate (DDS_UR_RATE4).	**0** to 100000	60
Milliseconds	Number of milliseconds in the least frequent update rate (DDS_UR_RATE4).	**0** to 999 if Seconds > 0 500 to 999 if Seconds = 0	0
AdvRequests	Number of advance requests per scan rate.	Minimum = 1 Default = **1** Maximum = 10	Not configured

NOTE: The lower the number of AdvRequests, the lower the PeerWay load and the higher the saturation level will be from Dynamic Data Services.

Alarm Generation Configuration (alarmgen.cfg)

The Alarm Generation configuration file contains Alarm Broadcast configuration information for the RNI, along with the maximum number of alarm generation sessions allowed. The Alarm Broadcast configuration is also stored in the RNI's NVRAM.

The Alarm Generation configuration file is updated when you change the RNI's alarm broadcast configuration from an RS3 console. (You do this by calling up the Configure Alarm Broadcast: xx screen, where xx indicates the RNI's RS3 node number.) The updated configuration is saved with the primary and backup configuration servers.

Configuration File Entries for Alarm Generation

The main Configuration Server file, cnfgsvr.cfg, contains an entry for alarm generation information, as shown in Figure 3.2.25. This entry specifies the:

- Application identifier (AlarmGenServer)
- Node name
- Name of file that contains the alarm generation configuration information.

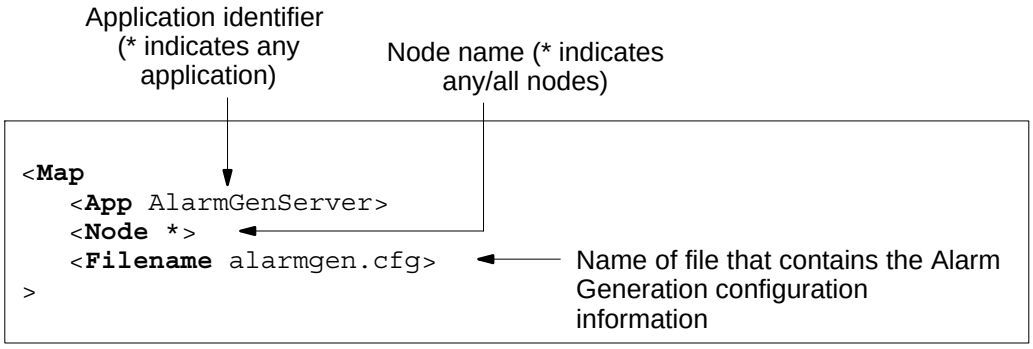


Figure 3.2.25. cnfgsvr.cfg Entries for Alarm Generation

Alarm Generation File Entries

Figure 3.2.26 shows the format of the Alarm Generation configuration file. Table 3.2.13 lists details about the Alarm Generation parameters.

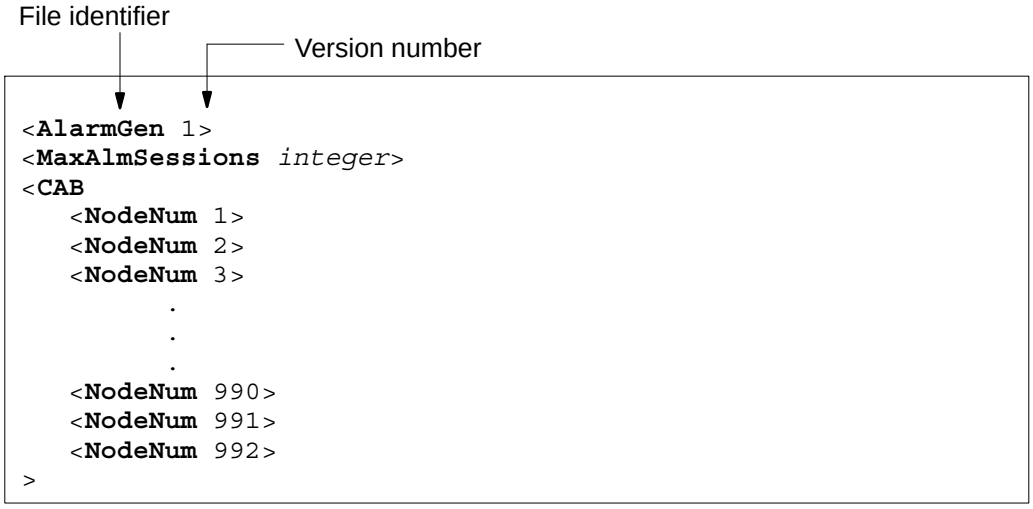


Figure 3.2.26. Alarm Generation Configuration File

Alarm Generation File Entries (continued)

Table 3.2.13. Alarm Generation Information

Keyword	Meaning	Valid Values (program default is in bold)	Example Configuration File
MaxAlmSessions	Maximum number of alarm generation sessions that can run at any one time.	0 to 100 Default = **2**	2
CAB (Configure Alarm Broadcast)			
NodeNum	A node to which the RNI should broadcast alarms. Generally, alarms are sent to consoles; however, Batch scripts and ControlFiles can also receive alarms. This keyword is repeated for each node to which the RNI must send alarms.	1 to 992	All nodes

FTP Session Configuration (ft.cfg)

The RNI File Transfer system uses File Transfer Protocol (FTP) to move files between the RS3 system and host applications by means of an RNI. The RNI File Transfer system consists of an FTP server, File Access interface, translators, and an RS3 file interface.

The RNI servers reference cnfgsvr.cfg to locate the Security Management file. This initiates a search of the Security Management configuration file to determine the user's system permission level. The RNI allows access only to users with the proper system permission.

Configuration File Entries for FTP

The main Configuration Server file, cnfgsvr.cfg, contains an entry for FTP information, as shown in Figure 3.2.25. This entry specifies the:

- Application identifier (File Transfer)
- Node name
- Name of file that contains the FTP configuration information.

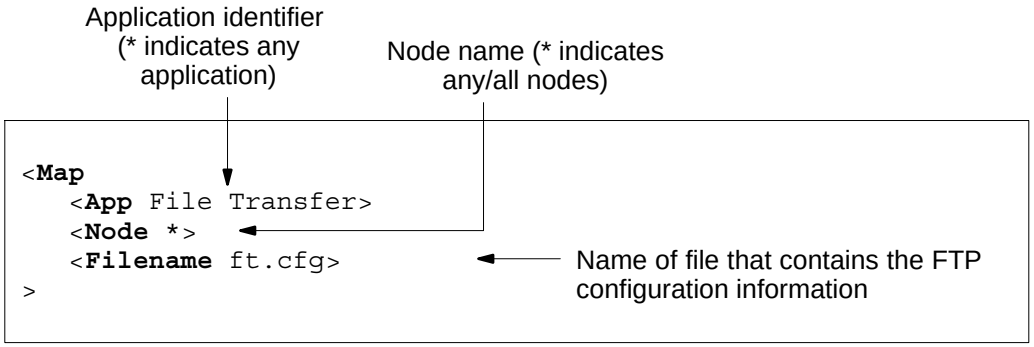


Figure 3.2.27. cnfgsvr.cfg Entries for FTP Session

FTP File Entries

Figure 3.2.28 shows the format of the FTP Session configuration file. Table 3.2.14 lists details about the FTP Session parameters.

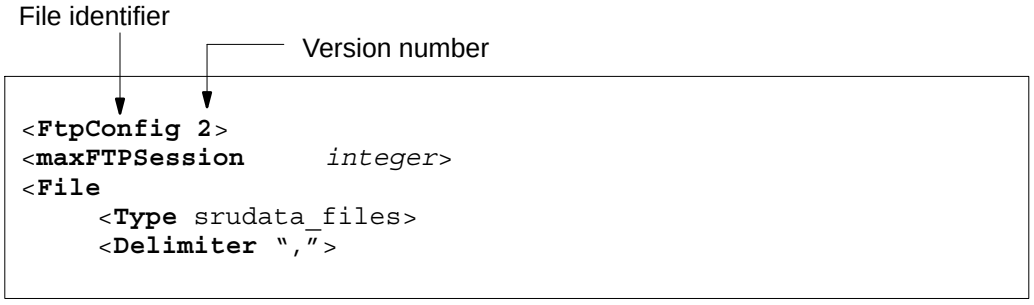


Figure 3.2.28. FTP Session Configuration File

FTP File Entries (continued)

Table 3.2.14. FTP Session Information

Keyword	Meaning	Valid Values (program default is in bold)	Example Configuration File
maxFTPSession	Maximum number of FTP sessions that can run at any one time.	1	1
File			
Type	Type of file to which this “File” option applies	srudata_files	
Delimiter	Character to be used to separate data fields in SRU Data files read from an MTCC or System Manager Station (SMS)	Printable character, space, or tab (must be enclosed in double quotes)	“,”

Static Block Cache Configuration (SB.cfg)

The static block cache is a storage area that RNI applications use to store RS3 static blocks requested by clients running on the RNI. The purpose of the static block cache is to reduce PeerWay traffic by storing the requested static blocks in a local cache.

Configuring the Cache Configuration File

The cache configuration file contains configuration parameters for the static block cache. You configure the cache size by assigning values to the cache parameters.

You create the cache configuration file as an ASCII or text (.txt) file. In order for the RNI to run the cache configuration file, you must configure the cache configuration file, the RNI node, and the application name for the cache in the configuration server file cnfgsvr.cfg. The RNI references the cnfgsvr.cfg file in order to locate the cache configuration file.

Cache configuration parameters are identified by keywords in an SGML (Standard Generalized Markup Language) format that conforms to ANSI standards.

Figure 3.2.29 shows the format of the cache configuration file and cnfgsvr.cfg file.

Configuring the Cache Configuration File (continued)

Configuration Server File

cnfgsvr.cfg

```
<  Map
   <  App       StaticBlock>
   <  Node      node_name>
   <  Filename  filename>
>
```

Cache Configuration File

SB.cfg

```
<   SB_config 1>
< full_block_cache_size      100>
< block_scale_cache_size     1250>
< point_scale_cache_size     5000>
<   base_update_time         2>
<   update_slope             5>
<    update_cutoff_age       50>
<descriptorFont
   <LegacyFont    European | Cyrillic>
   <P1Cyrillic    enable | disable>
 >
<engUnitFont
   <LegacyFont    European | Cyrillic>
   <P1Cyrillic    enable | disable>
 >
```

Figure 3.2.29. Configuring the Cache Configuration File

Configuration Parameters

Table 3.2.15 describes the configuration parameters available for the static block cache.

NOTE: If a keyword parameter and value are not included in the cache configuration file, the static block cache assigns the default value to the keyword parameter.

Table 3.2.15. Configuration Parameters for the Static Block Cache

Parameter	Keyword	Field Description (program default is in bold)	Example Configuration File
Configuration Type and Version	SB_config	Identifies the file type and version. The configuration file (cfg) version number for this release of the RNI is 1.	
Static Block Cache Size	full_block_cache_size	Specifies the maximum number of full blocks the cache can hold. The cache maintains a copy of all of the static data for these blocks. Block limits include: Minimum 1 Maximum 125 Default: **100**	100
	block_scale_cache_size	Specifies the maximum number of blocks for which the cache will maintain block level scaling information. The block level scaling information contains the block tag, block type, and block function type. Block limits include: Minimum 1 Maximum 6,000 Default: **1,250** **NOTE:** The number should be greater than the number of blocks you anticipate using in DDS.	1,250
	point_scale_cache_size	Specifies the maximum number of points for which the cache will maintain scaling information. Scaling information includes the engineering zero and engineering maximum values. Block limits include: Minimum 1 Maximum 10,000 Default: **4,000** **NOTE:** The number should be greater than the number of points you anticipate using in DDS.	4,000
Refresh Task	base_update_time	Specifies minimum time, in seconds, for static block refresh. Update time limits include: Minimum 1 Maximum 100 Default: **2**	2

(continued on next page)

Table 3.2.15. Configuration Parameters for the Static Block Cache (continued)

Parameter	Keyword	Field Description (program default is in bold)	Example Configuration File
Refresh Task (continued)	update_slope	Specifies rate at which the time between updates of a static block increases when the static block is not accessed. Update slope limits include: Minimum 1 Maximum 10 Default: **5**	5
	update_cutoff_age	Specifies minimum time in seconds that a block must not have been accessed before the Static Block Cache will stop updating the block. Update slope limits include: Minimum 1 Maximum 100 Default: **50**	50
descriptorFont	LegacyFont	Specifies which translation table to use for 7-bit character translations. European Character set includes English and European characters Cyrillic Character set is only Cyrillic characters Default: **European**	Not Configured
	P1Cyrillic	Specifies if the RNI supports translation of 8-bit strings. Default: **Disable**	Not Configured
engUnitFont	LegacyFont	Specifies which translation table to use for 7-bit character translations. European Character set includes English and European characters Cyrillic Character set is only Cyrillic characters Default: **European**	Not Configured
	P1Cyrillic	Specifies if the RNI supports translation of 8-bit strings. Default: **Disable**	Not Configured

Configuration Parameters (continued)

NOTE: It is recommended that you do not change default values for any of the parameters listed except the font settings. The font options provide a means to map the RS3-unique character codes used in the Cyrillic version of the MTCC to a standard character set. The mapping is configurable because there are several standard character sets for Cyrillic.

NOTE: For most customers, the English/European defaults of the descriptorFont and engUnitFont parameters will suffice; no changes to the configuration file are required.

For Russian customers using RS3 P1, P1Cyrillic should be enabled.

- If the entire configuration has been done on a system with P1, the LegacyFont can have either setting.
- If all or part of the configuration has been done on a system using V18, the LegacyFont must match the MTCC language settings for descriptors and Engineering Units.

For Russian customers using V18, P1Cyrillic should be disabled and the LegacyFont should match the MTCC configuration for displaying descriptors and Engineering Units.

Font_Map Configuration (fm.cfg)

The Font_Map configuration file contains language configuration information for the RNI. This file translates RS3 Cyrillic character sets to the appropriate character set.

Configuration File Entries for Font_Map

The main configuration server file, cnfgsvr.cfg, contains an entry for font_map configuration, as shown in Figure 3.2.30. This entry specifies the:

- Application identifier (StaticBlock)
- Node name
- Name of file that contains the font_map configuration information.

Configuration File Entries for Font_Map (continued)

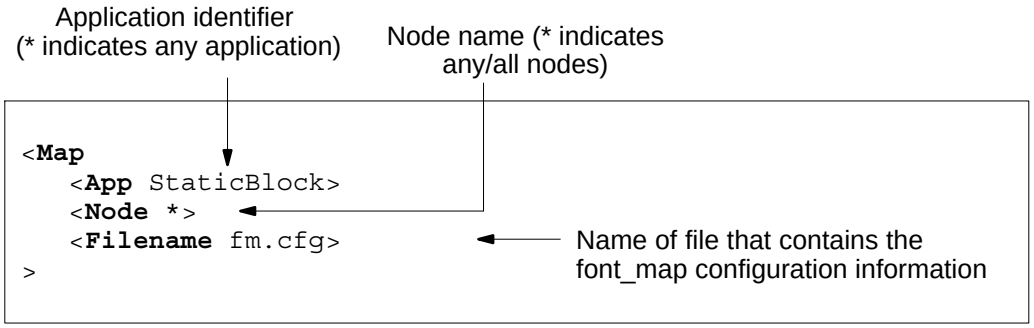


Figure 3.2.30. cnfgsvr.cfg Entries for Font_Map

NOTE: If you are upgrading, you must manually add the entries for the font_map configuration to the cnfgsvr.cfg file. (See RI: 3-2-45.)

File Identification

The Font_Map configuration file begins with file identification information. The file identification section appears as follows:

```
< Font_Map 1 >
```

7-bit Font_Map

The 7-bit font_map section contains 128 hexadecimal numbers. It contains only 128 values because the RS3 7-bit character set resides in the lower 128 bytes of the character set. The numbers entered depend on the character set being converted to. As shown in the following example, hexadecimal numbers must be delimited by commas and must be all must be on one line:

```
< 7bitFontMap 0,1,2,...127 >
```

8-bit Font_Map

The 8-bit font_map section contains 128 hexadecimal numbers. It contains only 128 values because the RS3 8-bit Cyrillic character set resides in the upper 128 bytes of the character set. The numbers entered depend on the character set being converted to. As shown in the following example, hexadecimal numbers must be delimited by commas and must all must be on one line:

```
< 8bitFontMap 0,1,2,...127 >
```

Font_Map Configuration File Example

Both of the example font_maps below translate RS3 7-bit Cyrillic and RS3 8-bit English/Cyrillic to the ISO-8859-5 character set, respectively.

```
   < Font_Map 1 >

   < 7bitFontMap
0x00,0xB0,0xB1,0xb2,0xb3,0xb4,0xb5,0xb6,0xb7,0xb8,0xb9,0xba,0xbb
,0xbc,0xbd,0xbe,0xbf,0xc0,0xc1,0xc2,0xc3,0xc4,0xc5,0xc6,0xc7,0xc
8,0xc9,0xca,0xcb,0xcc,0xcd,0xce,0xcf,0xd0,0xd1,0xd2,0xd3,0xd4,0x
d5,0xd6,0xd7,0xd8,0xd9,0xda,0xdb,0xdc,0xdd,0xde,0xdf,0x31,0x20,0
x21,0x22,0x23,0x24,0x25,0x26,0x27,0x28,0x29,0x2a,0x2b,0x2c,0x2d,
0x2e,0x2f,0x30,0x31,0x32,0x33,0x34,0x35,0x36,0x37,0x38,0x39,0x3a
,0x3b,0x3c,0x3d,0x3e,0x3f,0x40,0x53,0x2d,0x5f,0x56,0x57,0x58,0x5
9,0x5a,0x5b,0x5c,0x5d,0x5e,0x5f,0x60,0xe0,0xe1,0xe2,0xe3,0xe4,0x
e5,0xe6,0xe7,0xe8,0xe9,0xea,0xeb,0xec,0xed,0xee,0xef >

   < 8bitFontMap
0xB0,0xB1,0xb2,0xb3,0xb4,0xb5,0xb6,0xb7,0xb8,0xb9,0xba,0xbb,0xbc
,0xbd,0xbe,0xbf,0xc0,0xc1,0xc2,0xc3,0xc4,0xc5,0xc6,0xc7,0xc8,0xc
9,0xca,0xcb,0xcc,0xcd,0xce,0xcf,0xd0,0xd1,0xd2,0xd3,0xd4,0xd5,0x
d6,0xd7,0xd8,0xd9,0xda,0xdb,0xdc,0xdd,0xde,0xdf,0xb0,0xb1,0xb2,0
xb3,0xb4,0xb5,0xb6,0xb7,0xb8,0xb9,0xba,0xbb,0xbc,0xbd,0xbe,0xbf,
0xc0,0xc1,0xc2,0xc3,0xc4,0xc5,0xc6,0xc7,0xc8,0xc9,0xca,0xcb,0xcc
,0xcd,0xce,0xcf,0xd0,0xd1,0xd2,0xd3,0xd4,0xd5,0xd6,0xd7,0xd8,0xd
9,0xda,0xdb,0xdc,0xdd,0xde,0xdf,0xe0,0xe1,0xe2,0xe3,0xe4,0xe5,0x
e6,0xe7,0xe8,0xe9,0xea,0xeb,0xec,0xed,0xee,0xef,0xa1,0xf1,0xf2,0
xf3,0xf4,0xf5,0xf6,0xf7,0xf8,0xf9,0xfa,0xfb,0xfc,0xfd,0xfe,0xff
>
```

NOTE: The Font_Map configuration file shipped with the RNI supports translation to the MS Windows Cyrillic character set. If you need a different Cyrillic character set, contact your Fisher-Rosemount service support representative.

Translation Tables

There are six translation tables in the Static Block Library (SBL), divided into two groups: unpacking and packing. Table 3.2.16 shows the unpacking and packing translation tables.

Table 3.2.16. Translation Tables

Unpacking	Packing
7-bit European to ASCII (default)	ASCII to 7-bit European
7-bit Cyrillic to Font_Map character set	Font_Map to 7-bit Cyrillic **NOTE:** This table is automatically generated from the 7-bit Font_Map translation table.
8-bit to Font_Map character set	Font_Map to 8-bit **NOTE:** This table is automatically generated from the 8-bit Font_Map translation table.

NOTE: If no Font_Map file is provided and the descriptorFont or engUnitFont fields have either LegacyFont set to Cyrillic and/or P1Cyrillic enabled, the default translation tables will be provided. The default translation tables will be an *n* to *n* mapping, where *n* is some decimal value. No conversion will be done; a character that has a decimal value of 59 in an RS3 controller will be decimal value 59 in the strings delivered to the host application (for example, block descriptor from read/write service).

Block Change Notification Configuration (BCN.cfg)

The Block Change Notification configuration file contains the following configuration items.

- Maximum number of sessions
- The BCN Scan Rate
- The BCN Cycle Rate

Configuration File Entries for Block Change Notification

The main Configuration Server file, cnfgsvr.cfg, contains and entry for the Block Change Notification Services, as shown in Figure 3.2.31. This entry specifies:

- Application Identifier (BCN).
- Node name
- Name of the file that contains the Block Change Notification configuration information.

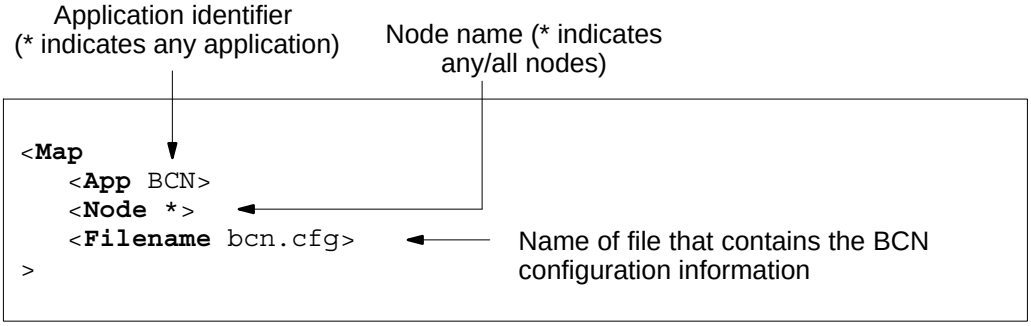


Figure 3.2.31. cnfgsvr.cfg Entries Block Change Notification

Block Change Notification File Entries

Figure 3.2.32 shows the format of the Block Change Notification configuration file. Table Table 3.2.17 lists the details about the Block Change Notification parameters.

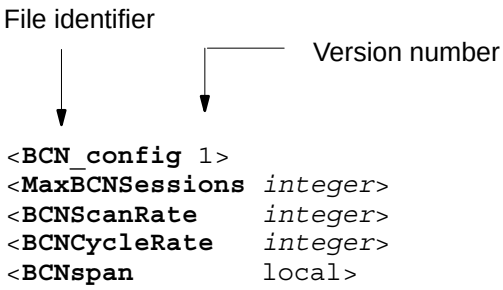


Figure 3.2.32. Block Change Notification Configuration File

Table 3.2.17. Configuration Parameters for Block Change Notification

Keyword	Meaning	Valid Values (program default is in bold)	Example Configuration File
maxBCNsessions	The maximum number of simultaneous session (0 sessions will deactivate the BCN API service).	0 to 10 Default = **0**	5
BCNScanRate	Inter−control file delay time in seconds, to throttle the Peerway scan rate. This value determines the minimum time between scanning consecutive Control Files.*	0 to 59 Default = **5**	5
BCNCycleRate	Cycle time to set a minimum time to start a new scan of the entire Peerway (primarily for small systems). This value determines the minimum time from the start of one BCN scan cycle until the start of the next scan cycle..*	0 to 1000 Default = **60**	60
BCNSpan	The range of the Peerway scan can be configured to be just the local Peerway or the entire plant.	local or all Default = **all**	local

NOTE: These times are defined as minimum times. There is no guarantee the scanning process will run in less than the time specified, nor will there be any notices posted (alarms or errors) if the actual scan time exceeds the tuning parameters.

Section 3:
BOOTPD

The RNI program image is loaded into the RNI by the BOOTPD program, on host computers that support the RNI boot operation.

bootptab is the configuration file for BOOTPD.

Installing bootptab

For specific information on creating and editing the required configuration files, see RI:2.

NOTE: If a bootptab file already exists on your host computer, you do not need a second bootptab file for the RNI. Simply add the configuration parameters shown in Table 3.3.1 to the existing file.

Configuring bootptab

Configure parameters in the bootptab file in the order listed in Table 3.3.1.

Table 3.3.1. bootptab File Parameters

Parameter	Entry	Description
tc	`tc=rni.defaults`	Template for common defaults
gw	`gw=`*`site_specific`*	IP address of the default gateway for the network.
vm	`vm=rfc1048`	Vendor magic cookie selector. Always rfc1048.
sm	`sm=`*`255.255.255.0`*	Subnet mask (network site dependent).
T15	`T15=`*`site_specific`*	Internet address of the primary configuration server. Specify the value as a hexadecimal number; for example, T15=0x0a001401 refers to a host computer with an IP address of 10.0.20.1.
T16	`T16=`*`site_specific`*	Internet address of the secondary configuration server. Specify the value as a hexadecimal number.
T17	`T17=`*`site_specific`*	Configuration server port number. Specify the value as a hexadecimal number. This value must be the same system wide. If the default value is correct, do not specify anything.
bf	`bf=rni_os.bin`	RNI bootfile name. The filename is normally that shown in the “Entry” column.
hd	`hd=`*`site_specific`*	Directory that contains the bootfile (system dependent). The directory must comply with tftp requirements.
ht	`ht=ether`	Hardware type to boot from.
ha	`ha=`*`site_specific`*	Hardware address of the RNI. BOOTPD uses this number to match an information request with the appropriate RNI node. Look for this address on a label on the front of the RNI itself. This is the RNI MAC address
ip	`ip=`*`site_specific`*	IP address of the RNI.

Starting Up BOOTPD

See RI:2 for specific information.

Chapter 4:
Monitoring the RNI

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Section 1:
Introduction

Two RS3 screens are used to monitor RNI activity:

- The Configure RNI screen allows you to change some RNI parameters and to view status information for the main RNI processor.
- The RNI Status screen shows status information for both the main RNI processor and the communication processor.

This chapter describes these two screens and how to use them.

Section 2:
Configure RNI Screen

The Configure RNI screen allows you to change some RNI parameters and to view status information for the main RNI processor.

Accessing the Configure RNI Screen

The Configure RNI screen contains both configuration and status information.

❑ **To access the Configure RNI screen:**

- On the command line, type **CRN** and press [ENTER].

or

- Type a node number and press [ENTER].

NOTE: If you do not type a node number when you call up the screen, the number of the first RNI node on the PeerWay appears; if you do type a node number, the screen for that node appears. If no RNI nodes exist or if you enter a node that is not an RNI, you receive an error message.

❑ **To access other RNI nodes:**

- Use the [PAGE FWD] and [PAGE BKWD] keys.

Monitoring the RNI

The Configure RNI screen (Figure 4.2.1) at the RS3 operator console provides status information about the RNI services, and a means for you to verify that your configuration is working.

NOTE: The RNI Configuration screen has several interactive fields under CONFIGURATION INFORMATION that accept user input. However, you probably will not need to change values in most of these fields, with the possible exception of the Configure RNI Node (see Figure 4.2.2) and Send Message Prs (see Figure 4.2.3) fields.

```
                              CONFIGURE RNI                  04-Mar-05  14:43:52

Node >930 (2 on Pway 30)   IP Addr 10.10.10.10      Booted  04-Mar-05  10:24:51
Program Version R5.0-x       PWDD Version    Vx.x-x       Boot Version 1.60
------------------------- CONFIGURATION INFORMATION -------------------------
Primary Config Server  10.10.10.11      Secondary Config Server

Configure RNI Node #  =>0    Distance Penalty  =>25   Transfer Rate  =>1600000

Time Correction =>.00 Sec/day      Pass Time =>yes    =>Send Msg Prs
------------------------------ STATUS INFORMATION ----------------------------
Idle Time    0          Bytes Free Reg0    0           Alm Gen     0
Tasks        0          Max Seg Size Reg0  0           Static Req  0
Threads      0          Bytes Free Reg1    0           Dyn Req     0
Errs Logged  2          Max Seg Size Reg1  0           Unit Msgs   0
Local   .    .    70    Host     2    0    0           Server 0    0    0
        Tot Ses Ses Used +---------------- Message Monitor ---------------------+
AlmGen  8       2        |                     MsgCnt Msgs Lost  %QFull  QSize |
RWBlock 4       1        |Tot Ses   4      Alm 0      0          0.0     1000  |
                         |Ses Used  1      Bat 0      0          0.0     0     |
                         |MsgQ Size 1999   DCB 0      0          0.0     100   |
                         |MsgQ Full 0.0    DSS 0      0                        |
--------- DDS ---------- +-------------------------------------------------------+
         Total      In Use
Contrs   1000       1               TimeIntvl  UnitMsgs   Saturation Pts/Msg
Blocks   2750       1            R1 1.000      0          0.0        0
Data Pts 10000      1            R2 2.000      0          0.0        0
Subscrip 10000      1            R3 30.000     1          0.17       1
Sessions 8          2            R4 .000       0          0.0        0
```

Figure 4.2.1. Configure RNI Screen

The RNI Status screen, described in RI:4, is also displayed at the RS3 operator console, and provides status information about communication between the two RNI processors (communication and main).

For more information about the Configure RNI and RNI Status screens, see RI:4, “Monitoring the RNI.”

RNI Address and Release Information

The first two information lines of the Configure RNI screen indicate PeerWay addressing and software release information, as shown in Figure 4.2.2. Table 4.2.1 gives details about the fields.

```
Screen Print :                CONFIGURE RNI                  04-Mar-05  14:43:52

Node >930 (2 on Pway 30)   IP Addr 10.10.10.10     Booted  04-Mar-05  10:24:51
Program Version R5.0-X      PWDD Version    Vx.x-x       Boot Version 1.60
------------------------- CONFIGURATION INFORMATION -------------------------
Primary Config Server  10.10.10.11     Secondary Config Server

Configure RNI Node #  =>0    Distance Penalty  =>25   Transfer Rate  =>1600000

Time Correction =>.00 Sec/day      Pass Time =>yes    =>Send Msg Prs
------------------------------ STATUS INFORMATION ----------------------------
Idle Time    0          Bytes Free Reg0    0           Alm Gen     0
Tasks        0          Max Seg Size Reg0  0           Static Req  0
Threads      0          Bytes Free Reg1    0           Dyn Req     0
Errs Logged  2          Max Seg Size Reg1  0           Unit Msgs   0
Local   0    0     0    Host     2    0    0           Server 0    0    0
        Tot Ses Ses Used +---------------- Message Monitor --------------------+
AlmGen  8       2        |                     MsgCnt Msgs Lost  %QFull  QSize |
RWBlock 4       1        |Tot Ses   4      Alm 0      0          0.0     1000  |
                         |Ses Used  1      Bat 0      0          0.0     0     |
                         |MsgQ Size 1999   DCB 0      0          0.0     100   |
                         |MsgQ Full 0.0    DSS 0      0                        |
--------- DDS ---------- +-------------------------------------------------------+
         Total      In Use
Contrs   1000      1               TimeIntvl  UnitMsgs   Saturation Pts/Msg
Blocks   2750       1             R1 1.000      0          0.0        0
Data Pts 10000      1             R2 2.000      0          0.0        0
Subscrip 10000      1             R3 30.000     1          0.17       1
Sessions 8          2             R4 .000       0          0.0        0
```

Figure 4.2.2. Configure RNI Screen

Table 4.2.1. RNI Status Information

Field	Description
Node	Number of the RNI node on the PeerWay
IP Address	Internet Protocol (IP) address of the main processor on the Ethernet side of the RNI
Booted	Date and time of last boot
Program Version	Version number of the RNI software
PWDD Version	Version number of the Peerway Device Driver
Boot Version	Version number of the EPROM

Configuration Information

The second section on the Configure RNI screen (lines 5 through 10, shown in Figure 4.2.3) allows you to send message pairs to the RNI and to change the default configuration, if desired. Table 4.2.2 describes the fields in this section of the screen and lists defaults and valid entries.

❑ **To change configuration information on the Configure RNI screen:**

- Type **CRN** on the command line and press [ENTER] to call up the screen.

❑ **To change the default RNI address:**

- Enter the appropriate value in the “Configure RNI Node #” field. The node number will change when the RNI is rebooted.

❑ **To send message pairs from the console to the RNI:**

- Cursor to the “Send Msg Prs” field and press [ENTER].

  A status message appears on the screen when the operation is complete.

```
Screen Print :                CONFIGURE RNI                  04-Mar-05  14:43:52

Node >930 (2 on Pway 30)   IP Addr 10.10.10.10      Booted  04-Mar-05  10:24:51
Program Version R5.0-X       PWDD Version    Vx.x-x       Boot Version 1.60
------------------------- CONFIGURATION INFORMATION -------------------------
Primary Config Server  10.10.10.11      Secondary Config Server

Configure RNI Node #  =>0    Distance Penalty  =>25   Transfer Rate  =>1600000

Time Correction =>.00 Sec/day      Pass Time =>yes    =>Send Msg Prs
----------------------------- STATUS INFORMATION -----------------------------
Idle Time    0          Bytes Free Reg0    0           Alm Gen     0
Tasks        0          Max Seg Size Reg0  0           Static Req  0
Threads      0          Bytes Free Reg1    0           Dyn Req     0
Errs Logged  2          Max Seg Size Reg1  0           Unit Msgs   0
Local   0    0    0     Host     2    0    0           Server 0    0    0
        Tot Ses Ses Used +---------------- Message Monitor --------------------+
AlmGen  8       2        |                    MsgCnt Msgs Lost  %QFull  QSize |
RWBlock 4       1        |Tot Ses   4      Alm 0      0          0.0     1000  |
                         |Ses Used  1      Bat 0      0          0.0     0     |
                         |MsgQ Size 1999   DCB 0      0          0.0     100   |
                         |MsgQ Full 0.0    DSS 0      0                        |
--------- DDS ---------- +-------------------------------------------------------+
         Total      In Use
Contrs   1000      1               TimeIntvl  UnitMsgs   Saturation Pts/Msg
Blocks   2750       1             R1 1.000      0          0.0        0
Data Pts 10000      1             R2 2.000      0          0.0        0
Subscrip 10000      1             R3 30.000     1          0.17       1
Sessions 8          2             R4 .000       0          0.0        0
```

Figure 4.2.3. Configure RNI Screen

Configuration Information (continued)

Table 4.2.2. RNI Configuration Information

Field	Description	Valid Entries
Primary Config Server	Internet address of the primary configuration server.	–––
Secondary Config Server	Internet address of the secondary configuration server.	–––
Configure RNI Node #	The node number of the RNI. **NOTE:** This will NOT change the address of the RNI immediately. The node number will change the next time the RNI is rebooted.	1 to 992
Distance Penalty	Specifies an “imaginary” distance for PeerWay routing. If information can be sent through more than one path, the system uses the path with the lowest “imaginary” distance. **CAUTION:** Do not change this value.	**Default = 25**
Transfer Rate	The rate for transferring data between the main and communication processors. **CAUTION:** Do not change this value.	**Default = 1600000**
Time Correction	**NOTE:** This feature is not available. A time-correction factor that allows you to synchronize the RS3 time with an external clock. This factor applies only to the PeerWay console responsible for maintaining the system time.	–––
Pass Time	**NOTE:** This feature is not available. Specifies whether or not the RNI sends time synchronization messages to or from the communication processor to the main processor.	–––
Send Msg Prs	Sends the message pairs for the current console to the RNI. A status appears after you press [ENTER].	[ENTER]

Status Information

The third section on the Configure RNI screen (lines 11 through 15 in Figure 4.2.4) shows RNI status information, which is explained in Table 4.2.3.

NOTE: You can use the RNI Status API from a client to obtain RNI configuration information. For more information on the RNI Status API, see RP:7.

```
Screen Print :                CONFIGURE RNI                  04-May-05  14:43:52

Node >930 (2 on Pway 30)   IP Addr 10.10.10.10      Booted  04-May-05  10:24:51
Program Version R5.0-X       PWDD Version    Vx.x-x       Boot Version 1.60
-------------------------- CONFIGURATION INFORMATION --------------------------
Primary Config Server  IP Addr 10.10.10.11  Secondary Config Server

Configure RNI Node #  =>0    Distance Penalty  =>25   Transfer Rate  =>1600000

Time Correction =>.00 Sec/day      Pass Time =yes    =>Send Msg Prs
------------------------------ STATUS INFORMATION -----------------------------
Idle Time    0          Bytes Free Reg0    0           Alm Gen     0
Tasks        0          Max Seg Size Reg0  0           Static Req  0
Threads      0          Bytes Free Reg1    0           Dyn Req     0
Errs Logged  2          Max Seg Size Reg1  0           Unit Msgs   0
Local   0    0    0     Host     2    0    0           Server 0    0    0
        Tot Ses Ses Used +---------------- Message Monitor ---------------------+
AlmGen  8       2        |                     MsgCnt Msgs Lost  %QFull  QSize |
RWBlock 4       1        |Tot Ses   4      Alm 0      0          0.0     1000  |
                         |Ses Used  1      Bat 0      0          0.0     0     |
                         |MsgQ Size 1999   DCB 0      0          0.0     100   |
                         |MsgQ Full 0.0    DSS 0      0                        |
--------- DDS ---------- +-------------------------------------------------------+
         Total      In Use
Contrs   1000       1               TimeIntvl  UnitMsgs   Saturation Pts/Msg
Blocks   2750       1            R1 1.000      0          0.0        0
Data Pts 10000      1            R2 2.000      0          0.0        0
Subscrip 10000      1            R3 30.000     1          0.17       1
Sessions 8          2            R4 .000       0          0.0        0
```

Figure 4.2.4. Configure RNI Screen

Status Information (continued)

Table 4.2.3. RNI Status Information

Field	Description
Idle Time	Amount of idle time in the RNI. **(Not supported in this version).**
Tasks	Number of tasks running in the RNI. **(Not supported in this version).**
Threads	Number of threads, or light−weight tasks, running in the RNI. **(Not supported in this version).**
Errs Logged	Number of errors logged in the RNI since boot-up time.
Bytes Free Reg0	Number of bytes free in Region 0 of the RNI. **(Not supported in this version).**
Max Seg Size Reg0	Maximum contiguous size of RAM in Region 0. **(Not supported in this version).**
Bytes Free Reg1	Number of bytes free in Region 1 of the RNI. **(Not supported in this version).**
Max Seg Size Reg1	Maximum contiguous size of RAM in Region 1. **(Not supported in this version).**
Alm Gen	Number of alarms generated per second, averaged over the last several seconds.
Static Req	Number of static block requests generated per second, averaged over the last several seconds.
Dyn Req	Number of dynamic block requests generated per second, averaged over the last several seconds.
Unit Msgs	Number of unit messages generated per second, averaged over the last several seconds.

Local, Host, and Server Communications

Line 17 of the Configure RNI screen shows three sets of timing information for this node. Each timer is described in a separate figure:

- Local communication Figure 4.2.5
- Host communication Figure 4.2.6
- Server communication Figure 4.2.7

NOTE: For point-to-point communications, such as alarms, timers 2 and 3 do not exist and are not updated because they do not have a corresponding reply.

Local Communication Timers

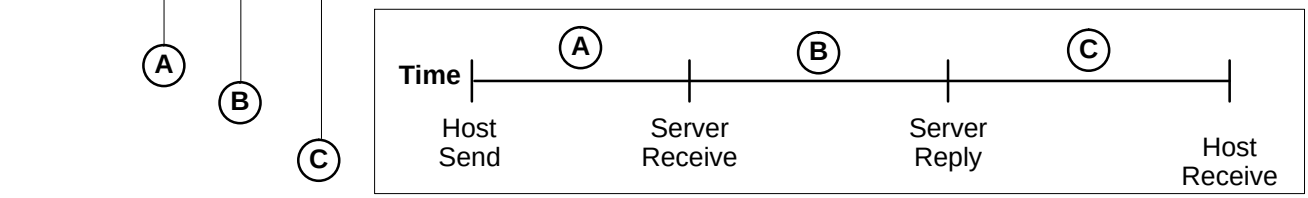
Local timers track messages between the host and server processes within the same node. Although these messages are never actually transmitted on the PeerWay, they are handled by the PeerWay device driver within this node.

```
Screen Print :                CONFIGURE RNI                  04-May-05  14:43:52

Node >930 (2 on Pway 30)   IP Addr 10.10.10.10      Booted  04-May-05  10:24:51
Program Version R5.0-X      PWDD Version    Vx.x-x       Boot Version 1.60
-------------------------- CONFIGURATION INFORMATION --------------------------
Primary Config Server  10.10.10.11      Secondary Config Server

Configure RNI Node #  =>0    Distance Penalty  =>25   Transfer Rate  =>1600000

Time Correction =>.00 Sec/day      Pass Time =>yes    =>Send Msg Prs
------------------------------ STATUS INFORMATION -----------------------------
Idle Time    0          Bytes Free Reg0    0           Alm Gen     0
Tasks        0          Max Seg Size Reg0  0           Static Req  0
Threads      0          Bytes Free Reg1    0           Dyn Req     0
Errs Logged  2          Max Seg Size Reg1  0           Unit Msgs   0
Local   0    0    0     Host     2    0    0           Server 0    0    0
```

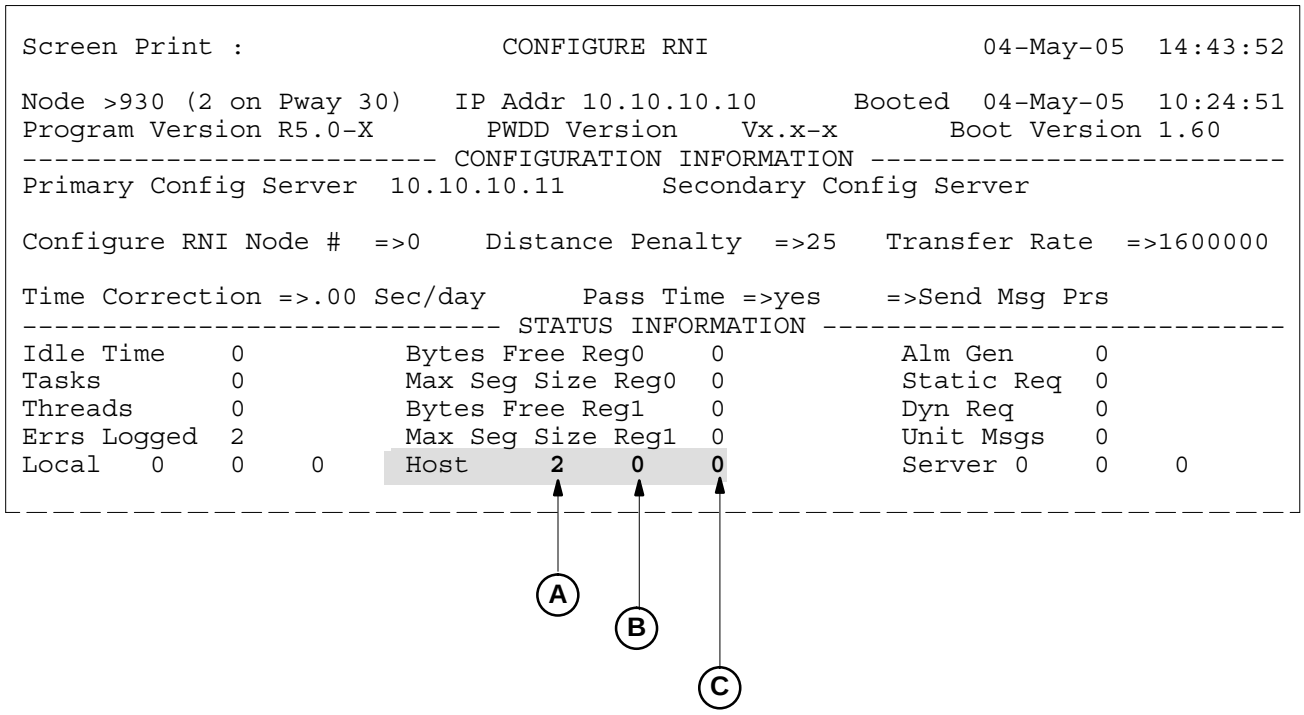


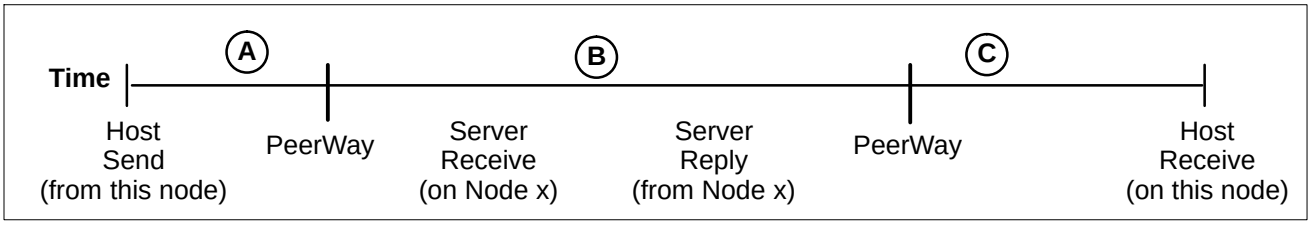
For timer …	**timing begins when** …	**and continues until** …
A	… the PeerWay device driver sees a message from the host process	… the server process receives the message.
B	… the server process receives message	… the server processes the message and generates a reply; and the PeerWay device driver puts that reply in the queue.
C	… the PeerWay device driver begins to transmit the server-process reply message	… the host process receives the reply.

Figure 4.2.5. Local Timers

Host Communication Timers

Host communication timers track messages initiated by the host process on this node and sent to another node.



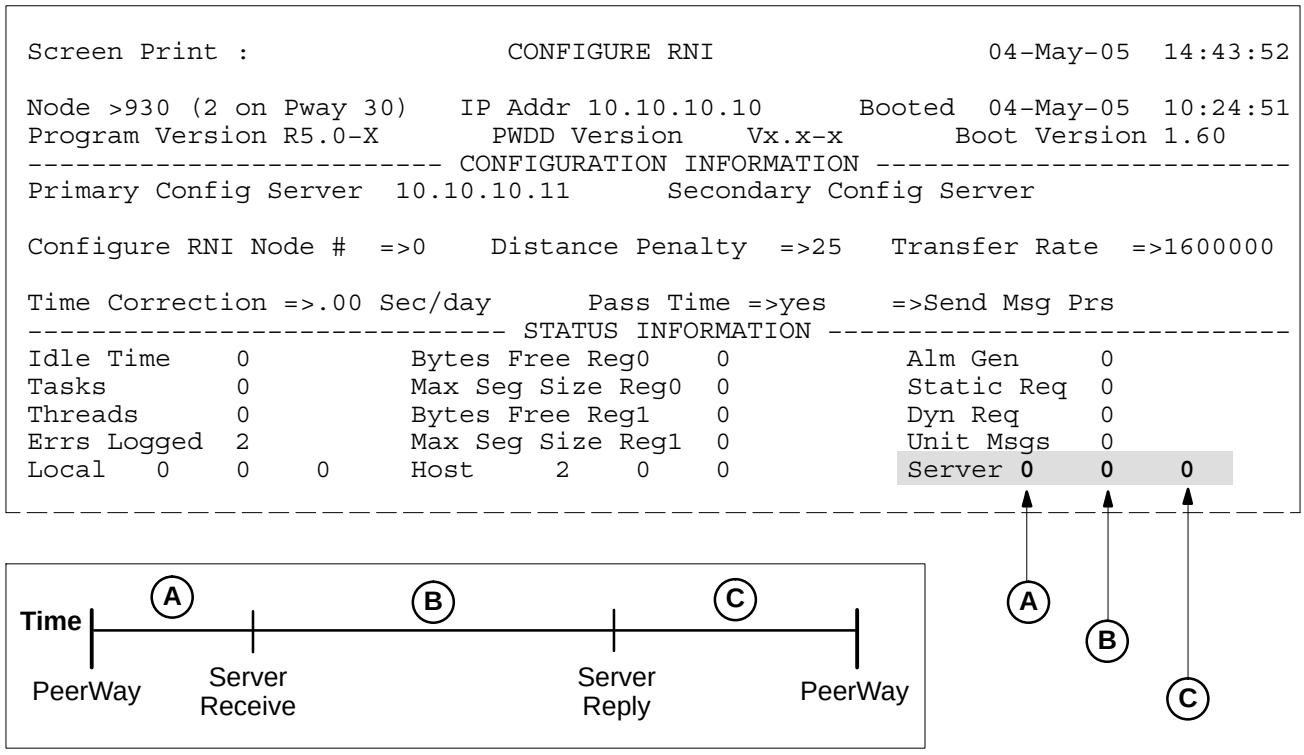


For timer …	**timing begins when** …	**and continues until** …
A	… the PeerWay device driver sees a message from the host process on this node	… the message begins transmission on the PeerWay.
B	… the message begins transmission on the PeerWay	… the server process on another node (Node x) receives the message, processes it, and sends a reply that reaches the PeerWay device driver on this node.
C	… the reply message reaches the PeerWay device driver on this node	… the host process on this node receives the reply.

Figure 4.2.6. Host Timers

Server Communication Timers

Server communication timers track messages that are received by this node from the host process on some other node.



For timer …	timing begins when …	and continues until …
A	… the PeerWay device driver on this node sees a message from a host process on another node	… the server process on this node receives the message.
B	… the server process on this node receives the message	… the server process on this node processes and generates a reply.
C	… the PeerWay device driver on this node gets the reply from the server process	… the message begins transmission on the PeerWay.

Figure 4.2.7. Server Timers

Message Monitor Information

The Message Monitor section of the Configure RNI screen contains both general session status and queue status.

Session Status Information

Message Monitor status information begins on line 18 of the Configure RNI screen. Figure 4.2.8 shows general status information for all messages. Table 4.2.4 describes these fields.

You define the total number of sessions and the session queue size in the configuration file.

```
Screen Print :                 CONFIGURE RNI                  04-May-05  14:43:52

Node >930 (2 on Pway 30)   IP Addr 10.10.10.10      Booted  04-May-05  10:24:51
Program Version R5.0-X       PWDD Version    Vx.x-x       Boot Version 1.60
------------------------- CONFIGURATION INFORMATION -------------------------
Primary Config Server  10.10.10.11      Secondary Config Server

Configure RNI Node #  =>0    Distance Penalty  =>25   Transfer Rate  =>1600000

Time Correction =>.00 Sec/day      Pass Time =>yes    =>Send Msg Prs
------------------------------ STATUS INFORMATION ------------------------------
Idle Time    0          Bytes Free Reg0    0           Alm Gen     0
Tasks        0          Max Seg Size Reg0  0           Static Req  0
Threads      0          Bytes Free Reg1    0           Dyn Req     0
Errs Logged  2          Max Seg Size Reg1  0           Unit Msgs   0
Local   0    0    0     Host     2    0    0           Server 0    0    0
        Tot Ses Ses Used +----------------- Message Monitor --------------------+
AlmGen  8       2        |                      MsgCnt Msgs Lost  %QFull  QSize |
RWBlock 4       1        |Tot Ses   4      Alm 0      0           0.0     1000   |
                         |Ses Used  1      Bat 0      0           0.0     0      |
                         |MsgQ Size 1999   DCB 0      0           0.0     100    |
                         |MsgQ Full 0.0    DSS 0      0                          |
--------- DDS ---------- +-----------------------------------------------------+
```

Figure 4.2.8. Message Monitor Status Information

Message Monitor Information (continued)

Table 4.2.4. Message Monitor Status Information

Field	Description
Tot Ses	Total number of message monitor sessions that can be run on this RNI.
Ses Used	Number of message monitor sessions currently in use.
MsgQ Size	Maximum number of messages that can be in a message queue. **NOTE:** Each session uses one message queue, and all message queues are the same size.
MsgQ Full	Average percent of available message space used by all message queues (alarm, DCB, and batch).

Message Queue Information

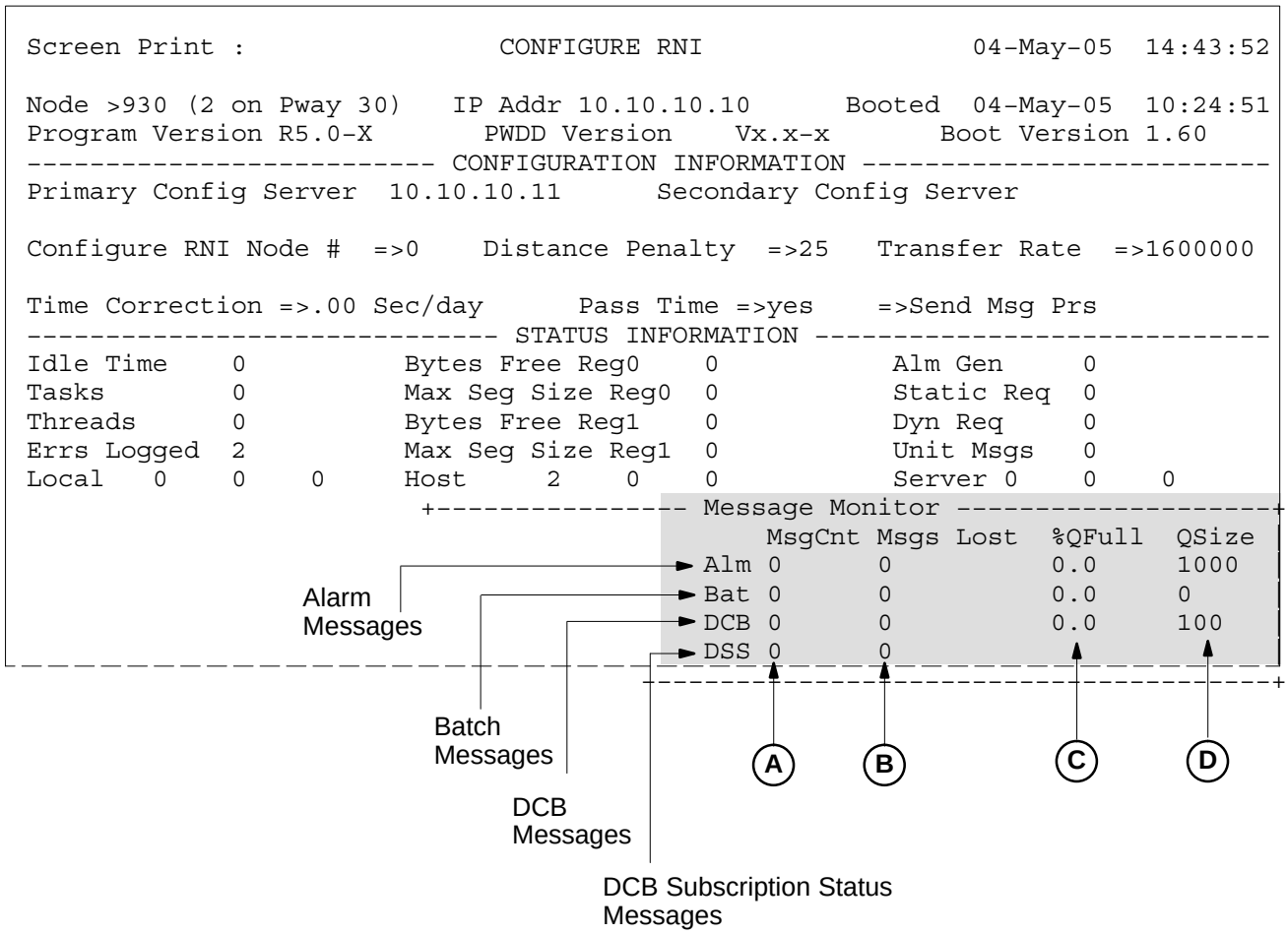
In the Message Monitor section of the Configure RNI screen, status information appears for the following message queues:

- Alarm
- Batch
- Data compression blocks (DCBs)
- DCB subscription status messages

This portion of the screen includes four columns of information for each type of queue, as shown in Figure 4.2.9.

NOTE: The counts for DCB messages and DCB messages lost reflect the actual number of DCB events. However, the number for DCB queue size reflects the number of packed messages in the queue. Because one packed message can contain more than one DCB event, the value shown on the screen does not indicate the total number of events in the queue.

Message Queue Information (continued)



Column	Name	Meaning	Description
A	MsgCnt	Message Count	Number of messages received since the RNI was started.
B	Msgs Lost	Messages Lost	Number of messages lost from each queue.
C	%QFull	% Queue Full(1)	Percentage full, for each queue.
D	QSize	Queue Size(2)	Maximum number of messages that can be in each queue.

(1) The queue size and percent full fields do not apply to DCB subscription status messages.

(2) The queue size for DCB messages is shown in terms of packed messages, not in terms of events.

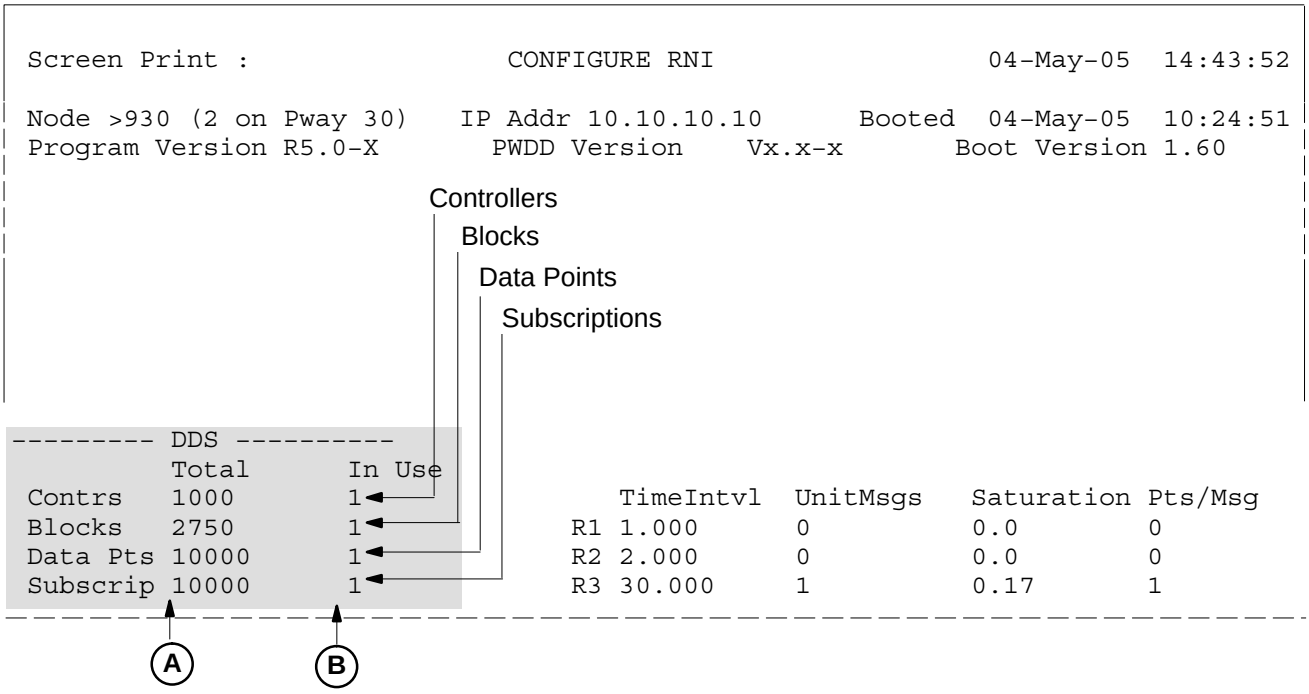
Figure 4.2.9. Message Queue Information

DDS-Related Information

The lower portion of the Configure RNI screen shows information related to Dynamic Data Services (DDS), as shown in Figure 4.2.10.

Information at the bottom left indicates the allowed (Total) and the In Use counts for:

- Controllers
- Blocks
- Data points
- Subscriptions
- Sessions



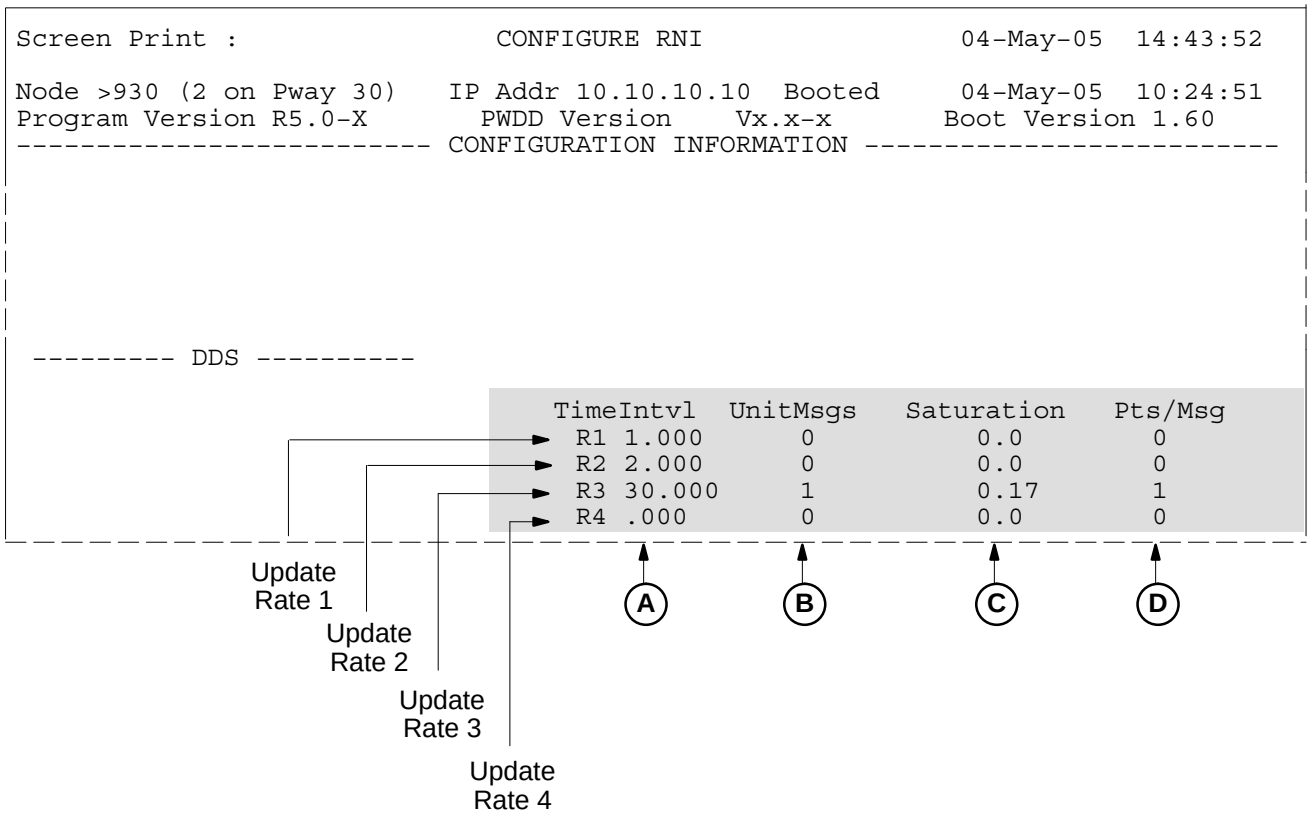
Column	Name	Description
A	Total	Total number allowed by Dynamic Data Services, of each data type.
B	In Use	Total number in use, of each data type.

Figure 4.2.10. DDS Information

DDS Update Rate Information

The lower right side of the Configure RNI screen shows status information for the four update rates you use to specify how fast the system should gather dynamic data, as shown in Figure 4.2.11.

You assign an update rate to each point when you subscribe to it in your application program. You specify the actual update rate in the configuration file. Update rate 1 is the fastest rate; update rate 4, the slowest.



Column	Name	Description
A	TimeIntvl	Update-time interval for each update rate.
B	UnitMsgs	Number of messages required to scan for RS3 data for each update rate.
C	Saturation	Percent of time required to scan for data requested at each update rate.
D	Pts/Msg	Average number of data points per message for each update rate.

NOTE: A high saturation value at the faster update rates affects the saturation level of the slower update rates.

Figure 4.2.11. DDS Update Rate Information

Section 3:
RNI Status Screen

The RNI Status screen provides status information for communication between the two RNI processors (communication and main).

Accessing the RNI Status Screen

❑ **To access the RNI Status screen:**

1. On the command line, type **CRN** and press [ENTER].

   or

   Type a node number and press [ENTER].
2. Press [EXCHANGE].

   The RNI Status screen appears, as shown in Figure 4.3.1

❑ **To view the processor information for other nodes:**

- Use the [PAGE FWD] and [PAGE BKWD] keys.

```
                              RNI STATUS

Node 190 (30 on Pway 6)
      Comm Processor                          Main Processor
TX       2 %    RX       8 %          TX       3 %    RX       7 %

NRoute   16     CRC      0            NRoute   25     CRC      0
                Abort    0                              Abort    0
RCount   88     Size     0            RCount   55     Size     0
XCount   55     BCount   0            XCount   86     BCount   0
ICount   137    Overrun  0            ICount   139    Overrun  0
Buffers  0      RgIns    0            Buffers  0      RgIns    0
RTic     16     RgRem    0            RTic     16     RgRem    0
RLink    16     RgAvail  0            RLink    16     RgAvail  0
RDist    0      RgBusy   0            RDist    1      RgBusy   0
RNode    0      TimeOut  0            RNode    1      TimeOut  0
RPoint   10     TicLost  0            RPoint   10     TicLost  0
RAck     41     LnkLost  0            RAck     42     LnkLost  0
RStat    40     RNack    0            RStat    7      RNack    0
                RBusy    0                              RBusy    0
MaxHop   0      REnq     0            MaxHop   0      REnq     0
DupRout  0      BadSeq   0            DupRout  0      BadSeq   0
NoPath   0      XBusy    0            NoPath   0      XBusy    0
ReQueue  0      XEnq     0            ReQueue  0      XEnq     0
```

Communication Processor Information

Main Processor Information

Figure 4.3.1. RNI Status Screen

RNI Status Screen Fields

The RNI Status screen contains four columns showing statistics for the processors:

- Columns 1 and 2: communications processor
- Columns 3 and 4: main processor

Figure 4.3.2 and Table 4.3.1 explain the fields in Columns 1 and 3.

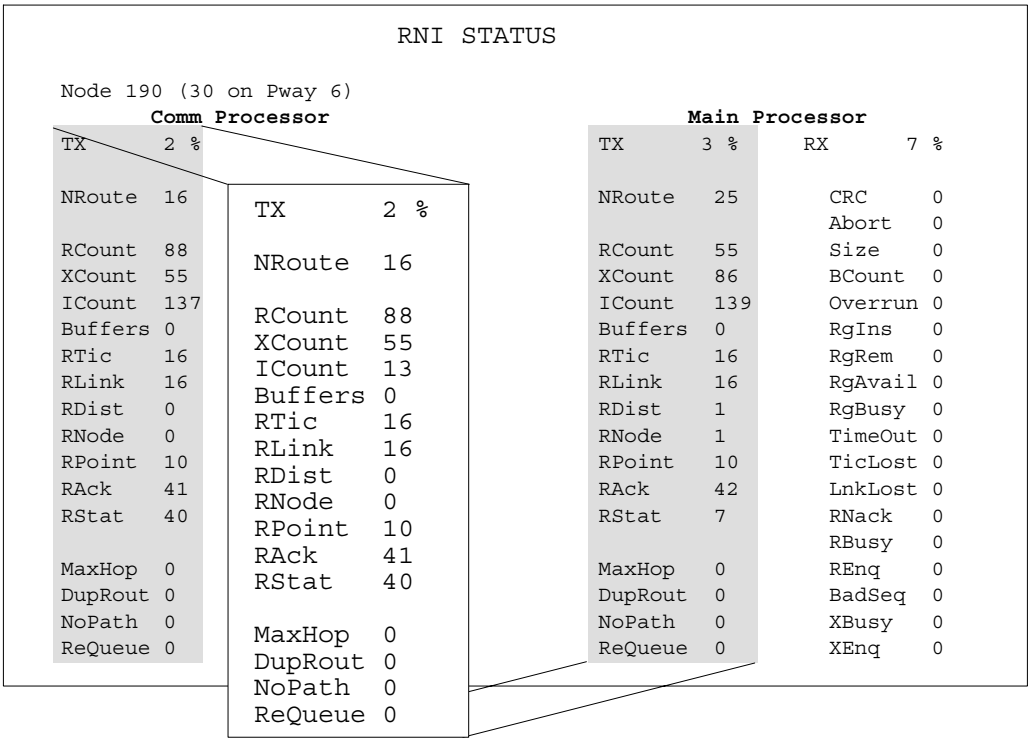


Figure 4.3.2. RNI Status Fields (Columns 1 and 3)

RNI Status Screen Fields (continued)

Table 4.3.1. RNI Status Fields (Columns 1 and 3)

Field	Indicates number of …
TX	… transmit bits per second divided by the data transfer rate for the interprocessor communications.
NRoute	… messages routed to the other processor.
RCount	… messages received from the other processor.
XCount	… messages transmitted to the other processor.
ICount	… background interrupts associated with communications between the two processors. **NOTE:** On the communications processor, this number also includes the number of background interrupts associated with PeerWay communications.
Buffers	… available PeerWay buffers.
RTic	… TIC messages received from the other processor.
RLink	… LINK messages received from the other processor.
RDist	… LINK−DISTANCE messages received from the other processor.
RNode	… LINK−NODE messages received from the other processor.
RPoint	… POINT messages received from the other processor.
RAck	… ACK messages received from the other processor.
RStat	… STATUS messages received from the other processor.
MaxHop	… messages received from the other processor that have exceeded the upper HOP count limit.
DupRout	… messages received from the other processor that are known and have been previously routed through this node.
NoPath	… messages received from the other processor that have no known path to the destination node.
ReQueue	… messages that have been re-queued for transmission on the PeerWay.

RNI Status Screen Fields (continued)

Figure 4.3.3 and Table 4.3.2 explain the fields in Columns 2 and 4.

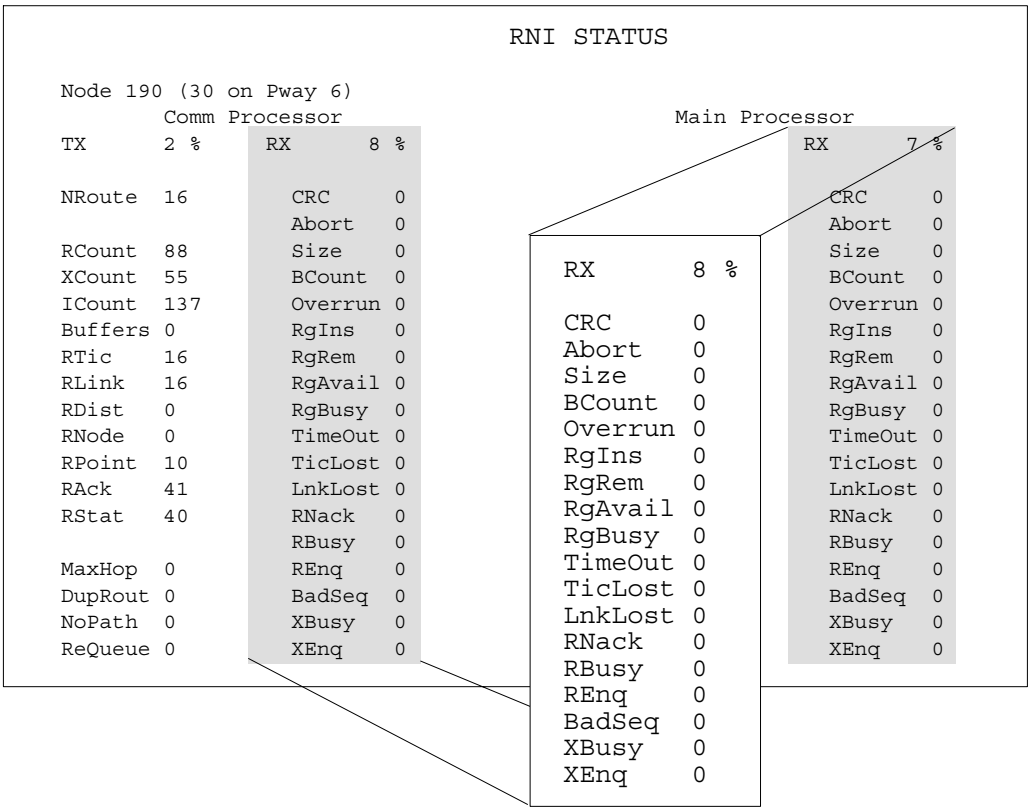


Figure 4.3.3. RNI Status Fields (Columns 2 and 4)

RNI Status Screen Fields (continued)

Table 4.3.2. RNI Status Fields (Columns 2 and 4)

Field	**Indicates number of** …
RX	… receive bits per second divided by the data transfer rate for the interprocessor communications.
CRC	… messages received from the other processor with a CRC error.
Abort	… failed attempts to remove an interprocessor message from shared RAM.
Size	… messages received from the other processor with a size error.
BCount	(Currently unused)
Overrun	… failed attempts to place an interprocessor message into shared RAM.
RgIns	… times this processor inserted a message into shared RAM.
RgRem	… times this processor removed a message from shared RAM.
RgAvail	… times this processor checked for a packet in shared RAM.
RgBusy	… times this processor found the ring busy.
TimeOut	… interprocessor messages that have timed out.
TicLost	… interprocessor TIC messages that have not been acknowledged.
LnkLost	… interprocessor LINK messages that have not been acknowledged.
RNack	… interprocessor messages that have not been acknowledged.
RBusy	… BUSY messages received from the other processor.
REnq	… ENQUIRY messages that have been received from the other processor.
BadSeq	… interprocessor messages with a bad sequence number.
XBusy	… interprocessor POINT messages for which the buffer allocation failed.
XEnq	… interprocessor ENQUIRY messages that have been scheduled for transmission.

Appendixes

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Appendix A:
Reloading Bootload Data

Certain error conditions may indicate that the RNI hardware is failing. These conditions include:

- Red LED light.
- RNI does not boot.
- RNI does not respond to “ping” command (or similar command on the operating system you are using).
- Console port output indicates some type of error condition.

Before replacing the RNI, however, you may want to verify the RNI bootload data. You can do that by performing the steps in this section for the appropriate board. Call Emerson Process Management support for assistance in interpreting diagnostics data.

Overview of Boot Events

When you boot the RNI, a number of messages travel between the RNI and host nodes. For installation, it is useful to know the sequence of events. Figure A.1 shows the sequence.

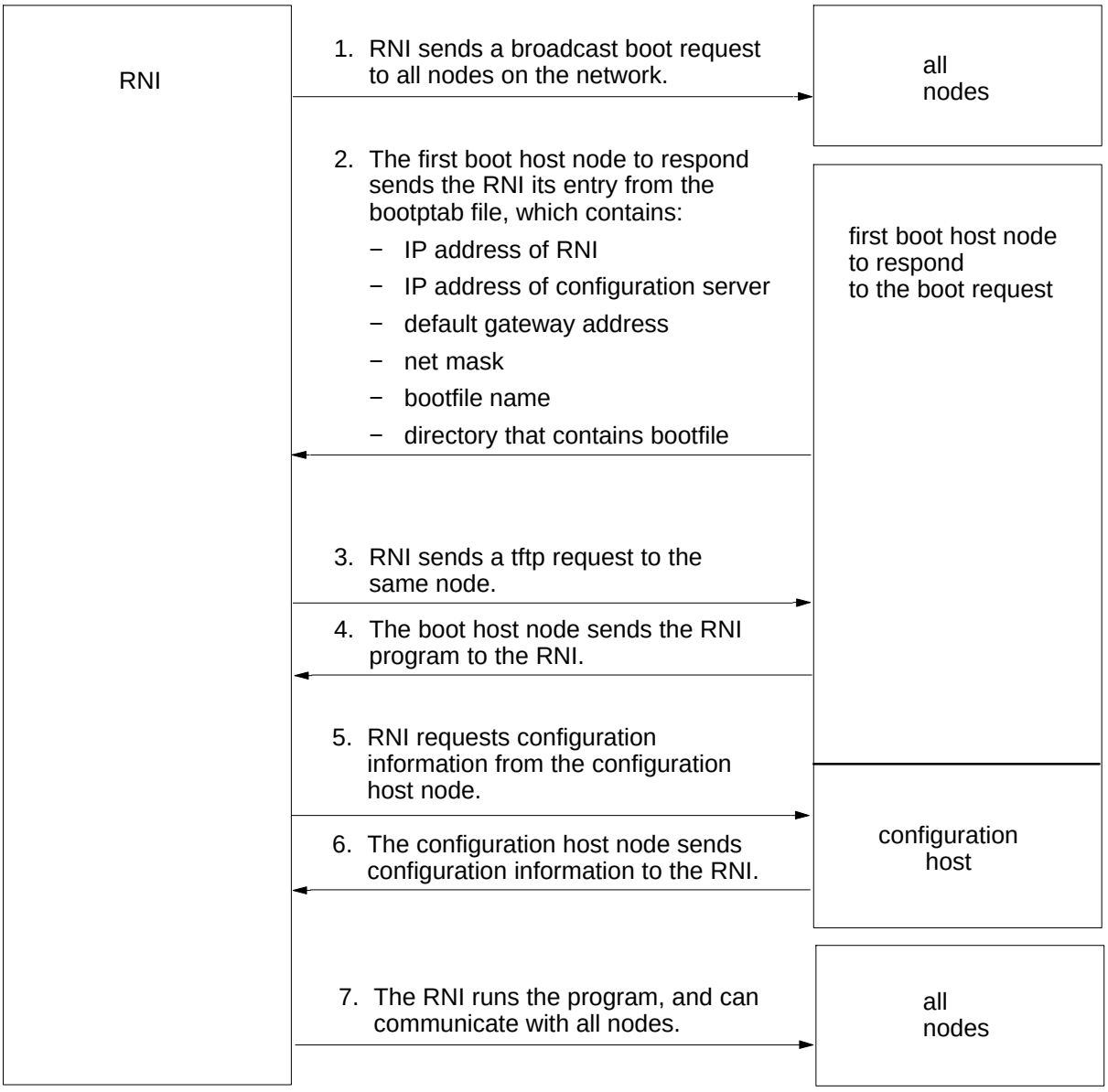


Figure A.1. Sequence of Events at Power Up

Reloading Bootload Data on the RNI Board

Boot load data is preset at the factory. The following procedures to load and verify RNI bootload data are provided for troubleshooting purposes.

Setting up the Serial Port

Following are the procedures for using the serial port. For more detailed information on RNI hardware, see the *RS3 Service Manual*.

1. Attach an ASCII terminal or a PC with terminal emulator software to the “Serial Port 1/Console” connector on the RNI faceplate, as shown in Figure A.2.
2. Set up the terminal using the following parameters:
   - 8 bits per character
   - 1 stop bit per character
   - no parity
   - 9600 baud
   - XON/XOFF handshaking enabled
3. Turn on the power to the RNI.

NOTE: See RI: 1−2−2 for information on possible loss of the RNI software image if you remove power or reset the RNI.

NOTE: The RNI must be connected to the Ethernet but not to the PeerWay while setting up the hardware.

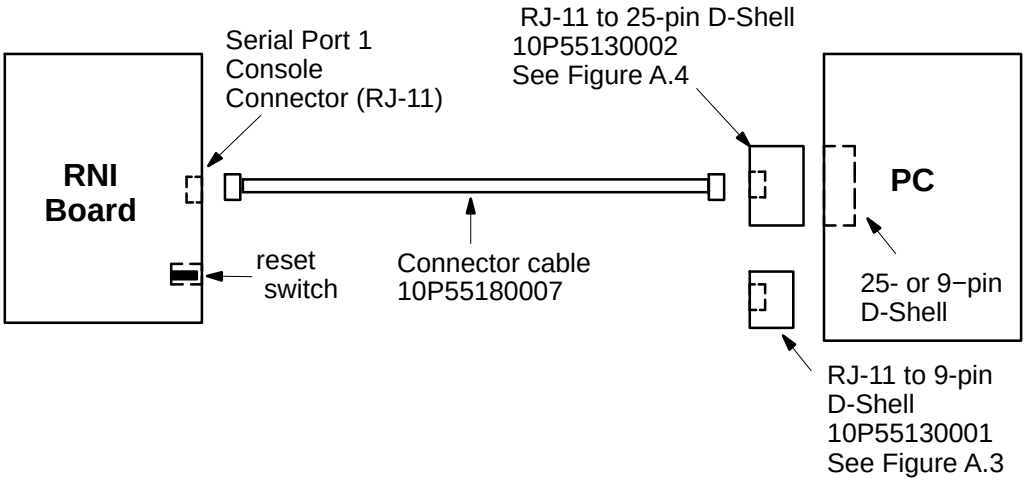


Figure A.2. RNI and PC Hardware Connectors

The RJ-11 to 9-pin D-Shell connector can be purchased from Emerson Process Management or be constructed using the information contained in Figure A.3 and Table A.1.

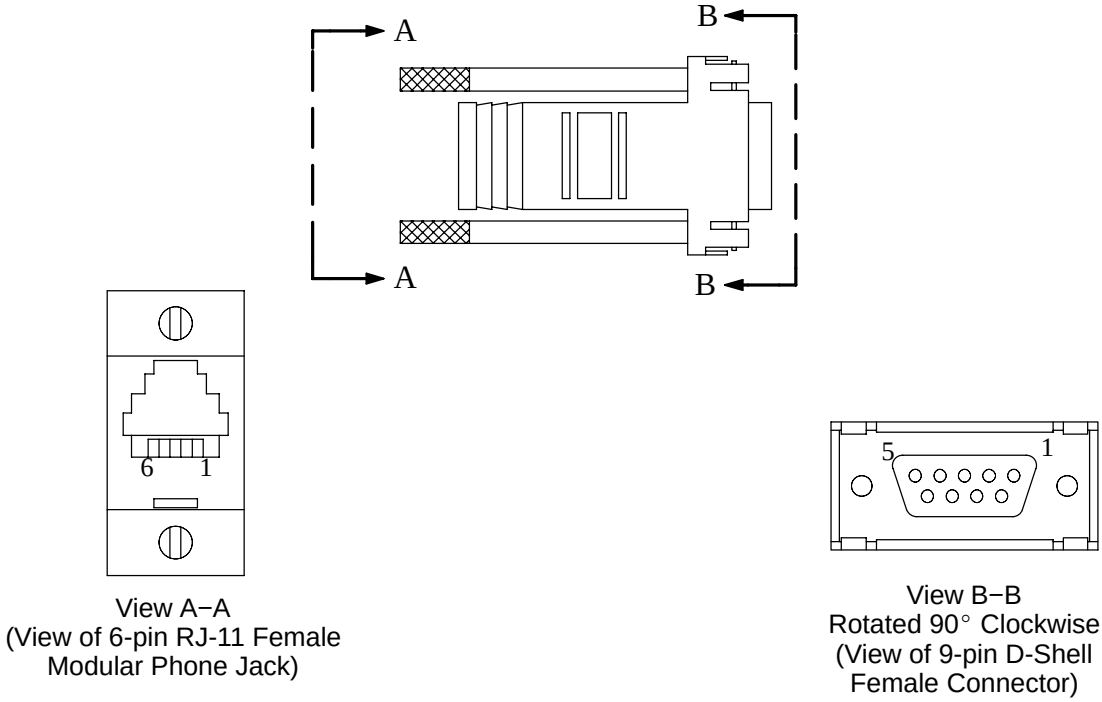
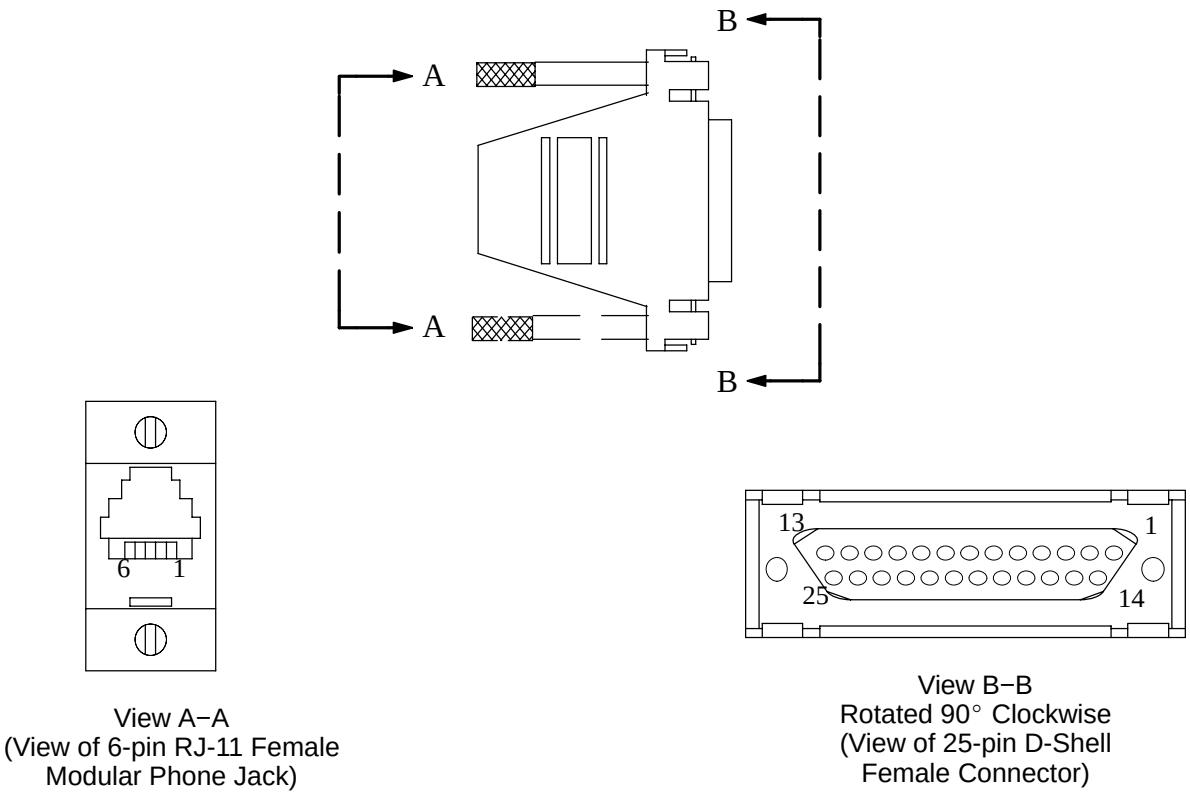


Figure A.3. RJ-11 to 9-pin D-Shell Connector (10P55130001)

Table A.1. Connector Pinout for 10P55130001

Connector Pinout		
RJ-11	**DB-9**	**Signal**
Pin 1	Pin 3	TXD
Pin 2	not used	–––
Pin 3	Pin 5	GND
Pin 4	not used	–––
Pin 5	not used	–––
Pin 6	Pin 2	RXD

The RJ-11 to 25-pin D-Shell connector can be purchased from Emerson Process Management or be constructed using the information contained in Figure A.4 and Table A.2.



View A−A
(View of 6-pin RJ-11 Female Modular Phone Jack)

View B−B
Rotated 90° Clockwise
(View of 25-pin D-Shell Female Connector)

Figure A.4. RJ-11 to 25-pin D-Shell Connector (10P55130002)

Table A.2. Connector Pinout for 10P55130002

Connector Pinout		
RJ-11	**DB-25**	**Signal**
Pin 1	Pin 2	TXD
Pin 2	not used	−−−
Pin 3	Pin 7	GND
Pin 4	not used	−−−
Pin 5	not used	−−−
Pin 6	Pin 3	RXD

Configuring Boot Software Parameters

During parameter configuration, six prompts are displayed in succession on the PC connected to the serial port. Press [ENTER] to accept the parameter option.

1. After the Copyright message is displayed, press [ENTER] to display the configuration parameters.

   The “Language” prompt is the first prompt to display. When you enter a parameter for a prompt, the next prompt is displayed. Enter a parameter value or press [ENTER] to accept the default parameter value.

2. At the “Language” prompt (T1), use the space bar to select one of the following language parameters:

English	Display data in English.
Numeric	Display data in numeric values.

3. At the “Led Blink Rate” prompt (T2), enter a value between 15000 and 32767. The default blink rate is 15000.

   Use the Backspace key to clear the default value, then type the new number. Press [ENTER] when you have finished.

4. At the “Test Mode” prompt (T3), use the space bar to select one of the following test mode parameters:

Normal	Executes all diagnostics tests. If the diagnostics pass, the boot ROM will attempt to load application software. Most users will choose to perform this test.
Loop on Failure	Executes all diagnostics tests. If a failure is detected, the boot ROM reexecutes the failed test continuously until the error condition is corrected. To discontinue the test loop, press any key when the prompt is displayed again. This test is useful if you intend to record test results in a log file.
Halt on Failure	Executes all diagnostic tests. If a failure is detected, the boot ROM halts testing, and you must repeat all tests. Press any key to start the diagnostics tests again.
Loop on Test	Executes individual diagnostics tests repeatedly. Press the “n” key to discontinue the test and start the next test in the sequence. Press any other key to start all diagnostics tests again.

Reloading Bootload Data on the RNI Board (continued)

5. At the “Change RTC” prompt, enter “Yes” or “No” to change the CPU clock. No is the default parameter. If the clock time is wrong or has never been set, select “Yes” using the space bar

   NOTE: You will not be prompted for an RTC value until after you execute step 9b.

6. Enter Greenwich Mean Time (GMT) using the following format:

   MMDDYYHHMM

   The clock is preset to GMT.

7. At the “Disable Real Time Clock” prompt, enter “Yes” or “No”. No is the default parameter. If you do not intend to use the product for a long time, enter “Yes” to save the batteries.

8. At the “Change Ethernet Address” prompt, enter “Yes” or “No“. No is the default parameter. If the Ethernet address has never been programmed or you suspect that it is wrong, enter “Yes.”

   NOTE: You will not be prompted for an Ethernet address (MAC) value until after you execute step 9b.

   If you need to reset the address, the Ethernet address is on a label on the RNI board.

9. You can choose to review your selections or change parameters and execute diagnostics:

   a. To review or change your parameter selections, press [ENTER].

      or

   b. To change parameters (for the RTC and Ethernet address [MAC]) and/or execute diagnostics, press the space bar.

      If you entered “Yes” at either the “Change RTC” or “Change Ethernet Address” prompt, you will be prompted for a value for these options. When you are prompted, press the space bar to change the value and [ENTER] to accept the value.

   NOTE: The Ethernet address (MAC) for each RNI is unique. It is recommended that you not change this address. If the address is not the same as the address on the RNI label, the RNI may not boot after a reset. The RNI will need to be returned to the factory for resetting.

10. When you execute diagnostics, the RNI board performs a series of 12 diagnostic tests and boots the RNI. If any of the diagnostics tests fail, you can call up an exception list of diagnostic results (see RI: A-8).

RNI Board Diagnostics

The RNI diagnostics perform 12 diagnostics tests. If any of the diagnostics tests fail, report the test to an Emerson Process Management service representative for further instructions.

If a failure occurs, there are two ways to identify which diagnostics test failed.

- Determine the LED test number of the test that failed and match that number to the test name in Table A.3. To determine the LED test number, count the number of times the error LED on the RNI housing blinks in response to a test error. The red LED must be on.
- Determine the test that failed by the test name identified on a terminal emulator screen.

Table A.3. Diagnostics Tests

LED Test Number	Test Name
1	CPU Test
2	ROM Memory CRC Test
3	Memory Controller
4	Main Memory
5	68302 Static Memory
6	Main Memory Size
7	TRAP Exception Tests
8	TEA Exception Tests
9	Read/Write Latch Test
10	Real Time Clock Test
11	Watchdog Interrupt
12	Ethernet Loopback

Displaying the Exception List

After you run diagnostic tests, you can call up the exception list to list possible errors.

1. After the Copyright line, press [ENTER] to display the configuration parameters.
2. Press [ENTER] to move through the succession of six prompts. After you press [ENTER] at the Ethernet Address prompt, the “execute diagnostics” prompt is displayed.
3. At the “execute diagnostics” prompt, press the space bar to execute diagnostics.
4. At the prompt “DISPLAY EXCEPTION DATA”, press any key to display the exception data.

Figure A.5 shows an example of exception data display.

```
Change Ethernet Address  [No]
Press ENTER to review or space to execute diagnostics.

DISPLAY EXCEPTION DATA
Press a key to show exception data.
DISPLAY MODE is do not show.
DISPLAY MODE is scroll text.
DISPLAY MODE is page text.
DISPLAY MODE is do not show
DISPLAY MODE is scroll text.
DISPLAY MODE is page text.
END OF LINE MODE:  Append Carriage Return and Line Feed
END OF LINE MODE:  Append Carriage Nothing
END OF LINE MODE:  Append Line Feed
END OF LINE MODE:  Append Carriage Return
END OF LINE MODE:  Append Carriage Return and Line Feed

DISPLAY EXCEPTION DATA
Press a key to change exception display mode.

If you do not press a key, the exception data is searched. If any exception
data is found the following text is displayed.

Searching ...−−−−−−−−+Found Exception Data at Address 0x179618

Current Page Size:  000 Lines per Page.
Use 0−9, back space, or ENTER keys.  Range is 1 to 999.

Current Page Size:  024 Lines per Page.
Page Size is 024 Lines per Page.
EXCEPTION DETECTED:
CPU Test
ROM Memory CRC Test
Memory Controller
Copyright (c) 1995−1996, Fisher*Rosemount Systems.
RNI Diagnostics.  Press a key to change parameters.
```

Figure A.5. Exception Data Example

Appendix B:
Error Log Messages

Some error log messages occur with the information “Unknown status from RS3 = −xxx” where the “xxx” is the actual RS3 error number. Table B.1 lists the meaning of codes that might appear in this message.

Table B.1. Error Codes Returned from RS3

Code	RS3 Error
100	Block I/O Error
101	Illegal Block ID
102	Static Size Error
103	Dynamic Size Error
104	Tag Not Found ANYWHERE
105	Null Block Address Requested
106	Odd Block Problem
107	Function Static Problem
108	Message Format Error
109	Non−Supported Block Type
111	Bad Socket
112	Bad Node
113	Bad Highway Number
114	Link level Communication error
115	Network Communication error
116	Peerway Transport level error
117	BUSY on link level
118	Message Reply Timeout
121	No Controller Present

Code	RS3 Error
122	Update Code Conflict
123	Controller Memory Overflow
124	Controller Got Bad Message
125	No Tag Found
126	Block Not Configured
127	Controller Time Out
128	Communication Error with Ctlr
131	Value is at Limit
134	Illegal Controller Type
135	Blk Not Modified: Invalid Dyn Size
136	Internal Controller Error
137	Logic Active
138	Tracking Active
139	Not enough room in NV Mem
147	CSB Not Loaded Due to Size Mismatch
148	Illegal Block Type On RBL Controller
149	Illegal Block Address for Controller Type
151	Bad Data in Logic Prologue
192	Converted File Exceeds Max RPN Size

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