
Redundant NIC User's Guide

The Redundant NIC function provides a high-availability solution for your Windows NT Server 3.51 and 4.0 or NetWare 4.11 server. It is supported in the IBM PCI Token-Ring adapter and the IBM PCI Wake on LAN Token-Ring Adapter. This function maintains network connectivity in the event of a NIC- or lobe-related failure. You can assign a backup adapter to take control of the network connection if the active adapter fails.

The Redundant NIC function will initiate a failover when a cable fault or a hard error occurs on the adapter. A failover causes the driver to switch traffic from the active adapter to the backup adapter. The active and backup roles are traded between the adapters of the redundant pair.

In many cases, the failover to the backup adapter will occur seamlessly. Due to the failover latency involved in opening the backup adapter onto the ring, some protocols might require that sessions be reestablished. In either case, network connectivity is maintained and server downtime is avoided.

Redundant NIC Information for Windows NT Systems

Redundant NIC Setup Instructions

Follow these instructions when setting up a redundant NIC pair.

- 1** Ensure that both adapters of a redundant pair are cabled to the same network.
- 2** Use the Redundant NIC tab located in Properties for the primary adapters to control your redundant pairs.
- 3** You must specify a Locally Administered Address (LAA) for the primary adapter. The LAA is located in the Basic tab of Properties for the primary NIC.

Redundant NIC Usage Tips

- It is strongly recommended that you specify a Ring Speed parameter of 16 Mbps or 4 Mbps instead of Automatic. This will reduce the amount of time needed to perform a failover.
- Once a redundant pair has been defined, the secondary adapter is not configurable until the redundancy has been disabled.
- Once a redundant pair has been defined, neither the primary nor the secondary adapter can be removed until the redundancy has been disabled.
- When a failover occurs, check the cabling of the failed adapter. If it has been disconnected, reconnect it as soon as possible so that it is ready to function as a backup.
- The Redundant NIC function is supported on the IBM PCI Token-Ring adapter family; the Auto LANStreamer PCI adapter is not supported.

Managing Redundant NIC

The LAN Adapter Management Agent for NT, Version 1.31, allows you to view the state of the Redundant NIC operation. The Agent can be used in conjunction with the Nways Management applications. Nways Workgroup Manager for Windows NT 1.1.1 or higher, and Nways Manager for AIX 1.2.1 or higher, have been enhanced to recognize the Redundant NIC information.

Redundant NIC Information for NetWare Systems

The Redundant NIC function is provided in 2 pieces: RNIC.NLM and IBMTRPO.LAN. When a failover from the active to the backup adapter occurs, the only protocols that can be switched are IP and IPX. Any other protocol information that is bound to the active adapter will be lost.

Note: The only protocol information that is retained when a failover occurs is what is bound to the active adapter when the problem occurs. No protocols should be bound to the backup adapter. The only exception to this is when ROUTE.NLM is used. In that case, ROUTE.NLM should be bound to the active and backup adapters.

Failover can occur from the active to the backup adapter, and also from the backup to the active until a good connection is made.

Installation of Redundant NIC Software

Versions of IBMTRPO.LAN prior to Version 2.14 will not work with the Redundant NIC capability.

The network data rate must be set to the same value (16 Mbps or 4 Mbps) on both adapters or the Redundant NIC NLM will not allow the pair to be made. Each adapter must be plugged into the same ring on the network for the failover to be completely transparent to the clients communicating with the server.

The driver communicates adapter failures or cable disconnects to the RNIC NLM via the NESL/NEB interface. If ODINEB.NLM loads after the LAN driver, these messages are never sent to the RNIC NLM by the NESL/NEB subsystem. If the RNIC NLM does not failover after a cable disconnect or failure, verify that ODINEB.NLM is loading before the LAN driver.

If you use INETCFG.NLM to configure your system, follow the steps in "Installation using INETCFG.NLM" on page 3 instead of the following INSTALL.NLM section.

Installation using INSTALL.NLM

- 1** Install the ODI33F.EXE or higher patch from Novell.
- 2** Install the adapters you would like to pair into a NetWare 4.11 Server.
- 3** Copy RNIC.NLM, TOKENTSM.NLM, and ODINEB.NLM from the \NOVELL\NETWARE directory on the driver diskette to SYS:\SYSTEM on the server.
- 4** **load install** on the server and proceed to the section where you install network adapters.

- 5** Set up the primary adapter:

While in the Load Software panel, you will need the following information:

The path for the driver is A:\NOVELL\NETWARE.

Copy the new driver (IBMTRPO.LAN) and IBMTRPO.LDI from the diskette.

Choose protocols. In the Parameters panel, fill in a node address. Set Standby Mode to **Disabled**. Set other parameters as needed.

Save and load the driver. While it is processing, press **Alt+Esc** to get to the Console panel. Choose the slot of the primary adapter.

Choose a network number to bind to.

6 Set up the secondary adapter:

Choose to load an additional network driver.

Do not copy the driver again.

Select the same protocols you chose to use with the primary adapter. If you chose TCP/IP, use a temporary IP address for the secondary adapter. You must use the same Node Address. Standby Mode must be set to **Enabled**. Save and load the driver.

While it is processing, press **Alt+Esc** to get to the Console panel. When asked to load another frame type, answer **No**.

Choose the slot of the secondary adapter.

Choose a temporary network number to bind to.

Do not load an additional network driver.

7 Exit back to the Console.

8 Edit the AUTOEXEC.NCF file:

- Before all of the LOAD statements, add LOAD ODINEB.
- After all of the BIND statements, add LOAD RNIC PAIR <pairname> -p<slot#> -s<slot#> and any additional parameters. See “Setting Up a Redundant NIC Pair” on page 4.
- Delete all BIND statements for the secondary adapter.

9 Restart the server in order for the changes to take effect.

Warning: Double check your AUTOEXEC.NCF every time that you use the INSTALL.NLM program. It is possible that the INSTALL.NLM will move or remove ODINEB.NLM. Make sure that it loads before the network driver (IBMTRPO.LAN) and that RNIC loads after the network driver.

Installation using INETCFG.NLM

1 Install the ODI33F.EXE or higher patch from Novell.

2 Install the adapters you would like to pair into a NetWare 4.11 Server.

3 Copy RNIC.NLM, TOKENTSM.NLM, and ODINEB.NLM from the \NOVELL\NETWARE directory on the driver diskette to SYS:\SYSTEM on the server.

4 LOAD INETCFG on the server and proceed to the section where you add a new board.

5 Set up the primary adapter:

While in the New Board panel, you will need the following information:

The path for the driver is A:\NOVELL\NETWARE.

Choose IBMTRPO from the list.

In the Configuration Panel, name the Board, fill in the slot number, and the node. Standby Mode must be set to **Disabled**. Set other parameters as needed.

Save the changes.

6 Set up the secondary adapter:

Choose IBMTRPO from the list.

In the Configuration panel, name the Board (the name must be different from that of the primary adapter), fill in the slot number, and the node (must be the same as that of the primary adapter). Standby Mode must be set to **Enabled**. Set other parameters as needed.

Save the changes.

7 In the Protocols section, select User-specified Protocols, create and name a temporary protocol and save that information.

8 In the Bindings section, choose binding parameters for the primary adapter as needed. Bind the User-specified Protocol that you defined in the previous step to all appropriate frame types of the secondary adapter.

Since the User-specified Protocol that you created does not exist, no protocols will actually be bound to the secondary adapter. You might notice error messages that point this out when the server is starting up. These messages are for information only; no action is required.

9 Exit back to the Console.

10 Edit the AUTOEXEC.NCF file:

- Before the INITSYS.NCF command, add LOAD ODINEB.
- After the INITSYS.NCF command, add LOAD RNIC PAIR <pairname> -p<slot#> -s<slot#> and any additional parameters. See “Setting Up a Redundant NIC Pair.”

11 Restart the server in order for the changes to take effect.

Warning: Double check your AUTOEXEC.NCF every time you use the INETCFG.NLM program. It is possible that the INETCFG.NLM will move or remove ODINEB.NLM. Make sure that it loads before the network driver (IBMTRPO.LAN) and that RNIC loads after the network driver.

Setting Up a Redundant NIC Pair

Follow the instructions below to prepare RNIC.NLM to monitor your adapter pair.

The Redundant NIC NLM requires that several options be specified in order to create a pair. You can specify the options to RNIC.NLM when you load the nlm or on the command line after RNIC.NLM is loaded. To automate the commands on reboot, add them to your AUTOEXEC.NCF. See the examples on page 6.

To complete the setup you need to know the following:

- The slot number assigned to each adapter
- If TCP/IP is bound to your adapter then you need to know your default router's IP address
- Choose a name for your adapter pair.

To set up a pair when you load the nlm use the following format:

```
load rnic pair <pairname> -p<slot#> -s<slot#> [-r<ip_address>]
```

If RNIC is already loaded you can set up a pair by using the RNIC keyword on the system console. Its format is:

```
rnic pair <pairname> -p<slot#> -s<slot#> [-r<ip_address>]
```

A description of each parameter follows:

- <pairname>** This parameter is required and identifies the Redundant NIC pair. The pairname must be 12 characters or less. It is case-sensitive. All ASCII characters are accepted.
- p<slot#>** This parameter is required and tells the NLM the slot number of the IBM PCI Token-Ring Adapter that you want to be the active adapter initially.
- s<slot#>** This parameter is required and tells the NLM the slot number of the IBM PCI Token-Ring Adapter that you want to be the backup adapter initially.
- r<ip_address>** This parameter is optional. It might be needed if you are using TCP/IP on your active adapter. If you do not load the Token-Ring_SNAP frame type then you do not need this parameter. If you load the Token-Ring_SNAP frame type then you only need this parameter if you have IP bound and you have a default IP router. If this parameter is not specified, IP will not know what the default router is after an adapter failover.

Using Redundant NIC Software

The Command Line Interface

As stated previously, the **rnic** command can be used on the system console after RNIC.NLM is loaded. This command can be used to view your pair, manually switch from active to backup, create a pair, destroy a pair, and change the mode.

rnic help

Type **rnic help** and press **enter** to show the valid options for the rnic command. **rnic** will also display this information.

rnic pair

The **rnic pair** command is described in “Setting Up a Redundant NIC Pair” on page 4 discussed earlier.

rnic unpair

rnic unpair <pairname> will disassociate the backup adapter from the primary adapter. This command is necessary when you want to establish a new pair.

rnic show

To determine the status of the RNIC NLM, enter **rnic show**. This will display the configured pair. If a pair is configured the following information will be displayed: the pair name and LAA (node address), the slots that the primary and secondary adapters are using, the switching mode of the pair (manual, automatic, or disabled), the current state of the primary adapter, and the current state of the secondary adapter.

Note: The terms primary and secondary do not refer to which adapter is currently active. The primary adapter is initially the active adapter and was configured by using the **-p<slot#>** option on the command line. The secondary adapter is initially the backup adapter and was referred to by **-s<slot#>** on the command line.

There are several states that each adapter could be in. The possible states are:

Operating This adapter is open and operating.

Standby Ready This adapter is ready for failover if the active adapter fails.

Cable Disconnected The cable was disconnected from this adapter while it was active.

Error Detected There might be an adapter check error with the adapter.

Opening The adapter is trying to open.

rnic switch

```
rnic switch <pairname> [ mode manual | mode auto | mode disabled ]
```

rnic switch <pairname> will cause the pair identified by <pairname> to failover from its active to its backup adapter when in auto or manual mode.

Normally the Redundant NIC pair will automatically failover from the active to the backup if a cable fault or NIC failure is detected. Use this command to change the mode of the pair so that an automatic failover will not occur. To prevent automatic failovers from occurring, set the pair to manual mode. In manual mode the rnic switch command is the only way to failover from the active to the backup adapter. Disabled mode will not allow failovers. You can use disabled mode when performing maintenance on the backup adapter.

Examples

1 AUTOEXEC.NCF of a simple Redundant NIC configuration after using INSTALL.NLM:

```
set Time Zone = EST5EDT
set Daylight Savings Time Offset = 1:00:00
set Start Of Daylight Savings Time = (APRIL SUNDAY FIRST 2:00:00 AM)
set End Of Daylight Savings Time = (OCTOBER SUNDAY LAST 2:00:00 AM)
set Default Time Server Type = SINGLE

# Note: The Time zone information mentioned above
# should always precede the SERVER name.
set Bindery Context = 0=workgroup
file server name NWSRV1
ipx internal net 60990060

# The network environment for this server consists
# of a Token-Ring LAN with only one Frame Type
load tcpip
load odineb

# Primary adapter
LOAD IBMTRPO SLOT=3 NODE=400010203182 FRAME=TOKEN-RING NAME=IBMTRPO_1_TOK
BIND IPX IBMTRPO_1_TOK NET=ABCD1
# Secondary adapter loaded with the same frame type as the Primary
LOAD IBMTRPO SLOT=2 NODE=400010203182 STANDBY FRAME=TOKEN-RING NAME=IBMTRPO_2_TOK

# Create the Redundant NIC pair with Primary slot=3, and Secondary Slot=2
load rnic pair mypair -p3 -s2

mount all
```

2 AUTOEXEC.NCF of a complex Redundant NIC configuration after using INSTALL.NLM:

```
set Time Zone = EST5EDT
set Daylight Savings Time Offset = 1:00:00
set Start Of Daylight Savings Time = (APRIL SUNDAY FIRST 2:00:00 AM)
set End Of Daylight Savings Time = (OCTOBER SUNDAY LAST 2:00:00 AM)
set Default Time Server Type = SINGLE

# Note: The Time zone information mentioned above
# should always precede the SERVER name.
set Bindery Context = 0=workgroup
file server name NWSRV1
ipx internal net 60990060

# The network environment for this server includes both Token-Ring frame
# types, utilizes Source Routing, has an IP network with a default IP gateway,
# and utilizes Route Switching via the IBM 8210
LOAD IPXRTR routing=NLSP
load tcpip
load odineb

# Primary Adapter
LOAD IBMTRPO SLOT=3 NODE=400010203182 RTSWENABLE=YES FRAME=TOKEN-RING NAME=IBMTRPO_1_TOK
BIND IPX IBMTRPO_1_TOK NET=ABCD1
LOAD IBMTRPO SLOT=3 NODE=400010203182 RTSWENABLE=YES FRAME=TOKEN-RING_SNAP NAME=IBMTRPO_1_TSP
BIND IPX IBMTRPO_1_TSP NET=FF1
BIND IP IBMTRPO_1_TSP ADDR=10.20.31.82 MASK=ff.ff.ff.0 GATE=10.20.31.254

# Secondary Adapter with the same frame types as Primary loaded, but no
# bindings
LOAD IBMTRPO SLOT=2 NODE=400010203182 STANDBY RTSWENABLE=YES
FRAME=TOKEN-RING NAME=IBMTRPO_2_TOK
LOAD IBMTRPO SLOT=2 NODE=400010203182 STANDBY RTSWENABLE=YES
FRAME=TOKEN-RING_SNAP NAME=IBMTRPO_2_TSP

# Create the Redundant NIC pair with the Primary slot=3, the Secondary slot=2, and
# the Default IP gateway=10.20.31.254
load rnic pair mypair -p3 -s2 -r10.20.31.254

# If Source Routing is needed, then route.nlm must be loaded for
# all the logical boards of both the primary and secondary adapter
load route name=ibmtrpo_1_tok rsp=ar time=10
load route name=ibmtrpo_1_tsp rsp=ar time=10
load route name=ibmtrpo_2_tok rsp=ar time=10
load route name=ibmtrpo_2_tsp rsp=ar time=10

mount all
```

3 AUTOEXEC.NCF of installs with INETCFG (it is the same for both complex and simple installs):

```
set Time Zone = EST5EDT
set Daylight Savings Time Offset = 1:00:00
set Start Of Daylight Savings Time = (APRIL SUNDAY FIRST 2:00:00 AM)
set End Of Daylight Savings Time = (OCTOBER SUNDAY LAST 2:00:00 AM)
set Default Time Server Type = SINGLE
# Note: The Time zone information mentioned above
# should always precede the SERVER name.
set Bindery Context = 0=workgroup
file server name NWSRV2
ipx internal net 35083DE8

; Network driver LOADs and BINDs are initiated via
; INITSYS.NCF. The actual LOAD and BIND commands
; are contained in INITSYS.NCF and NETINFO.CFG.
; These files are in SYS:ETC.
load odineb
sys:etc\initsys.ncf
load rnic pair mypair -p7 -s6

mount all
```

4 What is shown if user selects View All Commands from INETCFG after a simple installation:

```
# The network environment for this server consists
# of a Token-Ring LAN with only one Frame Type
LOAD SNMP
LOAD IBMTRPO NAME=TOK1_TOK FRAME=TOKEN-RING SLOT=7 NODE=400010203181
    RXBUFFERS=32 TXBUFFERS=16 DATARATE=AUTO FULLDUPLEX=YES
RTSWENABLE=NO
LOAD IBMTRPO NAME=TOK2_TOK FRAME=TOKEN-RING SLOT=6 NODE=400010203181
    RXBUFFERS=32 TXBUFFERS=16 DATARATE=AUTO FULLDUPLEX=YES STANDBY
RTSWENABLE=NO
BIND IPX TOK1_TOK net=abcd1 seq=1
LOAD DUMMY
BIND DUMMY TOK2_TOK
```


5 What is shown if user selects View All Commands from INETCFG after a complex installation:

```
# The network environment for this server includes both Token-Ring frame
# types, utilizes Source Routing, has an IP network with a default IP gateway,
# and utilizes Route Switching via the IBM 8210
LOAD SNMP
LOAD IBMTRPO NAME=TOK1_TOK FRAME=TOKEN-RING SLOT=7 NODE=400010203181
    RXBUFFERS=32 TXBUFFERS=16 DATARATE=AUTO FULLDUPLEX=YES
RTSWENABLE=YES RTSWTABLESIZE=1024
LOAD IBMTRPO NAME=TOK1_TSP FRAME=TOKEN-RING_SNAP SLOT=7 NODE=400010203181
    RXBUFFERS=32 TXBUFFERS=16 DATARATE=AUTO FULLDUPLEX=YES
RTSWENABLE=YES RTSWTABLESIZE=1024
LOAD IBMTRPO NAME=TOK2_TOK FRAME=TOKEN-RING SLOT=6 NODE=400010203181
    RXBUFFERS=32 TXBUFFERS=16 DATARATE=AUTO FULLDUPLEX=YES STANDBY
RTSWENABLE=YES RTSWTABLESIZE=1024
LOAD IBMTRPO NAME=TOK2_TSP FRAME=TOKEN-RING_SNAP SLOT=6 NODE=400010203181
    RXBUFFERS=32 TXBUFFERS=16 DATARATE=AUTO FULLDUPLEX=YES
STANDBY RTSWENABLE=YES RTSWTABLESIZE=1024
LOAD IPXRTR ROUTING=NLSP
BIND IPX TOK1_TOK net=abcd1 seq=1
BIND IPX TOK1_TSP net=ff1 seq=2
LOAD ROUTE NAME=TOK1_TOK RSP=AR TIME=10
LOAD ROUTE NAME=TOK1_TSP RSP=AR TIME=10
LOAD ROUTE NAME=TOK2_TOK RSP=AR TIME=10
LOAD ROUTE NAME=TOK2_TSP RSP=AR TIME=10
LOAD TcpiP RIP=Yes Forward=No
BIND IP TOK1_TSP ARP=Yes Mask=ff.ff.ff.0 Address=10.20.31.81
LOAD DUMMY
BIND DUMMY TOK2_TOK
BIND DUMMY TOK2_TSP
```

Redundant NIC NLM Messages

RNIC-100: Failed to allocate memory for LAN boards

Problem Determination: Your server is not able to allocate memory for RNIC.NLM

Operator Response: Try unloading NLM's that are not needed or add more memory to the server.

RNIC-101: Failed to register for one or more NESL events.

Problem Determination: The Redundant NIC NLM was unable to register for some NESL/NEB events. This could prevent the Redundant NIC pairs from functioning properly.

Operator Response: Update MSM.NLM to the latest available level.

RNIC-102: Pairing succeeded

Problem Determination: A Redundant NIC pair was created successfully and will be monitored for events from the adapters that make up the pair.

Operator Response: None.

RNIC-103: Must specify -p and -s to create a Redundant NIC pair

Problem Determination: The Redundant NIC NLM must be told the slot for the primary and secondary adapters when a pair is created.

Operator Response: See “Setting Up a Redundant NIC Pair” on page 4 for information about creating a pair.

RNIC-104: Must specify a name for a Redundant NIC Pair

Problem Determination: Redundant NIC pairs must be given a name for the pairing to be completed.

Operator Response: Try to create the pair again and specify a pair name.

RNIC-105: Pair name in use. Choose another name.

Problem Determination: You tried to use an existing pair name for another pair.

Operator Response: None.

RNIC-106: The default IP router address that was specified is invalid.

Problem Determination: The default IP router address format that you specified was incorrect.

Operator Response: Verify the IP address of your router.

RNIC-107: Unable to get options structure memory.

Problem Determination: There was a problem allocating memory. The server could be out of memory or there could be a problem with CLIB.NLM.

Operator Response: Try unloading NLM's that are not needed or add more memory to the server.

RNIC-108: No Redundant NIC pairs loaded

Problem Determination: There are no configured pairs to show at this time.

Operator Response: None.

RNIC-109: Unable to determine slots. Driver could have been unloaded.

Problem Determination: The adapter no longer appears to be where Redundant NIC thought it was. Pairs should get destroyed when the driver unloads. This message indicates that removing the pairs did not work.

Operator Response: Try removing the pair using **rnic unpair <pairname>**. Recreate the pair.

RNIC-110: All pairs were removed.

Problem Determination: All Redundant NIC pairings were successfully removed.

Operator Response: None.

RNIC-111: Invalid Redundant NIC pair name

Problem Determination: The pairname specified with the RNIC switch command does not exist.

Operator Response: Use **rnic show** to determine the correct name.

RNIC-112: Manual adapter failover succeeded

Problem Determination: An RNIC switch command was issued to a Redundant NIC pair and the failover completed successfully.

Operator Response: None.

RNIC-113: Invalid RNIC switch command

Problem Determination: The RNIC switch command that you specified was not correct.

Operator Response: Type **rnic help** to get help with the rnic command.

RNIC-114: Switch Mode set to <mode>

Problem Determination: The Redundant NIC switch mode was successfully set to the specified mode.

Operator Response: None.

RNIC-116: <pairname> unpaired successfully

Problem Determination: The Redundant NIC pair <pairname> was removed successfully.

Operator Response: None.

RNIC-117: Unknown or malformed command

Problem Determination: You typed in a command that was not valid.

Operator Response: Type **rnic help** to get help with the rnic command.

RNIC-200: Unable to get parameter structure memory

Problem Determination: Your server is not able to allocate memory for RNIC.NLM.

Operator Response: Try unloading NLM's that are not needed or add more memory to the server.

RNIC-201: Setup failed: Invalid command line format

Problem Determination: You typed an rnic pair parameter that was not valid.

Operator Response: Type **rnic help** to get help with the rnic command.

RNIC-202: Setup failed: Unable to get memory for RNIC profile

Problem Determination: Your server is not able to allocate memory for RNIC.NLM.

Operator Response: Try unloading NLM's that are not needed or add more memory to the server.

RNIC-203: Setup failed: Problem initializing the adapter pair

Problem Determination: The initialization routine for the pair failed.

Operator Response: Try creating the pair again.

RNIC-204: Setup failed: Parameters structure is missing

Problem Determination: There was a problem accessing the parameters structure.

Operator Response: Try setting up the pair again.

RNIC-205: Setup failed: Failed to find any IBM token-ring boards.

Problem Determination: The Redundant NIC NLM was not able to find any IBM Token-Ring boards loaded at this time.

Operator Response: Load Token-Ring boards for the primary and secondary adapters.

RNIC-206: Setup failed: Primary adapter not found

Problem Determination: There is no adapter in the slot that you specified as primary.

Operator Response: Specify the correct slot.

RNIC-207: Setup failed: Could not allocate space to read the MSM Config Table

Problem Determination: Problem allocating memory. It is possible that the machine is low on RAM.

Operator Response: Try unloading NLM's that are not needed or add more memory to the server.

RNIC-208: Setup failed: Problem reading the MSM Config Table

Problem Determination: The Config table for the adapter could not be read.

Operator Response: Make sure that you are using the correct LAN driver.

RNIC-209: Setup failed: Incorrect LAN Driver version

Problem Determination: Your LAN driver is too old.

Operator Response: Use the one that came with the RNIC.NLM diskette or a newer version if one is available.

RNIC-210: Setup failed: Secondary adapter not found

Problem Determination: There is no adapter in the slot that you specified as secondary.

Operator Response: Specify the correct slot.

RNIC-211: Setup failed: Primary and Secondary logical boards to not match

Problem Determination: The logical boards on the primary adapter do not match the logical boards on the secondary adapter.

Operator Response: Check the frame types for the primary and secondary adapters. They should match.

RNIC-212: Setup failed: Primary and Secondary MAC addresses do not match

Problem Determination: The same Locally Administered Address must be assigned to each adapter using the NODE ADDRESS=<LAA> command line keyword.

Operator Response: Set the Locally Administered Address on the primary and secondary adapters to the same address.

RNIC-213: Setup failed: Could not find MLID Config table to perform adapter status check

Problem Determination: There is a problem reading the adapter Config table.

Operator Response: Try setting up the pair again.

RNIC-214: Setup failed: The primary adapter must not be shut down

Problem Determination: The primary adapter must be open in order for Redundant NIC to initialize correctly.

Operator Response: Specify a primary adapter that is not shut down.

RNIC-215: Setup failed: The secondary adapter must not be open

Problem Determination: The secondary adapter must be closed when Redundant NIC is being initialized.

Operator Response: Specify an adapter that was loaded with the standby keyword.

RNIC-216: Setup failed: The ring speed for the adapters do not match

Problem Determination: Both adapters must be set to the same ring speed.

Operator Response: Configure the adapters so that they have the same ring speed.

RNIC-217: Setup failed: Multiple pairs not allowed at this time.

Problem Determination: Only one pair can be created at this time.

Operator Response: None.

RNIC-300: Unpair failed: Invalid RNIC pair name

Problem Determination: The pair that you tried to remove does not exist.

Operator Response: Type **rnic show** to find the correct pair name of the adapters that you would like to remove.

RNIC-301: Unpair failed: Could not remove link from list of pairs

Problem Determination: There was a problem unpairing the adapters.

Operator Response: Try to remove the pair again.

RNIC-400: Manual adapter failover unsuccessful: The switching mode is disabled.

Problem Determination: When the switching mode is disabled you cannot initiate a manual failover.

Operator Response: Set the switching mode to manual or auto.

RNIC-401: Manual adapter failover unsuccessful: The backup adapter is not able to become active at this time.

Problem Determination: An attempt was made to failover to the backup adapter. The state of the backup adapter is preventing it from becoming an active adapter.

Operator Response: Make sure that the backup adapter is not open.

RNIC-402: Manual adapter failover unsuccessful: Shutdown of active adapter failed

Problem Determination: The active adapter could not be shut down.

Operator Response: Try issuing a manual failover from the command line.

RNIC-403: Manual adapter failover unsuccessful: Failed to activate backup adapter.

Problem Determination: The backup adapter could not be reset.

Operator Response: Try issuing a manual failover from the command line.

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