

VMISFT-566x Fibre Channel Drivers

Installation Manual



A GE Fanuc Company

12090 South Memorial Parkway
Huntsville, Alabama 35803-3308, USA
(256) 880-0444 ♦ (800) 322-3616 ♦ Fax: (256) 882-0859
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Overview

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Introduction

This manual provides information that enables you to install and run a VMISFT-566x driver for your platform. A VMISFT-566x driver enables you to access the features of a variety of VMICPCI, VMIPCI and VMIPMC Fibre Channel Interface hardware.

Multiple Fibre Channel devices can be installed in the same system.

Intended Audience

Knowledge of the following operating systems is assumed:

- VxWorks for the VMISFT-566x-ABC-037 driver
- Solaris 2.6, 7 or 8 for the VMISFT-566x-ABC-000 and VMISFT-566x-ABC-005 drivers
- Windows NT 4.0 or later for the VMISFT-566x-ABC-000 driver

The Fibre Channel host adapter card should be installed in a CompactPCibus, PCibus or PMCbus slot of the computer system, depending on your type of card.

Software developers should be familiar with the following development platforms:

- Wind River Tornado 2 for the VMISFT-566x-ABC-037 driver

VMISFT-566x Drivers, Platforms and Supported Boards

VMISFT-566x driver software is available for the Windows NT, Solaris and VxWorks platforms. The software is delivered on a platform-specific CD. Updates of the Windows NT and Solaris drivers can be downloaded from www.vmicnet.com.

Drivers and Platforms

The following VMISFT-566x drivers are available for the listed platforms. Your CD contains the driver specific for your system.

Driver	Platform	For More Information
VMISFT-566x-ABC-037	VxWorks	Page 13
VMISFT-566x-ABC-000	Solaris SPARC/x86 SCSI	Page 55
VMISFT-566x-ABC-005	Solaris SPARC/x86 IP	Page 67
VMISFT-566x-ABC-000	Windows NT	Page 85

For information on the specific contents of each platform's CD, see the "Accessing Additional Information" sections for each driver on page 52 (VxWorks), page 66 (Solaris SPARC/x86 SCSI), page 84 (Solaris SPARC IP) and page 94 (Windows NT).

Supported Boards

VMISFT-566x drivers support the following CompactPCI, PCI and PMC boards:

Board	Description
VMICPCI-5660 ^{§†}	CompactPCI bus Fibre Channel Host Adapter
VMICPCI-5661 ^{*†}	CompactPCI bus Fibre Channel Host Adapter
VMIPCI-5660 ^{§†}	PCI bus Fibre Channel Host Adapter
VMIPCI-5661	PCI bus Fibre Channel Host Adapter
VMIPMC-5660 ^{§†}	PMC bus Fibre Channel Host Adapter
VMIPMC-5661	PMC bus Fibre Channel Host Adapter
VMIPMC-5664	PMC Fibre Channel Host Adapter with Redundant External Ports
VMIPMC-5666 [*]	PMC 2 Gigabit Fibre Channel Host Bus Adapter

§ Not supported by the VMISFT-566x-ABC-037 VxWorks driver

* Not supported by the VMISFT-566x-ABC-000 Solaris driver

† Not supported by the VMISFT-566x-ABC-005 Solaris driver

VMIC Technical Support

You may contact VMIC's customer service at:

TELEPHONE: 1-800-269-4714
256-880-0444 (outside of U.S.)

FAX: 256-650-7245

E-MAIL: software.cs@vmic.com

Service is free for 30 days after product delivery. After this time however, you must purchase VMIC's Maintenance Agreement for continued support. For more information, refer to the Maintenance Agreement documentation that was delivered with the product.

With your correspondence, please provide the following:

- Product number and version, found by reading the VERSION (VxWorks), release.txt (Solaris) or RELEASE.TXT (Windows NT) file
- Type of target hardware, processor and Fibre Channel board
- Software version numbers of Tornado and board support package (VxWorks)
- Exact wording of any messages on your screen
- What you were doing when the error occurred
- What steps you have taken (if any) to resolve the problem

In addition, when e-mailing, please include the following:

- Your name
- Your company's name
- Your phone and fax numbers

The VMISFT-566x-ABC-037 VxWorks Driver

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Introduction

This chapter provides configuration, installation and operation information for the VMISFT-566x-ABC-037 Fibre Channel driver for the VxWorks platform.

VMISFT-566x-ABC-037 Supported Boards

The VMISFT-566x-ABC-037 Fibre Channel driver supports the following boards.

Board	Description
VMICPCI-5661	CompactPCI bus Fibre Channel Host Adapter
VMIPCI-5661	PCI bus Fibre Channel Host Adapter
VMIPMC-5661	PMC bus Fibre Channel Host Adapter
VMIPMC-5664	PMC Fibre Channel Host Adapter with Redundant External Ports
VMIPMC-5666	PMC 2 Gigabit Fibre Channel Host Bus Adapter

System Requirements

To install and run the VMISFT-566x-ABC-037 Fibre Channel driver, you must have the following:

Hardware

One of the following boards:

- VMIPCI-5661
- VMIPMC-5661
- VMICPCI-5661
- VMIPMC-5664
- VMIPMC-5666

One of the following PowerPC processors:

- PPC403gnu
- PPC405gnu
- PPC405Fgnu
- PPC601gnu
- PPC603gnu
- PPC604gnu
- PPC860gnu
- PPCEC603gnu

- OR -

One of the following X86 (Intel) processors:

- I80386gnu
- I80486gnu
- PENTIUMgnu

Software

- Wind River Tornado 2
- PowerPC BSP
- OR -
- PC486 BSP (Intel)

NOTE: The PowerPC portion of all drivers that operate on the VxWorks platform was developed using the Wind River Motorola MVME2700 PowerPC BSP.

Configuration Parameters

The include file `isp2xuser.h` is delivered with all VxWorks Fibre Channel drivers. It contains configuration parameters that define recommended values for the parameters to the host board adapters (HBA).

Defining the Board

The default configuration of all VxWorks Fibre Channel drivers is undefined. To use the VMISFT-566x-ABC-037 driver, you must define the board so the driver will recognize it after being compiled.

A board can be defined using either of the following methods:

- Edit the Tornado 2 Project Build Options
- Edit the `isp2xuser.h` file

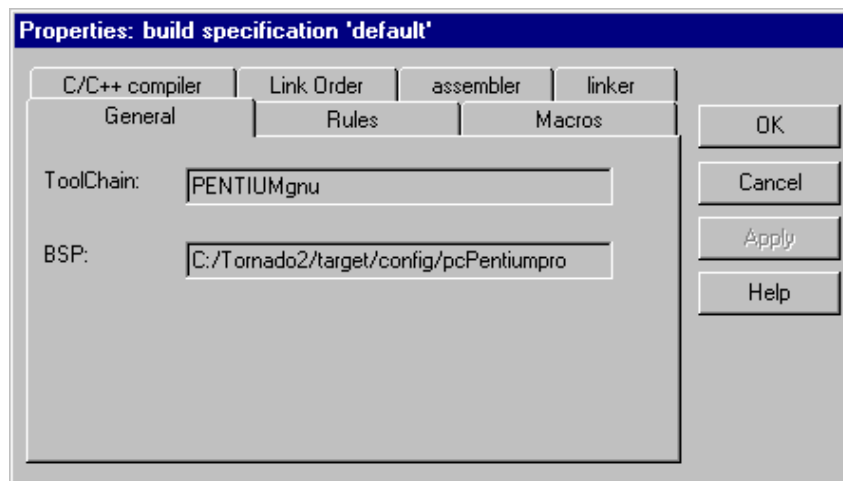
Steps for performing both methods are given in the following sections.

NOTE: Use only ONE of the following methods to define the board. It is not necessary to use both methods.

Defining the Board by Editing the Tornado 2 Project Build Options

1. Open a project in Tornado 2.
2. Click the **Build** tab.
3. Expand the workspace tree, if necessary, and double-click on the build specification.

The **Properties** dialog box displays.

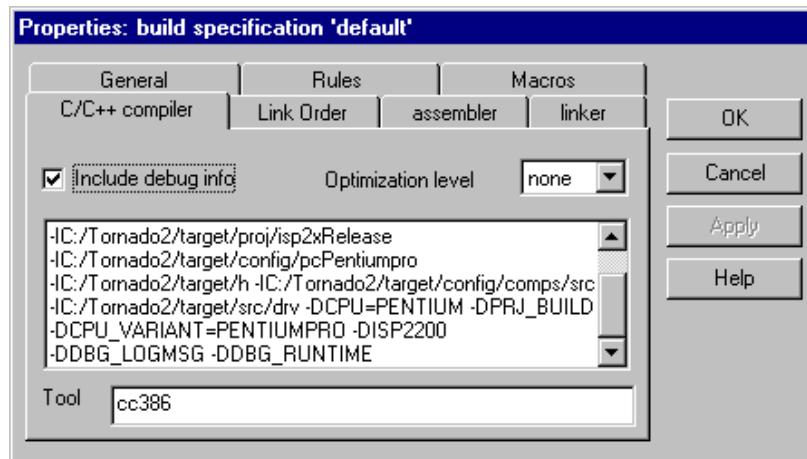


If the chip type is not defined in the `isp2xuser.h` file, continue to Step 4.

- OR -

If the chip type is already defined in the `isp2xuser.h` file, no further action is required. Proceed to Step 2 of "Including the `isp2x.a` Library File" on page 18 to include the `isp2x.a` library file in the build project.

- Click the **C/C++ compiler** tab.



- Type `-DDBG_LOGMSG -DDBG_RUNTIME` in the list box

- THEN -

Add one of the following:

- `-DISP2200` for the VMICPCI-5661, VMIPMC-5661 or the VMIPMC-5664 board
- `-DISP2300` for the VMIPMC-5666 board

For example, if you want to use the VMIPMC-5661, type the following:

```
-DDBG_LOGMSG -DDBG_RUNTIME -DISP2200
```

- Click **Apply** to save the change in the build options.

Defining the Board by Editing the `isp2xuser.h` File

- Open the `isp2xuser.h` file in a text editor and search for the line:

```
#define <chip type>
```

where `<chip type>` is the chip type on the board.

- Replace `<chip type>` with one of the following:

- `ISP2200` for the VMICPCI-5661, VMIPMC-5661 or the VMIPMC-5664 board
- `ISP2300` for the VMIPMC-5666 board

For example, if you want to use the VMIPMC-5661, change the line to:

```
#define ISP2200
```

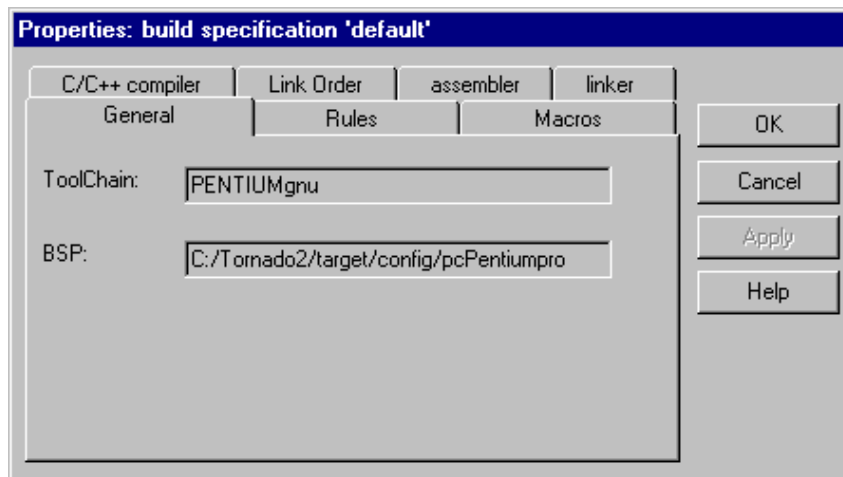
- Save and close the `isp2xuser.h` file.

Including the isp2x.a Library File

Once you have defined the board, do the following to include the isp2x.a library file:

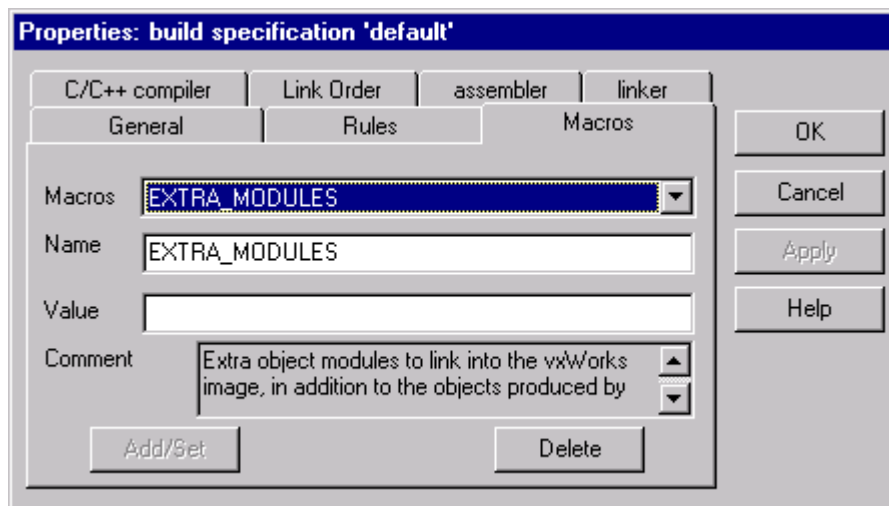
1. Open a project in Tornado 2.
2. Expand the workspace tree, if necessary, and double-click on the build specification.

The **Properties** dialog box displays.



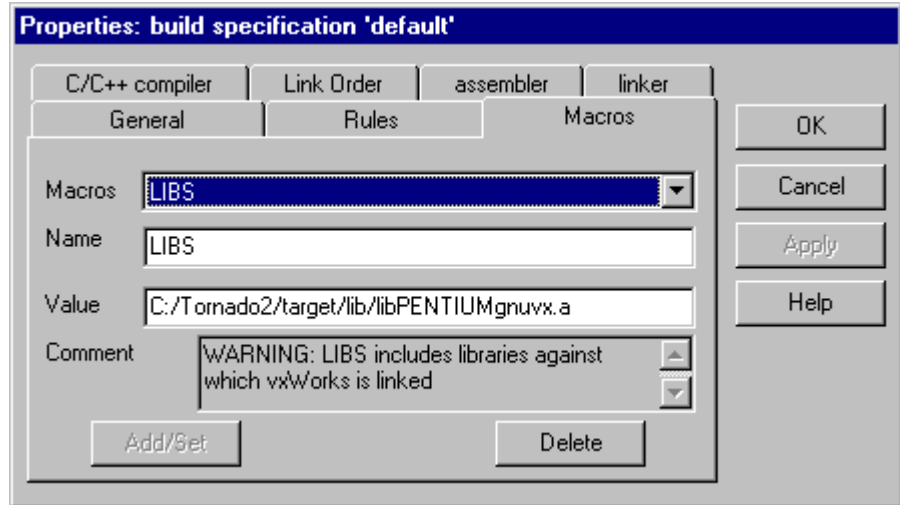
3. Click the **Macros** tab.

The **Macros** property page displays.



4. Select **LIBS** from the **Macros** drop-down menu.

The name **LIBS** displays in the **Name** field and the pathname and filename for the existing target library file displays in the **Value** field.



5. Add the `isp2x.a` file to the **Value** field by adding one space after the target library filename and then typing the pathname to the `isp2x.a` library file, which is `<root directory>/<chip type>/<processor type>`, followed by the filename (`isp2x.a`).

NOTE: Do not delete the existing library paths in the **Value** field.

For example, to define the `isp2x.a` file for the ISP2200 chip and the PCC603gnu processor if the driver software was installed on `F:\VMISFT-566X-ABC-037`, press the `SPACE BAR` once to include a space after the existing target library file and then type:

```
F:\VMISFT-566X-ABC-037\ISP2200\PCC603.gnu\isp2x.a
```

6. Click **Add/Set** to save the change to the **Value** field.
7. Click **Apply** to save the changes in the Build Options.
8. Click **OK** to close the dialog box.

Adding and Modifying Project Source Files, Routines, Components and Parameters

After defining the board and including the isp2x.a library file, the following source files must be added to the project:

- BSPX.c
- isp2xDebug.c
- isp2xpci.c
- isp2xuser.c

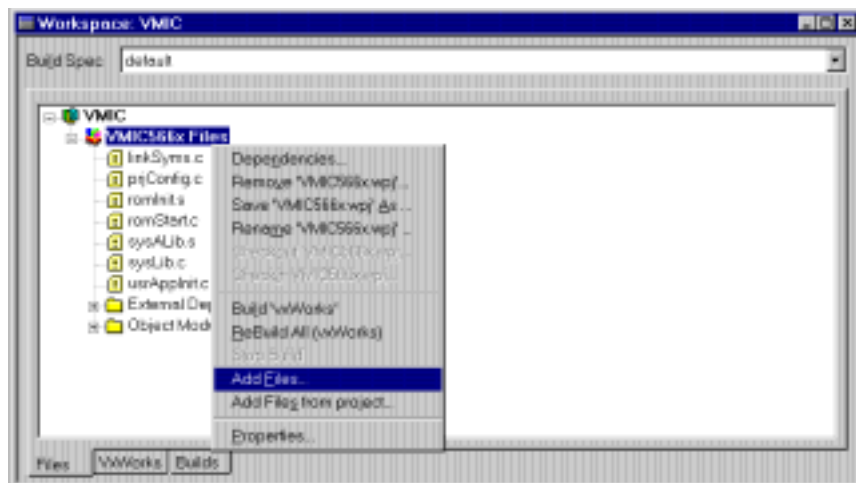
The following routines and components must be added to the project:

- network show routines
- semaphore show routine
- SCSI 2 component

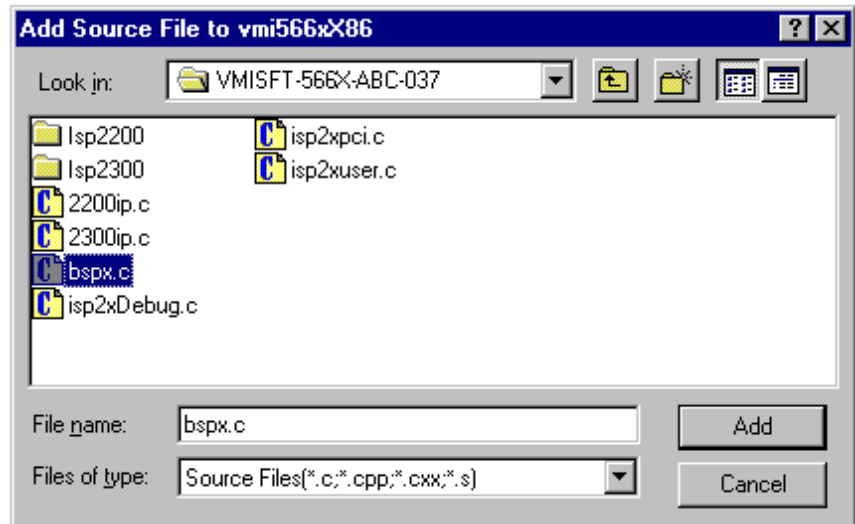
Additionally, the IP_MAX_UNITS (i.e. the maximum number of interfaces that can be attached to the IP layer) must be increased.

Do the following to perform these tasks in the project:

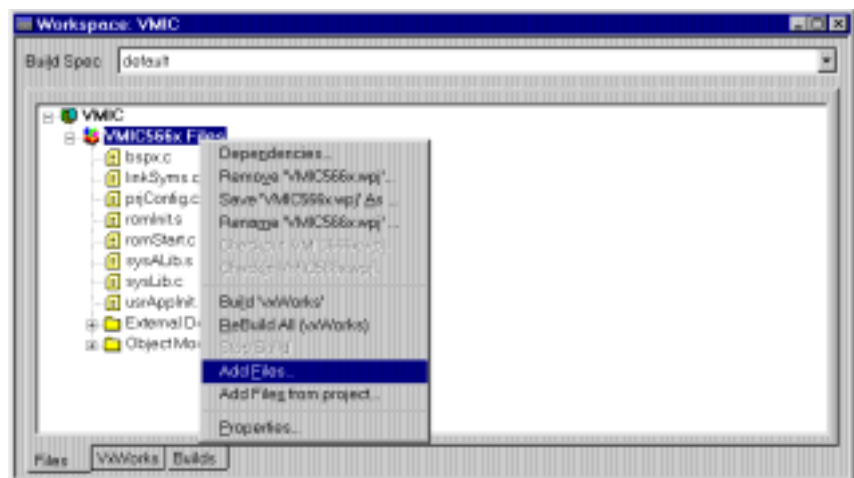
1. If necessary, open the project in Tornado 2.
2. Add the BSPX.c file, which contains the BSP abstraction layer, to the Tornado 2 project:
 - a. Click the **Files** tab.
 - b. Select the **Project > Add/Include > File** command.
-or-
Right-click on the project and then select **Add Files** from the shortcut menu.



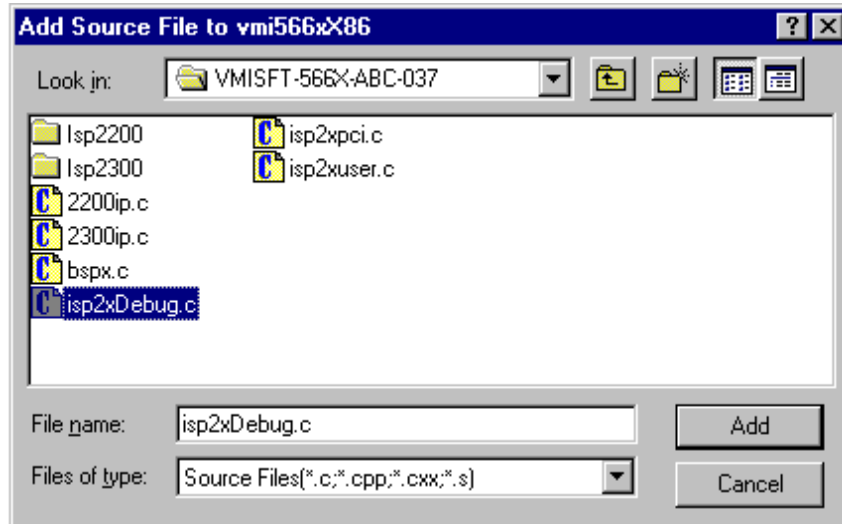
The **Add Source File** dialog box displays.



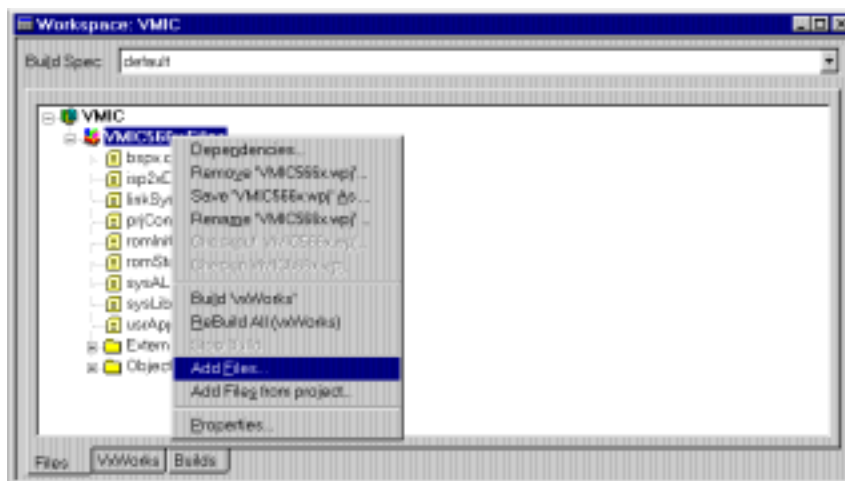
- c. Browse to the location of the `bsp.c` file.
 - d. Select the `BSPX.c` file and then click **Add**.
3. Add the `isp2xDebug.c` debug source file to the build project:
- a. Click the **Files** tab.
 - b. Select the **Project > Add/Include > File** command.
- or-
- Right-click on the project and then select **Add Files** from the shortcut menu.



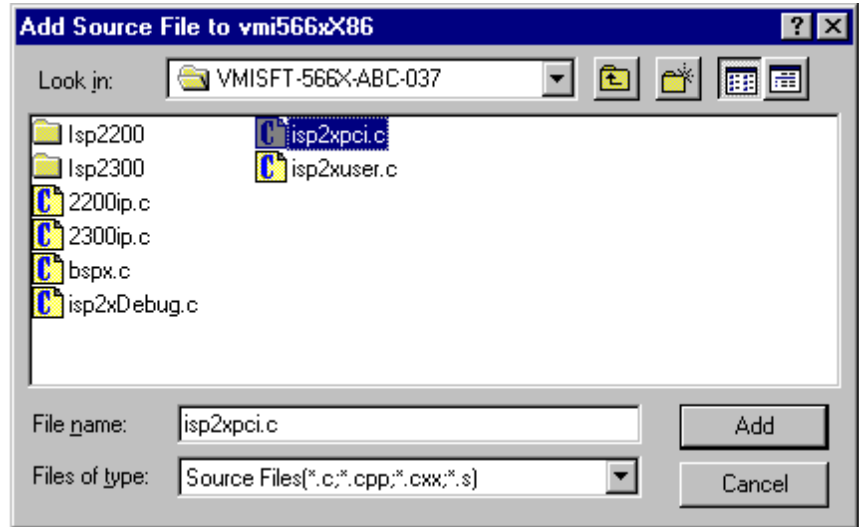
The **Add Source File** dialog box displays.



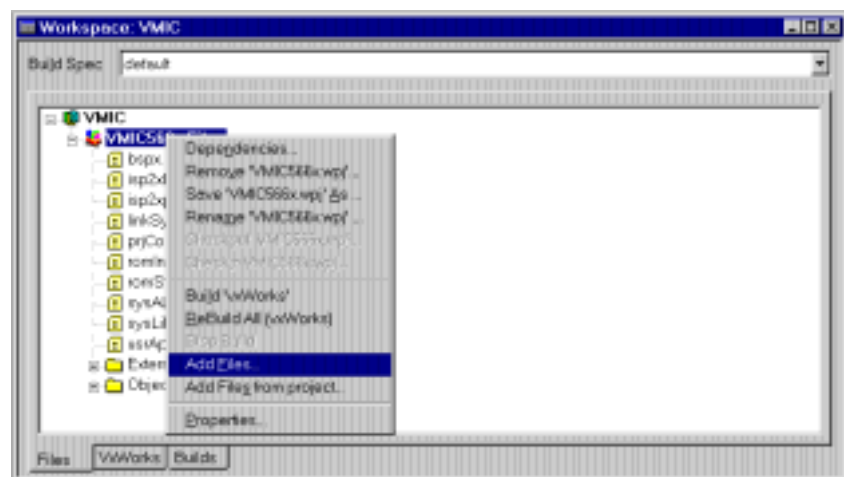
- c. Browse to the location of the `isp2xDebug.c` file.
 - d. Select the `isp2xDebug.c` file and then click **Add**.
4. Add the `isp2xpci.c` source file, which contains PCI configuration parameters, to the build project:
- a. Click the **Files** tab.
 - b. Select the **Project > Add/Include > File** command.
- or-
- Right-click on the project and then select **Add Files** from the shortcut menu.



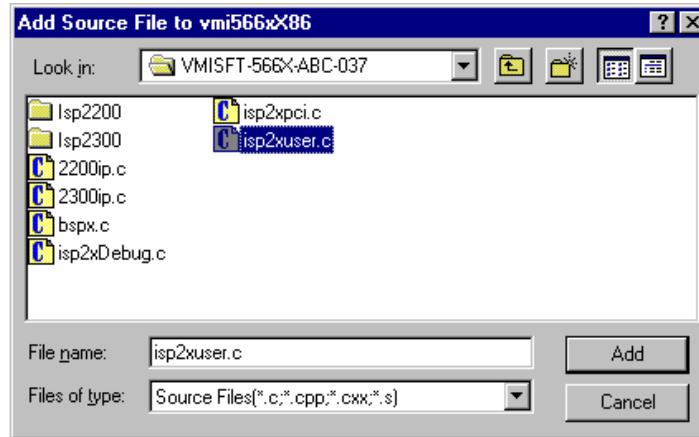
The **Add Source File** dialog box displays.



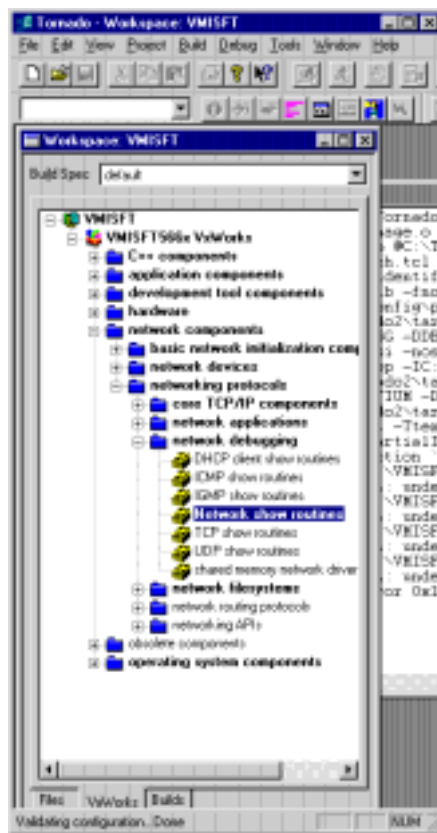
- c. Browse to the location of the `isp2xpci.c` file.
 - d. Select the `isp2xpci.c` file and then click **Add**.
5. Add the `isp2xuser.c` user source file to the build project:
- a. Click the **Files** tab.
 - b. Select the **Project > Add/Include > File** command.
-or-
Right-click on the project and then select **Add Files** from the shortcut menu.



The **Add Source File** dialog box displays.



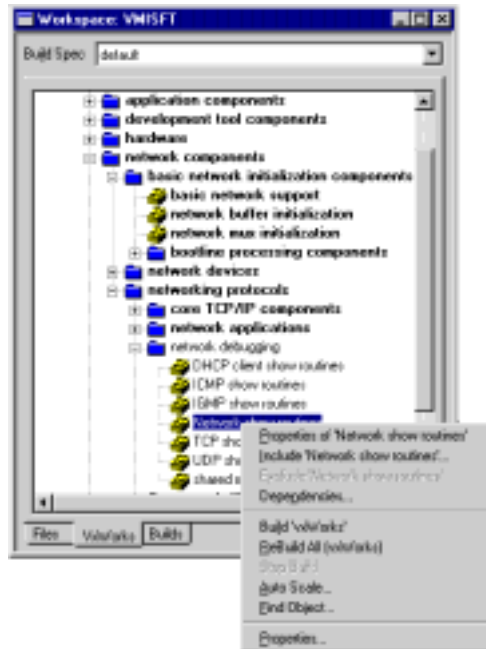
- c. Browse to the location of the `isp2xuser.c` file.
 - d. Select the `isp2xuser.c` file and then click **Add**.
6. Add the network show routines to the build project:
- a. Click the **VxWorks** tab.



- b. Expand the <workspace> > <project> > **network components** > **network protocols** > **network debugging** branches of the workspace tree, if necessary, and double-click **Network show routines**.

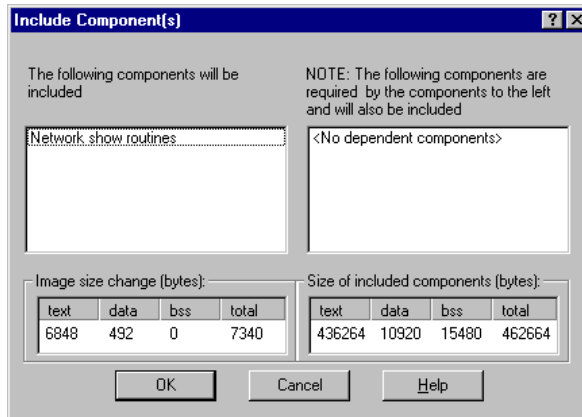
-or-

Right-click on **Network show routines** and then select **Include 'Network Show Routines'...** from the shortcut menu.

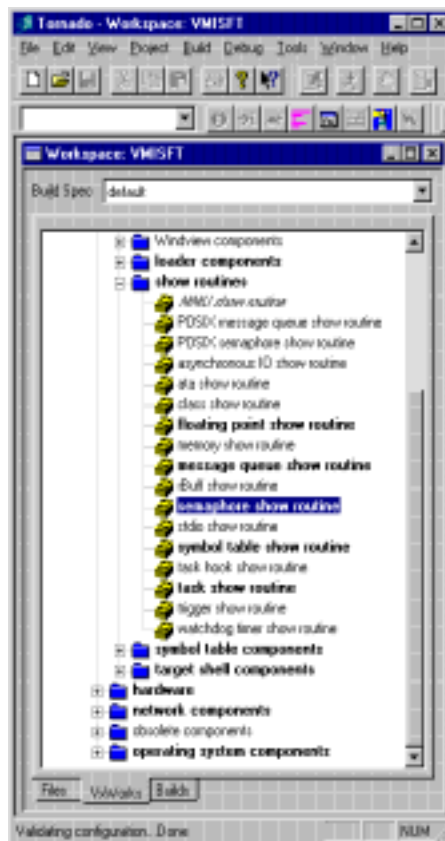


NOTE: The network show routines can only be added once to a project. If they have been added previously, **Include 'Network Show Routines'...** is dimmed in the shortcut menu. Additionally, double-clicking **Network show routines** in the Workspace window will display the properties of the component.

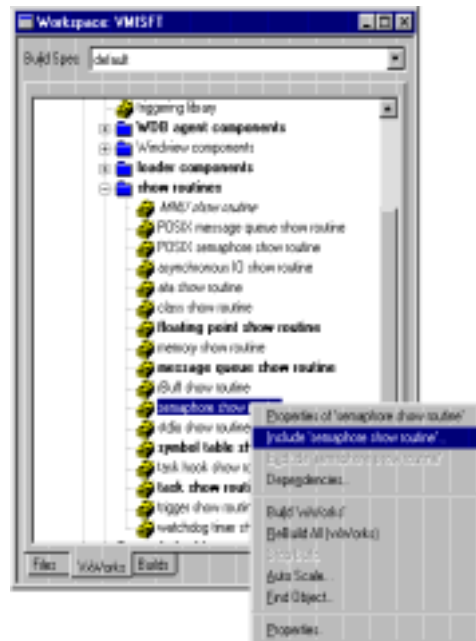
The **Include Component(s)** dialog box displays with **Network show routines** displayed in the list box as a component to include.



- c. Click **OK** to add the network show routines and dismiss the dialog box.
7. Add the semaphore show routine to the build project:
 - a. Click the **VxWorks** tab.

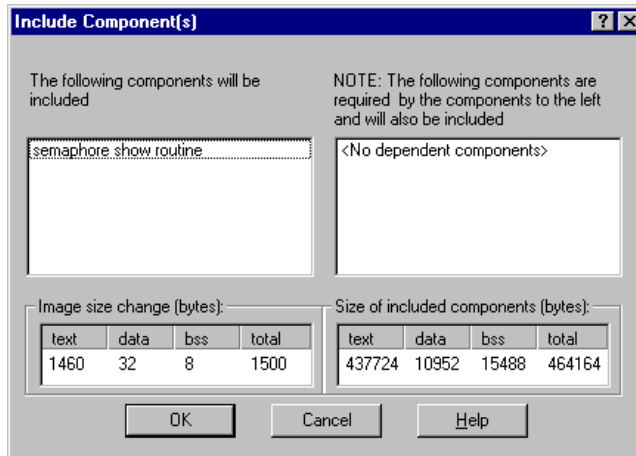


- b. Expand the <workspace> > <project> > **development tool components** > **show routines** branches of the workspace tree, if necessary, and double-click **semaphore show routine**.
-or-
Right-click on **Network show routines** and then select **Include 'semaphore show routine'...** from the shortcut menu.

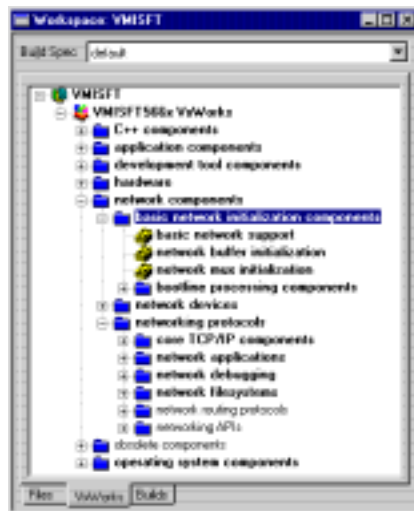


NOTE: The semaphore show routine can only be added once to a project. If it has been added previously, **Include 'semaphore show routine'...** is dimmed in the shortcut menu. Additionally, double-clicking **semaphore show routine** in the Workspace window will display the properties of the component.

The **Include Component(s)** dialog box displays with **semaphore show routine** displayed in the list box as a component to include.

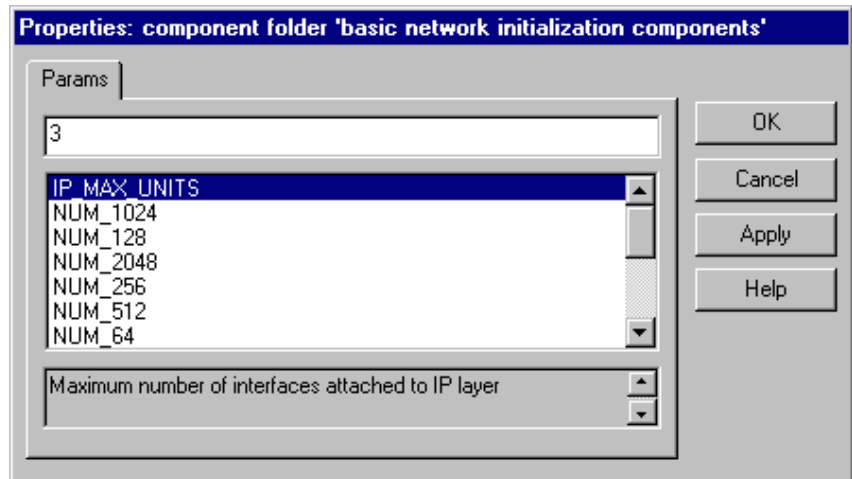


- c. Click **OK** to add the semaphore show routines and dismiss the dialog box.
8. Increase the IP_MAX_UNITS (i.e. the maximum number of interfaces that can be attached to the IP layer) from the default value of 1 to a value of 3:
 - a. Click the **VxWorks** tab.
 - b. Expand the **<workspace>** **>** **<project>** **>** **network components** branches of the workspace tree, if necessary.



- c. Right-click on **basic network initialization components** and then select **Properties** from the shortcut menu.

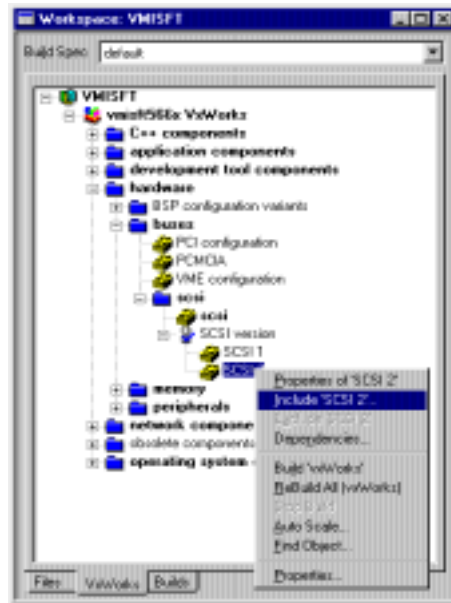
The **Include Component(s)** dialog box displays with **semaphore show routine** displayed in the list box as a component to include.



- d. Highlight **IP_MAX_UNITS** in the list box and change the default value of **1** in the text box to **3**.
- e. Click **Apply** to save the change.
- f. Click **OK** to dismiss the dialog box.
9. Verify that the SCSI 2 component is included:
- Click the **VxWorks** tab.
 - Expand the **<workspace>** > **<project>** > **hardware** > **scsi** branches of the workspace tree, if necessary.

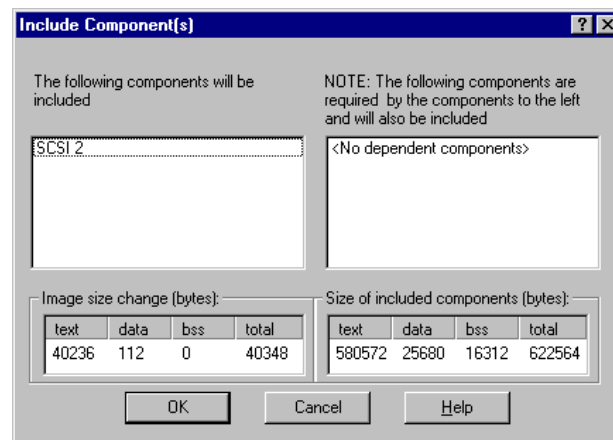


- c. Right-click on **SCSI 2** and then select **Include 'SCSI 2'...** from the shortcut menu.



NOTE: The SCSI 2 component can only be added once to a project. If it has been added previously, **Include 'SCSI 2'...** is dimmed in the shortcut menu. Additionally, double-clicking **SCSI 2** in the Workspace window will display the properties of the component.

The **Include Component(s)** dialog box displays with **SCSI 2** displayed in the list box as a component to include.



- d. Click **OK** to add the SCSI 2 component and dismiss the dialog box.

10. Rebuild the driver into the VxWorks image by selecting the Tornado 2 project and then selecting the **Build > Rebuild All** command.

-or-

Right-click on the project and then select **ReBuild All (VxWorks)** from the shortcut menu.

The driver is built into the VxWorks Image.

PowerPC and X86 (Intel)

This section contains a detailed description of the parameters and default settings common to both PowerPC and X86 (Intel) processors.

Driver Configuration (isp2xuser.c)

The functions in the following sections enable you to set up your Fibre Channel driver and are defined in the file `isp2xuser.c`. These functions can be modified to conform to and support your particular BSP.

isp2xUserCtrl Function Members

The following members are included in the `isp2xUserCtrl` structure, which is used to perform card-level configuration for the Fibre Channel driver. The configuration variables in the following table are configured in the `isp2xUserCreate` function.

Table 1-1 isp2xUserCtrl Function Members

Member	Description
<i>ipRecQSize</i>	<i>ipRecQSize</i> is a global parameter that contains the number of entries for the IP receive queue ring buffer and the IP receive buffer array. This buffer is maintained and controlled through Mailbox8. Each queue entry allocates 12 bytes of system memory. The minimum size is eight entries, which allocates 96 bytes (8 X 12 = 96). The default setting is 64, which allocates 768 bytes of system memory. The size of the IP receive buffer array is based on the product of the <i>ipMtuSize</i> parameter (with a default value of 8192) times the <i>ipRecQSize</i> parameter (with a default value of 64), which allocates 512 Kbytes for the IP receive buffer array in system memory.
<i>ipMtuSize</i>	<i>ipMtuSize</i> sets the size of the maximum transfer size between the driver and HBA firmware. Valid values are 140 to 65280 bytes. The default value is 8192 bytes.
<i>ipXmtBufCnt</i>	<i>ipXmtBufCnt</i> sets the maximum number of host IP transmit buffers appended to the RISC. The default value is 16.
<i>ipResources</i>	<i>ipResources</i> sets the maximum number of <i>respQSize</i> entries allocated for receiving IP buffers. The default value is 250 buffers. This value should be less than <i>respQSize</i> .
<i>ipLowWaterMark</i>	<i>ipLowWaterMark</i> sets when the HBA firmware interrupts the host to indicate that the firmware is running out of IP receive buffers. The default value is 0.

Table 1-1 isp2xUserCtrl Function Members (Continued)

Member	Description
<i>pageSize</i>	The <i>pageSize</i> parameter is used by the driver for setting memory alignment and buffer size. If your BSP does not define <i>pageSize</i> , the default value is 4096.
<i>resqQSize</i>	The <i>resqQSize</i> parameter contains the number of entries for the request buffer. This buffer is maintained and controlled through Mailbox4. Each queue entry allocates 64 bytes of system memory. The minimum size is eight entries, which allocates 512 bytes (8 X 64 = 512). The default value is 256, which allocates 32 Kbytes of system memory.
<i>respQSize</i>	The <i>RespQSize</i> parameter contains the number of entries for the response buffer. This buffer is maintained and controlled through Mailbox5. Each queue entry allocates 64 bytes of system memory. The minimum size is eight entries, which allocates 512 bytes (8 X 64 = 512). The default value is 256, which allocates 32 Kbytes of system memory.

isp2xScsiOverRide Function Members

The members in the following table are included in the **isp2xScsiOverRide** function, which is used to perform chip-level configuration for the Fibre Channel driver.

Table 1-2 isp2xScsiOverRide Function Members

Member	Description										
<i>connectionMode</i>	<p>The <i>connectionMode</i> parameter specifies the connection mode options. Valid values are:</p> <table border="1"> <thead> <tr> <th>Value</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Loop only</td> </tr> <tr> <td>1</td> <td>Point-to-Point only</td> </tr> <tr> <td>2</td> <td>Loop preferred, otherwise Point-to-Point</td> </tr> <tr> <td>3</td> <td>Point-to-Point preferred, otherwise Loop (ISP-2200 chip only)</td> </tr> </tbody> </table> <p>The default value is 2 for the ISP-2300 chip or 3 for the ISP-2200 chip.</p>	Value	Description	0	Loop only	1	Point-to-Point only	2	Loop preferred, otherwise Point-to-Point	3	Point-to-Point preferred, otherwise Loop (ISP-2200 chip only)
Value	Description										
0	Loop only										
1	Point-to-Point only										
2	Loop preferred, otherwise Point-to-Point										
3	Point-to-Point preferred, otherwise Loop (ISP-2200 chip only)										
<i>maxFrameLength</i>	The <i>maxFrameLength</i> parameter sets the HBA firmware maximum frame size, in bytes, allowed to be sent in one Fibre Channel packet. The maximum size is 2048 bytes. The default value is 2048 bytes.										
<i>adapterHardLoopID</i>	The <i>adapterHardLoopID</i> parameter sets the Hard Loop ID used by the firmware when in loop mode.										

Table 1-2 isp2xScsiOverRide Function Members (Continued)

Member	Description								
<i>enableHardLoopID</i>	The <i>enableHardLoopID</i> parameter enables the Hard Loop ID feature. Set <i>adapterHardLoopID</i> to the desired Loop ID.								
<i>dataRate</i>	<p>The <i>dataRate</i> parameter sets the link rate for ISP2300-based HBAs (i.e. VMIPMC-5666). Valid values are:</p> <table border="1"> <thead> <tr> <th>Value</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>1 Gbyte</td> </tr> <tr> <td>1</td> <td>2 GByte</td> </tr> <tr> <td>2</td> <td>Auto</td> </tr> </tbody> </table> <p>The default value is 2.</p>	Value	Description	0	1 Gbyte	1	2 GByte	2	Auto
Value	Description								
0	1 Gbyte								
1	2 GByte								
2	Auto								

PCI Configuration Parameters (isp2xpci.h)

The configuration parameters in the following table are applicable to the VMICPCI-5661, VMIPCI-5661, VMIPMC-5661 and VMIPMC-5664 Fibre Channel adapters.

Table 1-3 isp2xpci.h Configuration Parameters

Function	Description
<i>isp2xPciFind</i>	The <i>isp2xPciFind</i> function finds and configures the PCI device.

Installation Procedures

Complete the following steps to install a VxWorks Fibre Channel driver:

1. Log in as the user who owns the files in the VxWorks tree.
2. Edit the makefile using the Tornado 2 Project Build Options.
3. In the VxWorks configuration, ensure the following parameters are defined:

Parameter	Description
INCLUDE_PCI	Includes PCI subsystem code
INCLUDE_CACHE_SUPPORT	Includes CACHE subsystem code
INCLUDE_LOGGING	Includes target message logging capability
INCLUDE_SCSI	Includes SCSI library functions
INCLUDE_SCSI2	Includes SCSI-2 subsystem code

If you are installing a VMI5661 series, VMIPMC-5664 or VMIPMC-5666 adapter, ensure the additional two parameters are defined:

Parameter	Description
INCLUDE_NETWORK	Includes network subsystem code
INCLUDE_NET_SHOW	Includes network information and status capability

4. To support SCSI, a file system component must be configured. VxWorks supports three types of file systems:
 - DOS
 - RT11
 - Raw

One or all of these file systems must be defined for disk I/O support using the following parameters:

Parameter	Description
INCLUDE_DOSFS	Includes DOS file system support
INCLUDE_RAWFS	Includes Raw file system support
INCLUDE_RT11FS	Includes RT11 file system support

If you are installing a VMI5661 series, VMIPMC-5664 or VMIPMC-5666 adapter, continue to Step 5. Otherwise, go to Step 6.

5. To assist in testing and troubleshooting the network layer of a VxWorks Fibre Channel driver, the **ping** utility should be added to the VxWorks configuration using the following components.

Parameter	Description
INCLUDE_PING	Includes the ping utility
INCLUDE_SHELL	Includes the SHELL interpreter

6. Build the VxWorks image.

Verifying the Installation

Use the following methods to verify successful VxWorks Fibre Channel driver installation.

SCSI Verification Test

To verify the SCSI connection, the following assumptions are made:

- The DOS file system support (`INCLUDE_DOSFS`) and the target-based interactive C-expression interpreter (`INCLUDE_SHELL`) are included in the VxWorks image.
- The Fibre Channel disk is connected to the system being tested.

To test the SCSI, type the following and then press `ENTER`:

-> `isp2xCreate` for systems with a PowerPC processor

The following displays on the computer screen:

```
-> isp2xCreate
Adapter WWN 21ff00e08bffffff
Adapter in 64 Bit PCI Slot
NVRAM values:
  Max Frame Length = 2048
    Hard Loop ID = 0
    Risc Option = 0xa006
ISP 2300 Firmware Revision 3.0.35
value = 0 = 0x0
-> scsiAutoConfig(isp2xScsiGet(0))
value = 0 = 0x0
-> scsiShow(isp2xScsiGet(0))
ID LUN VendorID   ProductID      Rev. Type  Blocks  BlkSize pScsiPhysDev
-----
  0  0 SEAGATE  ST318452FC     0001  0 35843670  512  0x01ffbdc0
  1  0 SEAGATE  ST318452FC     0001  0 35843670  512  0x01b73680
  2  0 SEAGATE  ST318452FC     0001  0 35843670  512  0x01b73470
  3  0 SEAGATE  ST318452FC     0001  0 35843670  512  0x01b73260
value = 0 = 0x0
-> pBlk=scsiBlkDevCreate(0x01ffbdc0)
new symbol "pBlk" added to symbol table.
pBlk = 0x1ffb48: value = 28782792 = 0x1b730c8
-> dosFsMkfs("/sd0/",pBlk)
value = 29334560 = 0x1bf9c20
-> dosFsConfigShow("/sd0/")
device name:          /sd0/
total number of sectors: 35843670
bytes per sector:    512
media byte:          0xf0
# of sectors per cluster: 35
# of reserved sectors: 1
# of FAT tables:     2
# of sectors per FAT: 4001
max # of root dir entries: 112
# of hidden sectors: 0
removable medium:    false
```

```
disk change w/out warning: not enabled
auto-sync mode:           not enabled
long file names:         not enabled
exportable file system:  not enabled
lowercase-only filenames: not enabled
volume mode:             O_RDWR (read/write)
available space:         1167988736 bytes
max avail. contig space: 1167988736 bytes
value = 0 = 0x0
-> copy "test.txt", "/sd0/test.txt"
value = 0 = 0x0
-> ls "/sd0/"
TEST.TXT
value = 0 = 0x0
```

Network Verification Test

NOTE: Network verification testing is *not* applicable to VMI5660 series adapters, since they do not provide Fibre Channel IP support.

To verify the network connection, the following assumptions are made:

- The **ping** utility (`INCLUDE_PING`) and the target-based interactive C-expression interpreter (`INCLUDE_SHELL`) are included in the VxWorks image.
- Another networked Fibre Channel system is connected to the system being tested.

To test the network, type the following and then press `ENTER` if the controller is not already initialized:

```
isp2xCreate
```

The following displays on the computer screen:

```
-> isp2xCreate
Adapter WWN 21ff00e08bffffff
Adapter in 64 Bit PCI Slot
NVRAM values:
  Max Frame Length = 2048
  Hard Loop ID = 0
  Risc Option = 0xa006
ISP 2300 Firmware Revision 3.0.35
value = 0 = 0x0
-> isp2xNetSetup(0,"192.168.6.16")
isp (unit number 0):
  Flags: (0x63) UP BROADCAST ARP RUNNING
  Type: ETHERNET_CSMACD
  Internet address: 192.168.6.16
  Broadcast address: 192.168.6.255
  Netmask 0xffffffff Subnetmask 0xffffffff00
  Ethernet address is 00:e0:8b:ff:ff:ff
  Metric is 0
  Maximum Transfer Unit size is 8168
  0 packets received; 1 packets sent
  0 multicast packets received
  0 multicast packets sent
  0 input errors; 0 output errors
  0 collisions; 0 dropped
value = 0 = 0x0
-> ping "192.168.6.30",1
192.168.6.30 is alive
value = 0 = 0x0
```

NOTE: The IP address 192.168.6.30 represents the system networked to the system being tested.

Troubleshooting

If you encounter problems building or exercising the Fibre Channel driver, the following sections contain possible solutions and discuss the most common sources of errors and how to reduce the possibilities of encountering them.

Build Errors

Use the following methods to perform driver build troubleshooting.

- If the file `isp2xuser.c` generates the following error during the driver build, you have not defined the board type.

```
In file included from C:\Drivers\Qlogic_Fibre\vxworks\isp2x\isp2xuser.c:75:
C:\Drivers\Qlogic_Fibre\vxworks\isp2x\isp2xpci.h:45: warning: #warning
defaulting to PCI_CFG_FORCE
C:\Drivers\Qlogic_Fibre\vxworks\isp2x\isp2xpci.h:218: warning: #warning
using intConnect
C:\Drivers\Qlogic_Fibre\vxworks\isp2x\isp2xuser.c:100: #error define one of
ISP2200, ISP2300 in your project setting or makefile
C:\Drivers\Qlogic_Fibre\vxworks\isp2x\isp2xuser.c:359: warning: #warning
Useing cache macros
C:\Drivers\Qlogic_Fibre\vxworks\isp2x\isp2xuser.c:427: warning: #warning
Useing default cache line size 32
```

To resolve this error, define the board type. See "Defining the Board" on page 16 for more information.

SCSI Troubleshooting

Use the following methods to perform SCSI troubleshooting.

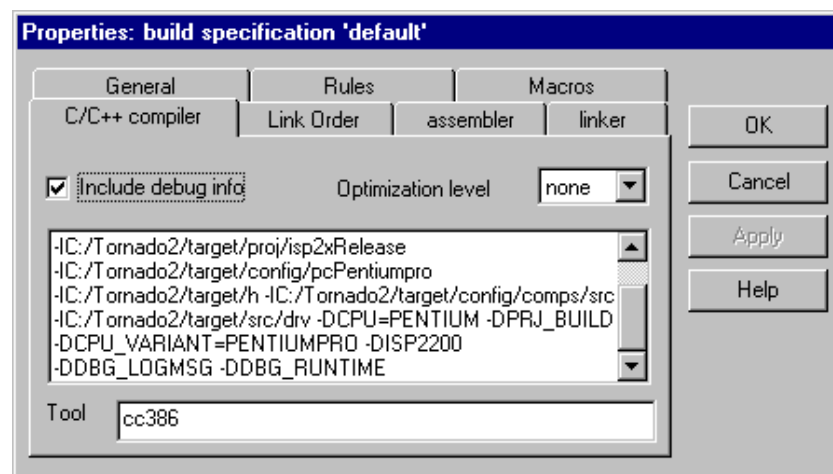
- Configure your system in a simple Point-to-Point configuration. To do this:
 - Cable the fibre/copper transmit to receive on an FC disk
 - Connect the receive to the transmit on the FC disk

Follow the instructions in "Verifying the Installation" on page 37.

If a problem still exists, edit the `isp2xuser.c` code to turn on all debug flags and warnings by doing the following:

1. Open a project in Tornado 2.
2. Click the **Build** tab.
3. Expand the workspace tree, if necessary, and double-click on the build specification.

The **Properties** dialog box displays.



4. Click the **C/C++ compiler** tab.
5. Add the following lines to turn on all debug flags:


```
-DDBG_RUNTIME
-DDBG_LOGMSG
```
6. Add the following line to turn on all warnings:


```
-Wall
```
7. Click **OK** to close the dialog box.
8. Set the `scsiDebug` flag to true:


```
scsiDebug = TRUE;
```

Performing the above will generate a large number of debug messages that will assist in determining the cause of the problem.

Network Troubleshooting

NOTE: Network troubleshooting is *not* applicable to VMI5660 series adapters, since they do not provide Fibre Channel IP support.

Use the following methods to perform network troubleshooting.

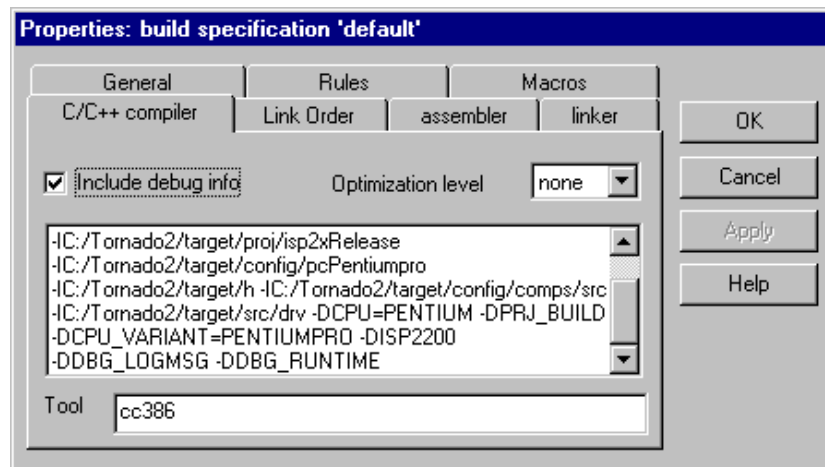
- Configure your system in a simple Point-to-Point configuration. To do this:
 - Cable the fibre/copper transmit to receive on another system
 - Connect the receive to the transmit on the other system

The network portion of this driver is dependent on the sysScsiInit verification test completing with no errors. See "Network Verification Test" on page 39 for more information.

If a problem still exists:

- Edit the isp2xuser.c code to turn on all debug flags and warnings by doing the following:
 1. Open a project in Tornado 2.
 2. Click the **Build** tab.
 3. Expand the workspace tree, if necessary, and double-click on the build specification.

The **Properties** dialog box displays.



4. Click the **C/C++ compiler** tab.
5. Add the following lines to turn on all debug flags:
 - DDBG_RUNTIME
 - DDBG_LOGMSG

6. Add the following line to turn on all warnings:

```
-Wall
```

7. Click **OK** to close the dialog box.

8. Set the `scsiDebug` flag to true:

```
scsiDebug = TRUE;
```

Performing the above will generate a large number of error messages that will assist in determining the cause of the problem.

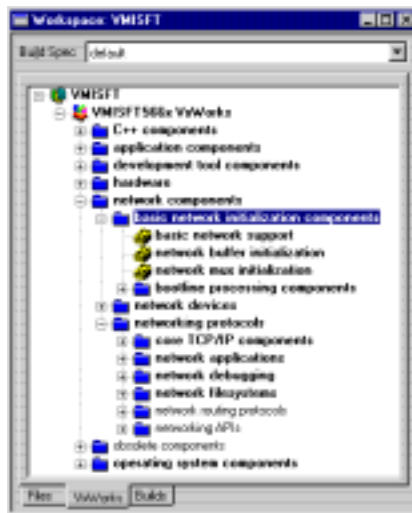
Using the VxWorks utility **ifShow**, verify that the Network IP addresses of the system being tested and the connected system are valid IP addresses.

- Using the VxWorks **ping** utility, issue a ping to the connected system's IP address, then use the **ifShow** utility to determine if the count of packets sent is increasing. Perform the same procedure from the connected system, using a similar utility for the platform, to ensure packet count is increasing on the system being tested.
- If the following occurs, increase the `IP_MAX_UNITS` value, which defines the maximum number of interfaces that can be attached to the IP layer, from the default of 1 to a value of 3.

```
-> isp2xNetSetup(0,"192.168.6.104")
0x7f43570 (tShell): Protocol is out of space. Increase IP_MAX_UNITS.
0x7f43570 (tShell): ERR:isp2xNetSetup: Failed to attach to device isp0
value = -1 = 0xffffffff = _func_taskRegsShowRtn + 0xffde3b83
```

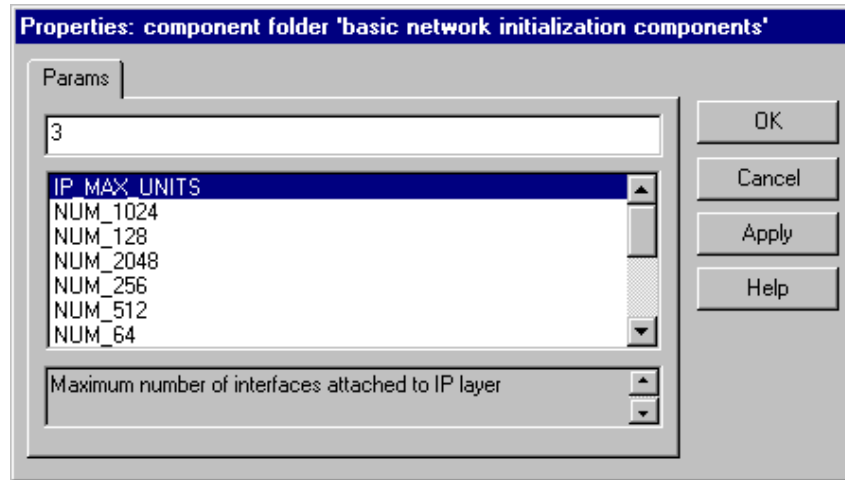
To increase the `IP_MAX_UNITS`, do the following:

1. If necessary, open the project in Tornado 2.
2. In the Workspace window, click the **VxWorks** tab.
3. Expand the **<workspace>** > **<project>** > **network components** branches of the workspace tree, if necessary.



4. Right-click on **basic network initialization components** and then select **Properties** from the shortcut menu.

The **Include Component(s)** dialog box displays with **semaphore show routine** displayed in the list box as a component to include.

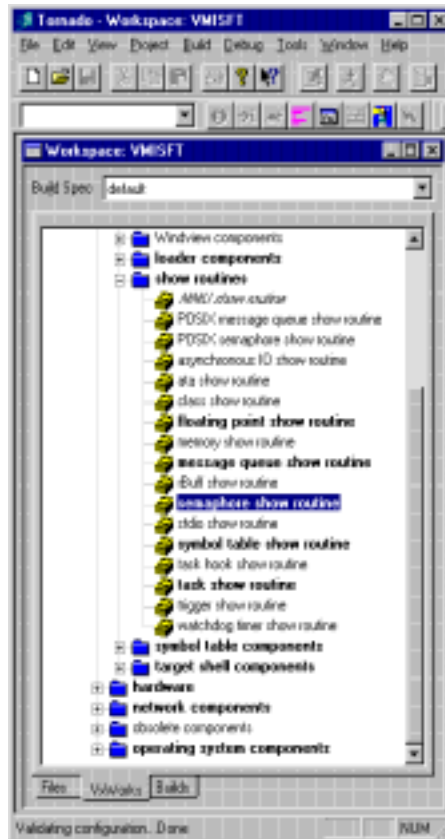


5. Highlight **IP_MAX_UNITS** in the list box and change the default value of **1** in the text box to **3**.
 6. Click **Apply** to save the change.
 7. Click **OK** to dismiss the dialog box.
- If the following occurs, the semaphore show routine has not been included in the build project.

```
C:\Tornado2\target\proj\VMISFT566x\default\C:\Tornado2\target\proj\
VMISFT566x\VMISFT-566X-ABC-037\isp2xuser.c:534: undefined reference to
'ifShow'
C:\Tornado2\target\proj\VMISFT566x\default\C:\Tornado2\target\proj\
VMISFT566x\VMISFT-566X-ABC-037\isp2xuser.c:534: undefined reference to
'ifShow'
C:\Tornado2\target\proj\VMISFT566x\default\C:\Tornado2\target\proj\
VMISFT566x\VMISFT-566X-ABC-037\isp2xuser.c:534: undefined reference to
'ifShow'
C:\Tornado2\target\proj\VMISFT566x\default\C:\Tornado2\target\proj\
VMISFT566x\VMISFT-566X-ABC-037\isp2xuser.c:534: undefined reference to
'semShow'
make: *** [vxWorks] Error 0x1
```

To include the semaphore show routine, do the following:

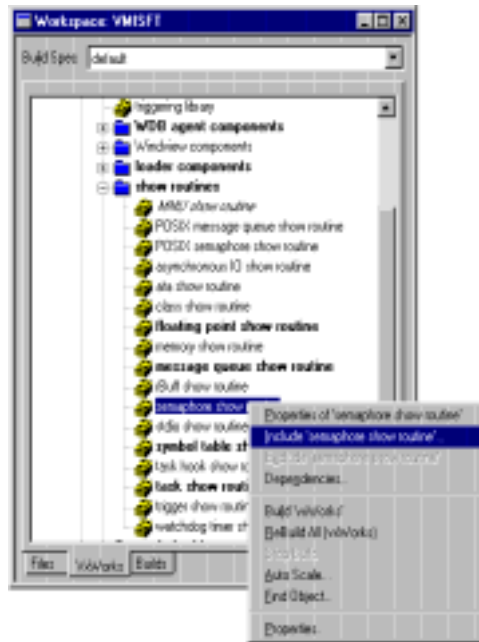
1. If necessary, open the project in Tornado 2.
2. In the Workspace window, click the **VxWorks** tab.



3. Expand the **<workspace>** > **<project>** > **development tool components** > **show routines** branches of the workspace tree, if necessary, and double-click **semaphore show routine**.

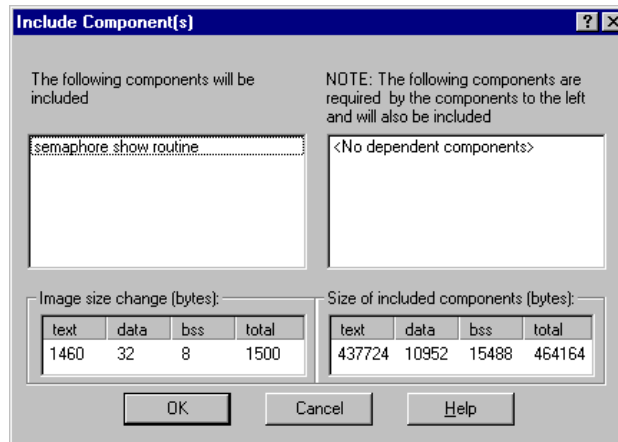
-OR-

Right-click on **Network show routines** and then select **Include 'semaphore show routine'...** from the shortcut menu.



NOTE: The semaphore show routine can only be added once to a project. If it has been added previously, **Include 'semaphore show routine'...** is dimmed in the shortcut menu. Additionally, double-clicking **semaphore show routine** in the Workspace window will display the properties of the component.

The **Include Component(s)** dialog box displays with **semaphore show routine** displayed in the list box as a component to include.



4. Click **OK** to add the semaphore show routines and dismiss the dialog box.

VxWorks Fibre Channel Functions

This section contains the following functions, which can be used with the VMISFT-566x-ABC-037 VxWorks Fibre Channel driver.

Function	Description	Page
isp2xScsiGet	Returns a ScsiCtrl pointer for SCSI Fibre Channel operations	48
isp2xIspShow	Displays Fibre Channel setup information	49
isp2xrpc	Provides user control of VMIPMC-5664 board modes	50
isp2xNetSetup	Sets up an IP END Network Interface	51

isp2xScsiGet

The **isp2xScsiGet** function returns the pointer to the Fibre Channel device. This function is applicable to all Fibre Channel boards.

Parameters

<i>Unit</i>	Index of the board for which the setting is being changed. The index of the first board is 0.
-------------	---

Return

success	Returns ScsiCtrl for Fibre Channel SCSI operations.
fail	Null.

Syntax

```
FC_CTRL* isp2xScsiGet (int Unit)
```

Example

```
-> scsiAutoConfig(isp2xScsiGet(0))  
value = 0 = 0x0
```


isp2xrpc

Use the **isp2xrpc** function to provide user control of VMIPMC-5664 board modes.

NOTE: This function is applicable to the VMIPMC-5664 adapter *only*.

Parameters

HBA_Index Index of the board for which the setting is being changed. The index of the first board is 0.

control The VMIPMC-5664 mode. Available modes are:

Value	Mode
ISP2XRPC_REDUND_A = 0x7	Redundant Port A
ISP2XRPC_REDUND_B = 0xb	Redundant Port B
ISP2XRPC_MAN_A = 0x5	Manual Port A
ISP2XRPC_MAN_B = 0x9	Manual Port B
ISP2XRPC_HUB = 0xe	Hub Mode
ISP2XRPC_STATUS = 0x0	One of the above modes, or -1 if an error occurs.

Return

success Returns the board's current mode.

fail -1. Failure to set the board's mode.

Syntax

```
IMPORT int16_t isp2xrpc (int16_t HBA_Index, isp2xrpc_enum_t control)
```

Example

Key in the following command line to put the board in Hub mode.

```
isp2xrpc (0, 0xe)
```

NOTE: By default, the VMISFT-566x-ABC-037 driver sets the VMIPMC-5664 board's mode to Hub mode.

isp2xNetSetup

Use the **isp2xNetSetup** function to set up an IP END Network Interface.

Parameters

<i>HBA_Index</i>	Index of the board for which the setting is being changed. The index of the first board is 0.
<i>Network_Address</i>	Address of the IP END Network Interface.

Return

success	Sets up the interface.
fail	-1. Failure to set up the interface.

Syntax

```
FC_CTRL* isp2xNetSetup (int HBA_Index, Network_Address)
```

Example

```
-> isp2xNetSetup(0,"192.168.6.104")
isp (unit number 0):
  Flags: (0x63) UP BROADCAST ARP RUNNING
  Type: ETHERNET_CSMACD
  Internet address: 192.168.6.104
  Broadcast address: 192.168.6.255
  Netmask 0xffffffff Subnetmask 0xffffffff
  Ethernet address is 00:20:38:00:14:01
  Metric is 0
  Maximum Transfer Unit size is 8168
  0 packets received; 1 packets sent
  0 multicast packets received
  0 multicast packets sent
  0 input errors; 0 output errors
  0 collisions; 0 dropped
value = 0 = 0x0
->
```

Accessing Additional Information

VMIC Documentation

The following files are distributed with the VMISFT-566x-ABC-037 VxWorks Fibre Channel driver software:

File	Description
2200ip.c	Firmware hex file download to 5661/5664 HBA
2300ip.c	Firmware hex file download to 5666 HBA
bsp.c	BSP abstraction
bsp.h	BSP abstraction interface
bspuser.h	BSP abstraction user configuration
isp2x.a	Library for the isp2x driver. An isp2x.a file is delivered for each supported processor type in the <root>/<chip type>/<processor type> directory, where <root> is the root directory of the delivery media, <chip type> is the HBA's chip type (Isp2200 for the VMICPCI-5661, VMIPMC-5661 and VMIPMC-5664 boards, or Isp2300 for the VMIPMC-5666 board) and <processor type> is the system's processor type. See "System Requirements" on page 15 for information on supported processor types.
isp2xApi.h	Isp2x API
isp2xDebug.c	Debug source
isp2xDebug.h	Debug include
isp2xisp.h	Defines and structures used by the driver
isp2xnvr.am.h	Isp2x NVRAM definitions
isp2xpci.c	PCI configuration parameters
isp2xpci.h	PCI configuration parameters include
isp2xuser.c	User section of code
isp2xuser.h	Defines and structures used by the driver
README.txt	List of files contained in the product
Release.txt	Release notes
vmisft566x.pdf	<i>VMISFT-566x Fibre Channel Drivers Installation Guide</i>

The following is a list of other reference documentation related to this driver:

VMIC VxWorks Board Support Package Abstraction (BSPX) Software Reference Manual
(523-000154-000)

VMICPCI-5661 CompactPCI bus Fibre Channel Host Adapter Product Manual
(500-655661-000)

VMIPCI-5661 PCI bus Fibre Channel Host Adapter Product Manual (500-855661-000)

VMIPMC-5661 PMC bus Fibre Channel Host Adapter Product Manual (500-755661-000)

VMIPMC-5664 PMC Fibre Channel Host Adapter with Redundant External Ports
Product Manual (500-755664-000)

VMIPMC-5666 PMC Fibre Channel Host Adapter with Redundant External Ports
Product Manual (500-755666-000)

Please call your VMIC sales representative for more information.

Wind River Documentation (VxWorks)

Additional information for accessing file systems or networks can be found in the I/O System and the Network sections of the *VxWorks Programmer's Guide* and the *VxWorks Network Programmer's Guide*.

Also see the VxWorks Online Help for information on the **scsi2Lib**, **dosFsLib**, **rt11FsLib** and **rawFsLib** commands.

The VMISFT-566x-ABC-000 Solaris SPARC/x86 SCSI Driver

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Introduction

This chapter provides configuration, installation and operation information for the VMISFT-566x-ABC-000 Fibre Channel driver for the Solaris platform (version 2.6 and later) on a family of VMIC 566x Host Bus Adapters (HBAs). The software is delivered with both 32-bit and 64-bit Solaris SPARC driver images, as well as with Solaris 32-bit x86 driver images.

The VMISFT-566x-ABC-000 Fibre Channel driver includes the following functionality:

- Point-to-Point
- Arbitrated Loop
- VMIPMC-5664 Redundant Port Utility (RPU)
- Fabric
- SCSI Initiator
- Support for multiple adapters and mixed sets of 5660, 5661 and 5664 HBAs
- Multiple HBA loop connections on a Solaris host

NOTE: Solaris hosts are limited to one HBA connection to a single fabric or switch.

The VMISFT-566x-ABC-000 Fibre Channel driver is delivered with the **5664 Redundant Port Utility**. The VMIPMC-5564 Host Bus Adapter features a built-in hub with two external ports and an internal local port that can operate in one of three modes:

- Hub mode
- Redundant mode
- Manual Mode

Boot-time and run-time mode configuration are supported. For more information on the available modes, see "VMIPMC-5664 Operating Modes" on page 95.

VMISFT-566x-ABC-000 Supported Boards

The VMISFT-566x-ABC-000 Fibre Channel driver supports the following boards:

Board	Description
VMIPCI-5660	PCI bus Fibre Channel Host Adapter
VMIPCI-5661	PCI bus Fibre Channel Host Adapter
VMIPMC-5660	PMC bus Fibre Channel Host Adapter
VMIPMC-5661	PMC bus Fibre Channel Host Adapter
VMIPMC-5664	PMC Fibre Channel Host Adapter with Redundant External Ports

NOTE: VMI5660 series adapters provide Fibre Channel SCSI-2 support, but do *not* provide Fibre Channel IP support. Therefore, certain functionality contained in the VMIPMC-566x-ABC-000 driver will not be usable with VMI5660 series adapters.

System Requirements

To install and run the VMISFT-566x-ABC-000 Fibre Channel driver, you must have the following:

Hardware

- One of the following boards:
 - VMIPCI-5661
 - VMIPMC-5661
 - VMIPCI-5660
 - VMIPMC-5660
 - VMIPMC-5664
- Sun SPARC workstation
- Intel x86 platform

Software

- Sun SPARC platform — Solaris 2.6, 7 or 8
- Intel x86 platform — Solaris 8

Installation Procedure

NOTES: You must have administrator privileges to install the VMISFT-566x-ABC-000 Fibre Channel driver.

On SPARC platforms, the driver installation scripts automatically determine which driver image to install and validate (32-bit or 64-bit), based on the platform on which it is being loaded. No user interaction is required.

On Intel x86 platforms, a 32-bit driver image only is loaded.

This installation procedure also installs the **5664 Redundant Port Utility**. See "Solaris" on page 112 for information on using the utility.

Complete the following steps to install the VMISFT-566x-ABC-000 Fibre Channel driver:

1. Determine the current operating system version installed on the host system and ensure that it is either Solaris 2.6, 7 or 8 by opening a console window and then typing `uname -r` at the prompt.

One of the following values displays:

Value	OS Version
5.6	Solaris 2.6
5.7	Solaris 7
5.8	Solaris 8

NOTE: For Intel x86 platforms, only Solaris 8 is supported.

2. Shut down the host system.
3. Install the 566x host bus adapter(s) in the available PCI or PMC slots.
4. Boot the host system.
5. Log on as root (#).
6. Change directories to the directory containing the driver.

For SPARC platforms, type the following:

```
# pkgadd -d v566xR02.00
```

- or -

For Intel x86 platforms, type the following.

```
# pkgadd -d v566xR02.00x86
```

7. The system lists the driver package and then displays the following prompt:

```
Select package(s) you wish to process (or 'all' to process
all packages). (default: all) [?,??,q]:
```

Press RETURN.

8. Once the driver package is processed, the following prompt displays if conflicting files are found:

```
Do you want to install these conflicting files [y,n,?,q] y
```

Type **y** and then press RETURN.

9. The system displays the following verification prompt:

```
Do you want to continue with the installation of <v566x> [y,n,?] y
```

Type **y** and then press RETURN.

10. Reboot the host system when installation is complete.

Installation Example

The following illustrates a typical VMISFT-566x-ABC-000 driver installation:

```
# pkgadd -d v566xR02.00
```

```
The following packages are available:
```

```
 1 v566x      VMISFT-566x Fibre-Channel SCSI Host Adapter Driver
                (sparc) release R02.00
```

```
Select package(s) you wish to process (or 'all' to process
all packages). (default: all) [?,??,q]:
```

```
Processing package instance <v566x> from </floppy/no_name/v566xR02.00>
```

```
VMISFT-566x Fibre-Channel SCSI Host Adapter Driver
(sparc) release R02.00
```

```
Copyright (c) 2001 by VMIC, Inc., All Rights Reserved.
```

```
## Executing checkinstall script.
```

```
Validating installation platform.
```

```
## Processing package information.
```

```
## Processing system information.
```

```
 4 package pathnames are already properly installed.
```

```
## Verifying disk space requirements.
```

```
## Checking for conflicts with packages already installed.
```

The following files are already installed on the system and are being used by another package:

```
/usr <attribute change only>
/usr/bin <attribute change only>
```

Do you want to install these conflicting files [y,n,?,q] y

```
## Checking for setuid/setgid programs.
```

This package contains scripts which will be executed with super-user permission during the process of installing this package.

Do you want to continue with the installation of <v566x> [y,n,?] y

```
Installing VMISFT-566x Fibre-Channel SCSI Host Adapter Driver as <v566x>
```

```
## Installing part 1 of 1.
/kernel/drv/sparcv9/v566x64
/kernel/drv/v566x32
/kernel/drv/v566x32.conf
/kernel/drv/v566x64.conf
/usr/bin/v5664util
[ verifying class <none> ]
## Executing postinstall script.
```

```
Installing kernel driver on Solaris 5.8 system.
```

```
devfsadm: driver failed to attach: v566x64
Warning: Driver (v566x64) successfully added to system but failed to attach
```

```
VMISFT-566x 64-bit driver installed.
```

```
Installation of <v566x> was successful.
#
```

Uninstalling the Driver

NOTE: You must have administrator privileges to uninstall the VMISFT-566x-ABC-000 Fibre Channel driver.

To uninstall the VMISFT-566x-ABC-000 Fibre Channel driver, perform the following:

1. Log in to a console window as root.
2. Enter `pkgrm v566x`.

The system lists the package currently installed and displays the following prompt:

Do you want to remove this package?

Type `y` and then press RETURN.

3. The system displays the following verification prompt:

Do you want to continue with the removal of this package [y,n,?,q]

Type `y` and press RETURN.

The driver images, driver configuration files in the `/kernel/drv` driver directory path and the `/usr/bin/v5664util 5664 Redundant Port Utility` are removed from the system.

NOTE: If the driver is currently running on the system, a message similar to the following displays in the console window when you verify driver removal:

```
Device busy
Cannot unload module: v566x64
Will be unloaded upon reboot.
```

4. Reboot the system to complete the driver removal.

Uninstall Example

The following is an example of the screen outputs that display when the VMISFT-566x-ABC-000 driver is removed:

```
# pkgrm v566x

The following package is currently installed:
      v566x          VMISFT-566x Fibre-Channel SCSI Host Adapter Driver
                        (sparc) release R02.00

Do you want to remove this package? y

## Removing installed package instance <v566x>

This package contains scripts which will be executed with super-user
permission during the process of removing this package.

Do you want to continue with the removal of this package [y,n,?,q] y
## Verifying package dependencies.
## Processing package information.
## Executing preremove script.

Removing kernel driver from Solaris 5.8 system.

VMISFT-566x 64-bit driver removed.
## Removing pathnames in class <sed>
## Removing pathnames in class <none>
/usr/bin/v5664util
/usr/bin <shared pathname not removed>
/usr <shared pathname not removed>
/kernel/drv/sparcv9/v566x64
/kernel/drv/v566x64.conf
/kernel/drv/v566x32.conf
/kernel/drv/v566x32
/kernel/drv <shared pathname not removed>
/kernel <shared pathname not removed>
## Updating system information.

Removal of <v566x> was successful.
#
```

Verifying the Installation

The Solaris **pkginfo** command displays information about each package installed on a system, including the VMISFT-566x-ABC-000 driver.

The following example illustrates a typical screen output:

```
$ pkginfo
..
..
..
system  SUNWxwplx  X Window System 64-bit library software
system  SUNWxwpmn  X Window System online programmers man pages
system  SUNWxwpsr  Sun4u-platform specific X server auxiliary filter modules
system  SUNWxwrtl  X Window System & Graphics Runtime Library Links in /usr/lib
system  SUNWxwrtx  X Window System 64-bit Runtime Compatibility Package
system  SUNWxwslb  X Window System static/lint libraries
system  SUNWxwslx  X Window System 64-bit lint libraries
system  SUNWxwsrc  X Window System sample source
system  SUNWypyr   NIS Server for Solaris (root)
system  SUNWypu   NIS Server for Solaris (usr)
system  v566x     VMISFT-566x Fibre-Channel SCSI Host Adapter Driver
```

Troubleshooting

If you encounter problems while using the Fibre Channel driver, there are many possible causes. The following sections discuss the most common sources of errors and how to narrow the possibilities of encountering them.

Determining the Driver/Fibre Channel Link Status

The progress of the driver installation and its operational state can be monitored interactively by viewing the `/var/adm/messages` file. The messages file automatically updates the driver diagnostic data and SCSI device discovery information as the driver installs or runs.

Recovering Port Disconnections and Device Resets

Fibre-Channel port disconnections or device resets during operation can take up to two minutes to recover, depending on the configuration settings and mode of operation.

Recognizing Target Devices

The Solaris host must be rebooted after driver installation or after new target devices have been installed in order for target devices to be recognized by the host.

Additionally, ensure all connections to and from the host and target devices have been made and are valid.

5664 Redundant Port Utility Cannot Open Device

If the **5664 Redundant Port Utility** cannot open a target device, ensure that an entry named `/dev/v566x<#>` has been created for the device, where `<#>` is the instance number of the HBA. If the `/dev/v566x<#>` entry does not exist, you must modify the `/etc/devlink.tab` file, which creates the entry, and then reboot the system. See "Using the 5664 Redundant Port Mode Utility (v5664util)" on page 115 for more information.

NOTE: When editing the `/etc/devlink.tab` file, use the `TAB` key to insert spaces. Do *not* use the space bar to add spaces within the file.

Accessing Additional Information

VMIC Documentation

The following files are distributed with the VMISFT-566x-ABC-000 Solaris Fibre Channel driver software:

File	Description
v566xR02.00	Device driver package for Solaris SPARC systems
v566xR02.00x86	Device driver package for Solaris Intel x86 systems
readme.txt	Contains product description and installation/removal instructions.
release.txt	Release info and history
vmisft566x.pdf	VMISFT-566x Drivers Manual

The following is a list of other reference documentation related to this driver:

VMIPCI-5660 PCI bus Fibre Channel Host Adapter Product Manual (500-855661-000)
VMIPCI-5661 PCI bus Fibre Channel Host Adapter Product Manual (500-855661-000)
VMIPMC-5660 PMC bus Fibre Channel Host Adapter Product Manual (500-755661-000)
VMIPMC-5661 PMC bus Fibre Channel Host Adapter Product Manual (500-755661-000)
*VMIPMC-5664 PMC Fibre Channel Host Adapter with Redundant External Ports
Product Manual (500-755664-000)*

Please call your VMIC sales representative for more information.

Sun Documentation

Solaris and SPARC documentation is available from Sun Microsystems Inc. via the World Wide Web. For a current list of downloadable documentation, go to:

<http://docs.sun.com>

The VMISFT-566x-ABC-005 Solaris SPARC/x86 IP Driver

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Introduction

This chapter provides configuration, installation and operation information for the VMISFT-566x-ABC-005 Fibre Channel IP driver for the Solaris platform (version 2.6 and later) on a family of VMIC 566x Host Bus Adapters (HBAs). The software is delivered with both 32-bit and 64-bit Solaris SPARC driver images, as well as with Solaris 32-bit x86 driver images.

The VMISFT-566x-ABC-005 Fibre Channel driver includes the following functionality:

- Point-to-Point
- Arbitrated Loop
- VMIPMC-5664 Redundant Port Utility (RPU)
- Fabric
- Support for multiple adapters and mixed sets of 5661, 5664 and 5666 HBAs

The VMISFT-566x-ABC-005 Fibre Channel driver is delivered with the **5664 Redundant Port Utility**. The VMIPMC-5564 Host Bus Adapter features a built-in hub with two external ports and an internal local port that can operate in one of three modes:

- Hub mode
- Redundant mode
- Manual Mode

Boot-time and run-time mode configuration are supported. For more information on the available modes, see "VMIPMC-5664 Operating Modes" on page 95.

VMISFT-566x-ABC-005 Supported Boards

The VMISFT-566x-ABC-005 Fibre Channel IP driver supports the following boards:

Board	Description
VMIPCI-5661	PCI bus Fibre Channel Host Adapter
VMIPMC-5661	PMC bus Fibre Channel Host Adapter
VMIPMC-5664	PMC Fibre Channel Host Adapter with Redundant External Ports
VMIPMC-5666	PMC 2 Gigabit Fibre Channel Host Bus Adapter

NOTE: VMI5660 series adapters provide Fibre Channel SCSI-2 support, but do *not* provide Fibre Channel IP support. Therefore, the VMIPMC-566x-ABC-005 driver does not support VMI5660 series adapters.

System Requirements

To install and run the VMISFT-566x-ABC-005 Fibre Channel IP driver, you must have the following:

Hardware

- One of the following boards:

ISP2200 Driver:

- VMIPCI-5661
- VMIPMC-5661
- VMIPMC-5664

ISP2300 Driver:

- VMIPMC-5666
- Sun SPARC workstation
- Intel x86 platform

Software

- Sun SPARC platform — Solaris 2.6, 7 or 8
- Intel x86 platform — Solaris 8

Installation Procedure

NOTES: You must have administrator privileges to install the VMISFT-566x-ABC-005 Fibre Channel IP driver.

On SPARC platforms, the driver installation scripts automatically determine which driver image to install and validate (32-bit or 64-bit), based on the platform on which it is being loaded. No user interaction is required.

On Intel x86 platforms, a 32-bit driver image only is loaded.

This installation procedure also installs the **5664 Redundant Port Utility**. See "Solaris" on page 112 for information on using the utility.

Complete the following steps to install the VMISFT-566x-ABC-005 Fibre Channel IP driver:

1. Determine the current operating system version installed on the host system and ensure that it is either Solaris 2.6, 7 or 8 by opening a console window and then typing `uname -r` at the prompt.

One of the following values displays:

Value	OS Version
5.6	Solaris 2.6
5.7	Solaris 7
5.8	Solaris 8

NOTE: For Intel x86 platforms, only Solaris 8 is supported.

2. Determine which driver package to load, based on the HBA type defined in the previous step. See "Accessing Additional Information" on page 84 for a list of the drivers delivered with the VMISFT-566x-ABC-005 Fibre Channel IP driver.
3. Shut down the host system.
4. Install the 566x host bus adapter(s) in the available PCI or PMC slots.
5. Boot the host system.
6. Log on as root (#).

NOTE: For ISP2300 HBAs (i.e., the VMIPMC-5666), include the "2x" listed in the following steps. For ISP2200 HBAs, do *not* include the "2x".

7. Enter the following from the Driver release directory if you are installing the driver on a SPARC platform:

```
# pkgadd -d v566xip<2x>R04.00
```

-or-

Enter the following from the Driver release directory if you are installing the driver on an x86 platform:

```
# pkgadd -d v566xip<2x>R04.00x86
```

8. The system lists the driver package and then displays the following prompt:

```
Select package(s) you wish to process (or 'all' to process  
all packages). (default: all) [?,??,q]:
```

Press RETURN.

If you are installing the v566xipR04.00 or the v566xipR04.00x86 package (ISP2200 HBA support), continue to Step 9.

If you are installing the v566xip2xR04.00 or the v566xip2xR04.00x86 package (ISP2300 HBA support), go to Step 10.

9. Once the driver package is processed, the following prompt displays if conflicting files are found:

```
/usr <attribute change only>  
/usr/bin <attribute change only>
```

```
Do you want to install these conflicting files [y,n,?,q] y
```

Type **y** and then press RETURN.

10. The system displays the following verification prompt:

```
Do you want to continue with the installation of <v566xip> [y,n,?] y
```

Type **y** and then press RETURN.

The v566xip<2x> package scripts automatically validate and determine which driver image to install (32-bit or 64-bit).

The driver is now installed in the system.

11. Reboot the host system when installation is complete.

Installation Example

The following illustrates a typical VMISFT-566x-ABC-005 driver installation:

```
# pkgadd -d v566xipR04.00
The following packages are available:
  1  v566xip      VMISFT-566x Fibre-Channel IP Host Adapter Driver
                        (sparc) release R04.00

Select package(s) you wish to process (or 'all' to process
all packages). (default: all) [?,??,q]:

Processing package instance <v566xip> from </floppy/no_name/v566xipR04.00>

VMISFT-566x Fibre-Channel IP Host Adapter Driver
(sparc) release R04.00
Copyright (c) 2001 VMIC. All Rights Reserved.
## Executing checkinstall script.

Validating installation platform.

## Processing package information.
## Processing system information.
   3 package pathnames are already properly installed.
## Verifying disk space requirements.
## Checking for conflicts with packages already installed.

The following files are already installed on the system and are being
used by another package:
  /usr <attribute change only>
  /usr/bin <attribute change only>

Do you want to install these conflicting files [y,n,?,q] y

## Checking for setuid/setgid programs.

This package contains scripts which will be executed with super-user
permission during the process of installing this package.

Do you want to continue with the installation of <v566xip> [y,n,?] y
```

Installing VMISFT-566x Fibre-Channel IP Host Adapter Driver as <v566xip>

```
## Installing part 1 of 1.  
/kernel/drv/sparcv9/v566xip64  
/kernel/drv/v566xip32  
/kernel/drv/v566xip32.conf  
/kernel/drv/v566xip64.conf  
/usr/bin/v5664util  
[ verifying class <none> ]  
## Executing postinstall script.
```

Installing kernel driver on Solaris 5.7 system.

```
exit status = 0  
devfsadm[513]: verbose: mknod /devices/pci@1f,4000/scsi@4:pci1077,2200  
01/31/20666  
devfsadm[513]: verbose: mknod /devices/pseudo/clone@0:fc 01/31/20600  
Driver (v566xip64) installed.
```

VMISFT-566x 64-bit driver installed.

Installation of <v566xip> was successful.

Driver Initialization

The Solaris IP driver can be configured by:

- Automatically configuring the IP address of the driver upon system reboot by setting up configuration files in the /etc directory
- Manually configuring the driver upon each reboot

The PCI board instance must be determined prior to configuring the driver. To determine the PCI board instance, do the following after the package is installed:

1. Open the /var/adm/messages file in a text editor.

NOTE: For ISP2300 HBAs (i.e., the VMIPMC-5666), include the “2x” listed in the following steps. For ISP2200 HBAs, do *not* include the “2x”.

2. Search for the following message:

```
NOTICE: fc<2x><instance#>: VMISFT-566x R04.00
```

Where <instance#> is the board instance number. For example, the following message identifies that board instance 3 is allocated for the ISP2200-based HBA:

```
NOTICE: fc3: VMISFT-566x R04.00
```

The following message identifies that board instance 1 is allocated for the ISP2300-based HBA:

```
NOTICE: fc2x1: VMISFT-566x R04.00
```

3. Close the text editor.

The following sections describe each method for configuring the Solaris IP driver.

Automatic Configuration

To set up the driver for automatic configuration upon reboot:

1. Log on as root (#).
2. Define a unique alias host name for the 566x fibre-channel adapter. For example, "fibre-a", etc.

NOTE: For ISP2300 HBAs (i.e., the VMIPMC-5666), include the “2x” listed in the following steps. For ISP2200 HBAs, do *not* include the “2x”.

3. Create a file named hostname.fc<2x><instance#> in the /etc directory, where <instance#> is the board instance number. For example, for board instance 0, create a file named hostname.fc0 for an ISP2200 HBA, or hostname.fc2x0 for an ISP2300 HBA.

4. Open the `hostname.fc<2x><instance#>` file in a text editor and add a line containing the name of your unique driver alias. For example:

```
fibres-a
```

5. Save and close the `hostname.fc<2x><instance#>` file.
6. Change directories to `/etc` and open the `hosts` file in a text editor.
7. Add an entry at the end of the `hosts` file containing the IP address of the fibre-channel adapter and the unique driver alias contained in the `hostname.fc<2x><instance#>` file. For example:

```
124.133.43.5    fibres-a
```

For more information on the `hosts` file, see the Solaris man pages on `hosts` by entering `man hosts`.

Manual Configuration

Use the **ifconfig** command to configure the network interface parameters for manual configuration. The device name for the v566xip driver is "fc". The device name for the ISP2300 v566xip2x driver is "fc2x". To access the specific board instance, it must be referenced as fc<2x><instance#>, where <instance#> is the board instance number.

To initialize and configure the driver manually upon reboot:

1. Log on as root (#).

NOTE: For ISP2300 HBAs (i.e., the VMIPMC-5666), include the "2x" listed in the following steps. For ISP2200 HBAs, do *not* include the "2x".

2. To initialize the driver, enter the commands:

```
ifconfig fc<2x><instance#> plumb up
ifconfig fc<2x><instance#> <IP address>
```

where <IP address> is the Internet protocol address to which the board instance is to be configured.

For example, to initialize board instance 0 to IP address 180.166.43.115, enter the commands:

```
ifconfig fc0 plumb up
ifconfig fc0 180.166.43.115
```

Uninstalling the Driver

NOTE: You must have administrator privileges to uninstall the VMISFT-566x-ABC-005 Fibre Channel driver.

To uninstall the VMISFT-566x-ABC-005 Fibre Channel driver, perform the following:

1. Log in to a console window as root (#).

NOTE: For ISP2300 HBAs (i.e., the VMIPMC-5666), include the “2x” listed in the following steps. For ISP2200 HBAs, do *not* include the “2x”.

2. If the driver is initialized, disable it by entering the command:

```
ifconfig fc<2x><instance#> unplumb
```

where *<instance#>* is the board instance number. For example, to disable instance 0 for an ISP2200 HBA, enter:

```
ifconfig fc0 unplumb
```

To disable instance 0 for an ISP2300 HBA, enter:

```
ifconfig fc2x0 unplumb
```

3. To remove the driver from the system, enter:

```
pkgrm v566xip<2x>
```

The system lists the package currently installed and displays the following prompt:

```
Do you want to remove this package?
```

Type **y** and then press RETURN.

4. The system displays the following verification prompt:

```
Do you want to continue with the removal of this package [y,n,?,q]
```

Type **y** and press RETURN.

The driver images and driver configuration files in the `/kernel/drv` driver directory path are removed from the system. If you are using the ISP2200 driver, the `/usr/bin/v5664util 5664 Redundant Port Utility` is also removed from the system.

NOTE: If the driver is currently running on the system, a message similar to the following displays in the console window when you verify driver removal:

```
Device busy
Cannot unload module: v566xip
Will be unloaded upon reboot.
```

-
5. Reboot the system to complete the driver removal.

Uninstall Example

The following is an example of the screen outputs that display when the VMISFT-566x-ABC-005 driver is removed:

```
# pkgrm v566xip

The following package is currently installed:
v566xip          VMISFT-566x Fibre-Channel IP Host Adapter Driver
                  (sparc) release R04.00

Do you want to remove this package? y

## Removing installed package instance <v566xip>

This package contains scripts which will be executed with super-user
permission during the process of removing this package.

Do you want to continue with the removal of this package [y,n,?,q] y
## Verifying package dependencies.
## Processing package information.
## Executing preremove script.

Removing kernel driver from Solaris 5.7 system.

VMISFT-566x 64-bit driver removed.
## Removing pathnames in class <sed>
## Removing pathnames in class <none>
/usr/bin/v5664util
/usr/bin <shared pathname not removed>
/usr <shared pathname not removed>
/kernel/drv/v566xip64.conf
/kernel/drv/v566xip32.conf
/kernel/drv/v566xip32
/kernel/drv/sparcv9/v566xip64
/kernel/drv/sparcv9 <shared pathname not removed>
/kernel/drv <shared pathname not removed>
/kernel <shared pathname not removed>
## Updating system information.

Removal of <v566xip> was successful.
#
```

Verifying the Installation

The Solaris **pkginfo** command displays information about each package installed on a system, including the VMISFT-566x-ABC-005 driver.

The following example illustrates a typical screen output:

```
$ pkginfo
..
..
..
system  SUNWxwplx  X Window System 64-bit library software
system  SUNWxwpmn  X Window System online programmers man pages
system  SUNWxwpsr  Sun4u-platform specific X server auxiliary filter modules
system  SUNWxwrtl  X Window System & Graphics Runtime Library Links in /usr/lib
system  SUNWxwrtx  X Window System 64-bit Runtime Compatibility Package
system  SUNWxwslb  X Window System static/lint libraries
system  SUNWxwslx  X Window System 64-bit lint libraries
system  SUNWxwsrc  X Window System sample source
system  SUNWypr    NIS Server for Solaris (root)
system  SUNWypu    NIS Server for Solaris (usr)
system  v566xip    VMISFT-566x Fibre-Channel IP Host Adapter Driver
system  v566xip2x  VMISFT-566x Fibre-Channel IP Host Adapter Driver
```

Troubleshooting

If you encounter problems while using the Fibre Channel driver, there are many possible causes. The following sections discuss the most common sources of errors and how to narrow the possibilities of encountering them.

Determining the Driver/Fibre Channel Link Status

The progress of the driver installation and its operational state can be monitored interactively by viewing the `/var/adm/messages` file. The messages file automatically updates the driver diagnostic data and port discovery information as the driver installs or runs.

Recovering Port Disconnections and Device Resets

Recoveries from port disconnects are supported. If transmissions do not resume with the destination system after re-establishing the link, the destination node's IP address may need flushing from the local address resolution protocol (ARP) table. Use the following command after logging in as root(#):

```
arp -d <destination IP address>
```

where *<destination IP address>* is the Internet protocol address of the destination system. For example:

```
arp -d 180.166.43.120
```

For more information on the address resolution protocol table, see the Solaris man pages by entering `man arp`.

5664 Redundant Port Utility Cannot Open Device (ISP2200 Driver Only)

If the **5664 Redundant Port Utility** cannot open a target device, ensure that an entry named `/dev/v566xip<#>` has been created for the device, where *<#>* is the instance number of the HBA. If the `/dev/v566xip<#>` entry does not exist, you must modify the `/etc/devlink.tab` file, which creates the entry, and then reboot the system. See "Using the 5664 Redundant Port Mode Utility (v5664util)" on page 115 for more information.

NOTE: When editing the `/etc/devlink.tab` file, use the TAB key to insert spaces. Do *not* use the space bar to add spaces within the file.

Application Messages Larger Than the MTU Size

It is recommended that all integrated systems operate using the same MTU size to ensure interoperability, especially when message sizes exceed the MTU size. If the following line appears in the `/var/adm/messages` file or displays in the console screen, messages are discarded from any unmatched systems:

```
WARNING:fc<2x><instance #>: System MTU Mismatch:Verify all MTU settings.
```

Where `<instance#>` is the board instance number.

Accessing Additional Information

VMIC Documentation

The following files are distributed with the VMISFT-566x-ABC-005 Solaris Fibre Channel driver software:

File	Description
v566xipR04.00	Device driver package for Solaris SPARC systems with Solaris 2.6, 7, 8 SPARC ISP2200 support
v566xipR04.00x86	Device driver package for Solaris SPARC systems with Solaris 8 x86 ISP2200 support
v566xip2xR04.00	Device driver package for Solaris SPARC systems with Solaris 2.6, 7, 8 SPARC ISP2300 support
v566xip2xR04.00x86	Device driver package for Solaris SPARC systems with Solaris 8 x86 ISP2300 support
readme.txt	Contains product description and installation/removal instructions
release.txt	Release info and history
vmisft566x.pdf	VMISFT-566x Drivers Manual

The following is a list of other reference documentation related to this driver:

VMIPCI-5661 PCI bus Fibre Channel Host Adapter Product Manual (500-855661-000)

VMIPMC-5664 PMC Fibre Channel Host Adapter with Redundant External Ports Product Manual (500-755664-000)

VMIPMC-5666 PMC Fibre Channel Host Adapter with Redundant External Ports Product Manual (500-755666-000)

Please call your VMIC sales representative for more information.

Sun Documentation

Solaris and SPARC documentation is available from Sun Microsystems Inc. via the World Wide Web. For a current list of downloadable documentation, go to:

<http://docs.sun.com>

The VMISFT-566x-ABC-000 Windows NT Driver

Contents

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Uninstalling the Driver	93
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Introduction

This chapter provides installation, installation verification and uninstallation information for the VMISFT-566x-ABC-000 Fibre Channel driver that operates on the Windows NT platform.

NOTE: Windows NT drivers are not supported for versions of Windows NT earlier than 4.0.

The VMISFT-566x-ABC-000 Windows NT Driver Supported Boards

The VMISFT-566x-ABC-037 Fibre Channel driver supports the following boards.

Board	Description
VMICPCI-5660	CompactPCI bus Fibre Channel Host Adapter
VMICPCI-5661	CompactPCI bus Fibre Channel Host Adapter
VMIPCI-5660	PCI bus Fibre Channel Host Adapter
VMIPCI-5661	PCI bus Fibre Channel Host Adapter
VMIPMC-5660	PMC bus Fibre Channel Host Adapter
VMIPMC-5661	PMC bus Fibre Channel Host Adapter
VMIPMC-5664	PMC Fibre Channel Host Adapter with Redundant External Ports

NOTES:

The VMISFT-566x-ABC-000 Windows NT Fibre Channel driver is also delivered with the **5664 Redundant Port Utility**, which enables you to specify the operating mode of the VMIPMC-5664 board. See "5664 Redundant Port Utility" on page 105 for more information.

The 5660 series of boards provides Fibre Channel SCSI-2 support, but does *not* provide Fibre Channel IP support.

System Requirements

To install and run the VMISFT-566x-ABC-000 Fibre Channel driver, you must have the following:

Hardware

One of the following boards:

- VMIPCI-5661
- VMIPMC-5661
- VMICPCI-5661
- VMIPCI-5660
- VMIPMC-5660
- VMICPCI-5660
- VMIPMC-5664

Software

Windows NT 4.0 or later

Installation Procedures

The steps involved in installing the VMISFT-566x-ABC-000 Windows NT Fibre Channel driver differ, depending on whether you are installing the driver on the system for the first time, or you are updating the driver to a newer version.

To...	See Page...
Install the Windows NT Fibre Channel driver for the first time	89
Update an existing Windows NT Fibre Channel driver	91
Verify the installation of a Windows NT Fibre Channel driver	92

NOTES:

You must have administrator privileges to install or update a Windows NT Fibre Channel driver.

Updates of the Windows NT driver can be downloaded from www.vmicnet.com.

Initial Driver Installation

Complete the following steps if this is the first time you are installing a Windows NT Fibre Channel driver:

1. Close all programs and turn off virus protection software to prevent installation conflicts.

2. Select **Start > Settings > Control Panel**.

The **Control Panel** window displays.

3. Double-click **SCSI Adapters**. The **SCSI Adapters** dialog box displays.

4. Select the **Drivers** tab, and then click **Add**.

The **Creating driver list** message box displays, followed by the **Install Driver** dialog box.

5. Click **Have Disk**.

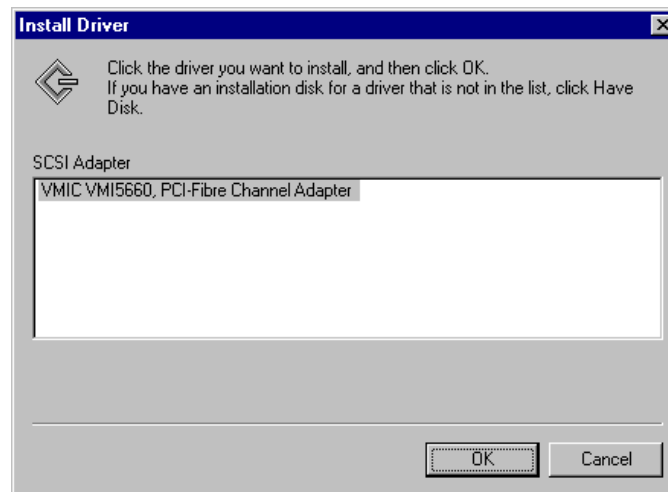
The **Install From Disk** dialog box displays.

6. Select the letter of your CD drive from the drop-down list and click **OK**. The drive letter displays in the **Copy manufacturer's files from** field.

NOTE: If you downloaded a Windows NT Fibre Channel driver from VMIC's web site (www.vmicnet.com), you must select the letter of the drive on which you placed the driver file, click **Browse**, and navigate to the directory containing the extracted files. Then, select the driver installation script (.inf).

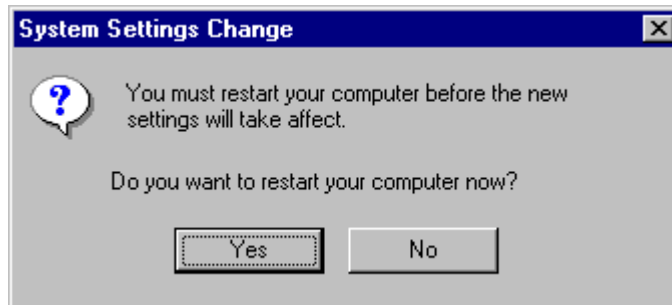
7. Click **OK** on the **Install From Disk** dialog box to dismiss it.

8. The **Install Driver** dialog box contains the name of the Windows NT Fibre Channel driver you want to install.



9. Select the driver and click **OK**.

The driver installs. When it is copied to your hard drive, the **System Settings Change** dialog box displays.



10. Click **Yes** to restart you computer. Installation is complete.

Updating a Driver

Complete the following steps if you have previously installed the VMISFT-566x-ABC-000 driver and are updating it to a newer version:

1. Close all programs and turn off virus protection software to prevent installation conflicts.
2. Select **Start > Programs > Command Prompt** to open a **Command Prompt** window.
3. Change the current directory to the Windows NT driver directory by typing:

```
[drive and path]\SYSTEM32\DRIVERS
```

where *[drive and path]* is the drive and path where Windows NT is located.

4. Make a backup copy of the old driver by typing:

```
COPY VMI566x.SYS VMI566x.SAV
```

5. Insert the CD with the updated driver and copy it over the old driver by typing:

```
COPY [drive]:VMI566x.SYS
```

where *[drive]* is the letter of your CD drive.

6. Shut down and reboot the system to complete driver installation.

Verifying the Installation

Use the Windows NT **Disk Administrator** tool to verify that the VMISFT-566x-ABC-000 Fibre Channel driver is properly installed on your computer.

To verify driver installation:

1. Select **Start > Programs > Administrative Tools (Common) > Disk Administrator**.

Disk Administrator initializes, after which the **Disk Administrator** dialog box displays. If your Fibre Channel device displays, the driver was successfully installed.

2. Select **Partition > Exit** to exit Disk Administrator.

NOTE: You must have administrator privileges to verify the installation of a Windows NT Fibre Channel driver.

Uninstalling the Driver

1. Select **Start > Settings > Control Panel**.

The **Control Panel** window displays.

2. Double-click **SCSI Adapters**. The **SCSI Adapters** dialog box displays.
3. Select the **Drivers** tab, select the Fibre Channel driver, and then click **Remove**.
4. A message box displays.



5. Click **Yes** to remove the driver.
6. Click **OK** to close the **SCSI Adapters** dialog box.

Accessing Additional Information

The following files are distributed with the VMISFT-566x-ABC-000 Windows NT Fibre Channel driver software:

File	Description
README.TXT	List of files contained in the product
RELEASE.TXT	Release info and history
OEMSETUP.INF	Fibre channel driver installation script
VMI566x.SYS	The Fibre Channel driver
Txtsetup.oem	Used to install as a boot device
vmi566x.1	Used by Txtsetup.oem to verify that the disk being installed is the correct install disk
vmisft566x.pdf	VMISFT-566x Drivers Manual

Additionally, the subdirectory vmi5664RPU contains setup files for the **5664 Redundant Port Utility**, which is used with the VMIPMC-5664 HBA on Windows NT. See "5664 Redundant Port Utility" on page 105 for more information.

The following is a list of other reference documentation related to this driver:

VMICPCI-5660 CompactPCI bus Fibre Channel Host Adapter Product Manual (500-655661-000)

VMICPCI-5661 CompactPCI bus Fibre Channel Host Adapter Product Manual (500-655661-000)

VMIPCI-5660 PCI bus Fibre Channel Host Adapter Product Manual (500-855661-000)

VMIPCI-5661 PCI bus Fibre Channel Host Adapter Product Manual (500-855661-000)

VMIPMC-5660 PMC bus Fibre Channel Host Adapter Product Manual (500-755661-000)

VMIPMC-5661 PMC bus Fibre Channel Host Adapter Product Manual (500-755661-000)

VMIPMC-5664 PMC Fibre Channel Host Adapter with Redundant External Ports Product Manual (500-755664-000)

Please contact your VMIC sales representative for more information.

VMIPMC-5664 Operating Modes

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VMIPMC-5664 Overview	96
VMIPMC-5664 Modes	97

Introduction

This section contains information about the operating modes of the VMIPMC-5664 board. Your SW-566x Fibre Channel driver enables you to utilize the various modes of this board.

VMIPMC-5664 Overview

The following diagram illustrates the VMIPMC-5664.

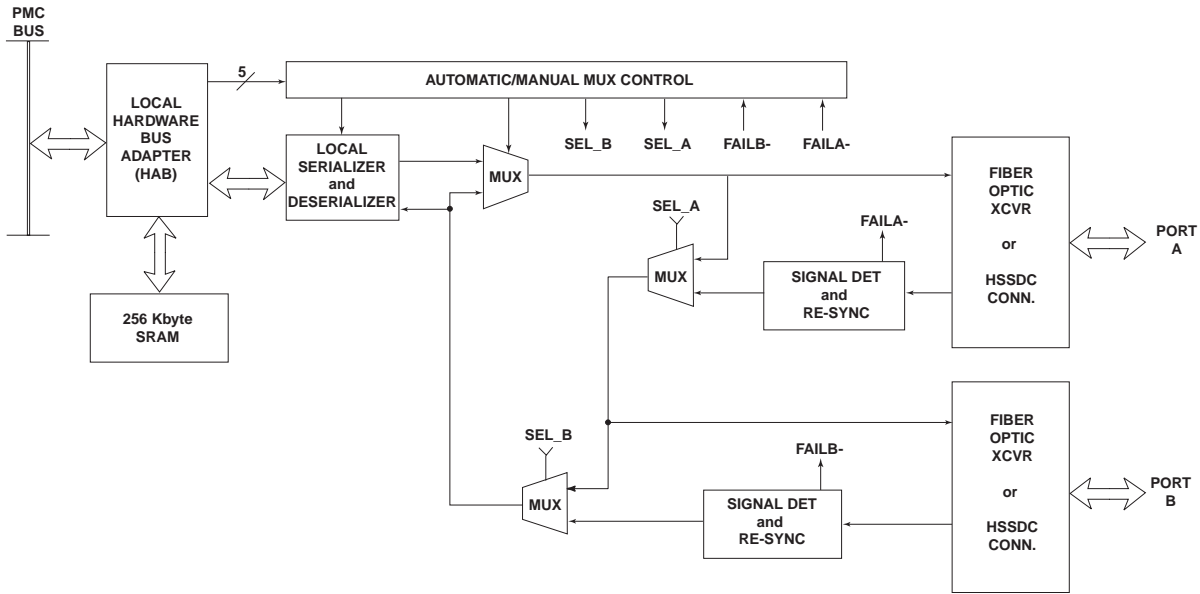


Figure A-1 VMIPMC-5664 Functional Block Diagram

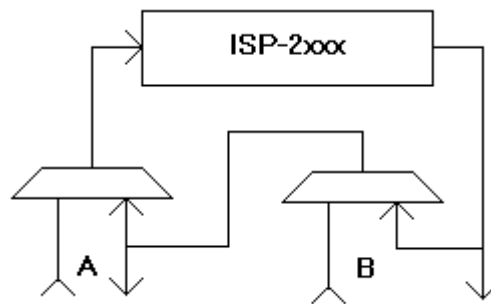
VMIPMC-5664 Modes

The VMIPMC-5664 has a built-in hub with two external ports (*Port A* and *Port B*), and an internal local port. When a port is in use, the external port is connected to the local port in a *loop* mode. When a port is not in use, it is in *bypass* mode. When in bypass mode, a port's receiver is disconnected and replaced with an internal connection that keeps the loop intact.

The VMIPMC-5664 operates in three major modes: Hub mode, Redundant mode, and Manual mode.

NOTES: The Redundant mode depends on loss of signal to disconnect its receiver. For example, if a cable is disconnected, both devices and the ends of the cable will lose their receive signal, causing both devices to fail over. A loss of only one signal will not fail over, as only one device detects the loss of the receive signal and the other will not fail over, leaving the loop broken.

The local ser/des mux is controlled by a signal of which the driver software has no control. The Qlogic firmware has control of this signal. For our use, the local ser/des mux is always enabled. To better understand the signal flow of systems that use this board, the diagram can be reduced as follows:



Hub Mode

Hub mode allows for the daisy-chaining of multiple Host Board Adapters (HBAs) without the use of an external hub. In this mode, the VMIPMC-5664 detects the receive signals on ports A and B.

- If there is a valid signal on a port, that port is connected to the internal local port.
- If no signal is detected, the port is bypassed so that the local loop is kept intact.

The following are the possible scenarios available in Hub mode.

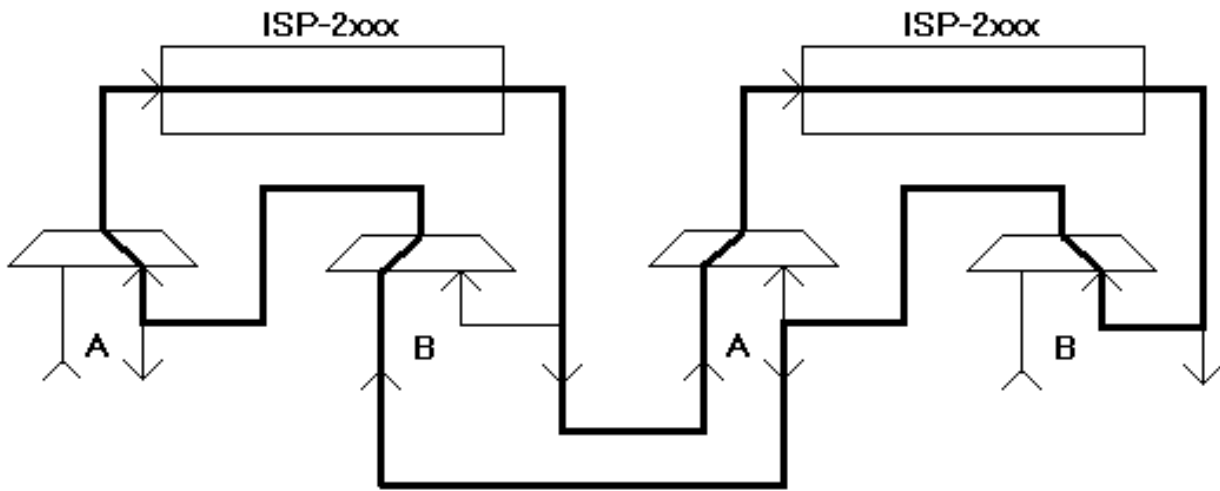


Figure A-2 2-N Node Daisy Chained Hub Mode

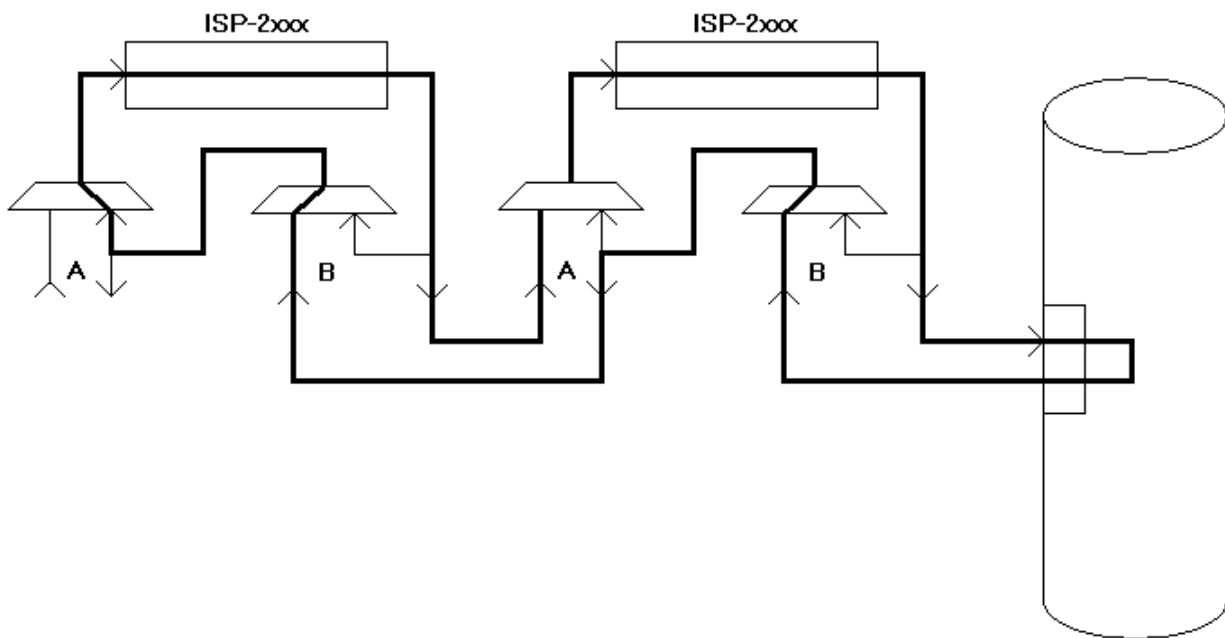


Figure A-3 2-N Node Daisy Chained Hub Mode Connected to Single Port JBOD

Redundant Mode

In *Redundant* mode, port A or B is the primary port. The primary port is connected to the local port, and the secondary port is bypassed. If no signal is detected on the primary, the primary is bypassed and the secondary is activated.

The following are the possible scenarios available in Redundant mode.

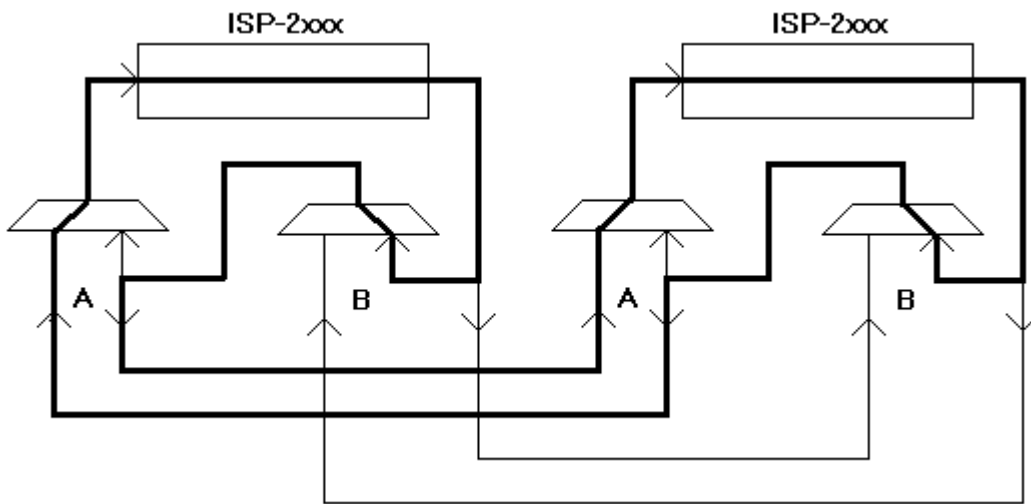


Figure A-4 2 Node Redundant Primary A, A-A B-B

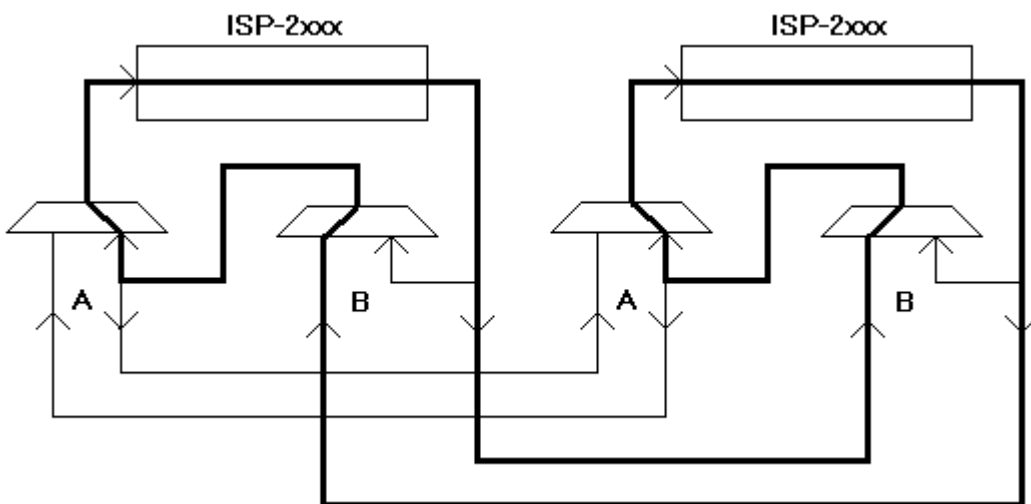


Figure A-5 2 Node Redundant Primary A A-A B-B A Failed, Switch to B

In the scenario illustrated in the following two diagrams, either the port or one of its connections can fail, but communication with the device will be maintained.

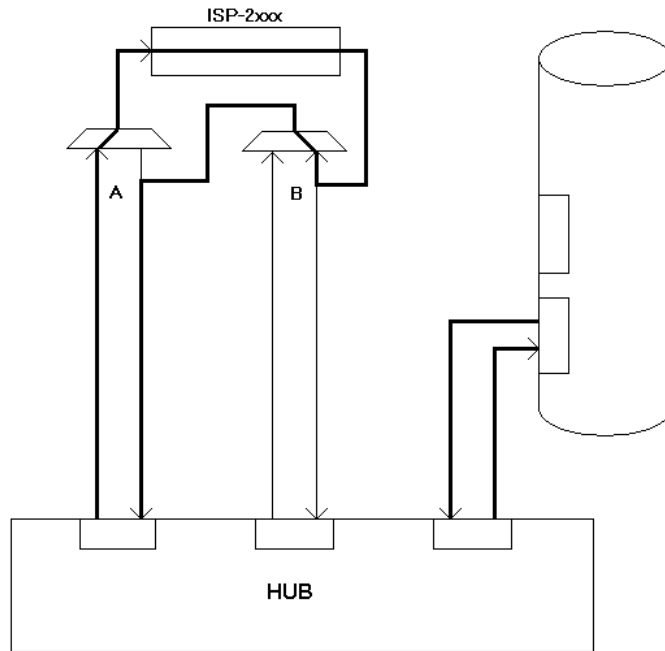


Figure A-6 1 Node Primary A Redundant B

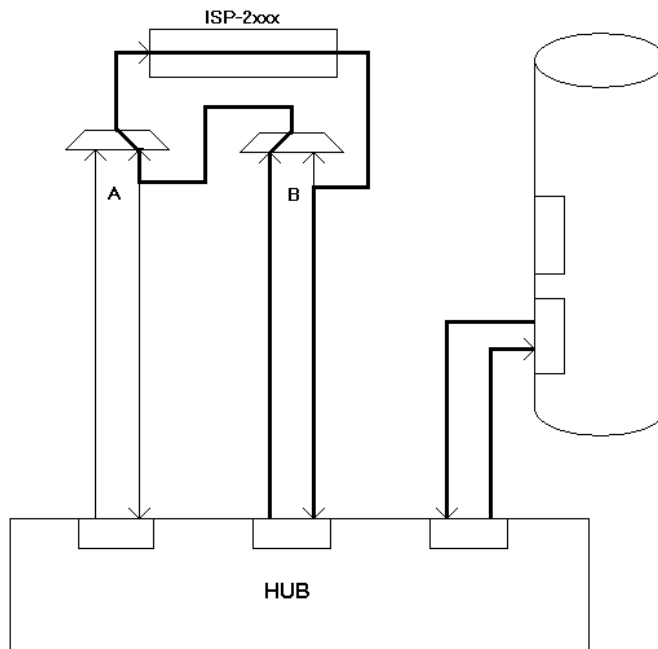


Figure A-7 1 Node Primary A Failed to B

In the scenario illustrated in the following two diagrams, either a hub, port or one of the connections can fail, but communication with the ISP-2xxx CPU will be maintained. More than two systems can be connected in this configuration, with fault tolerance being maintained.

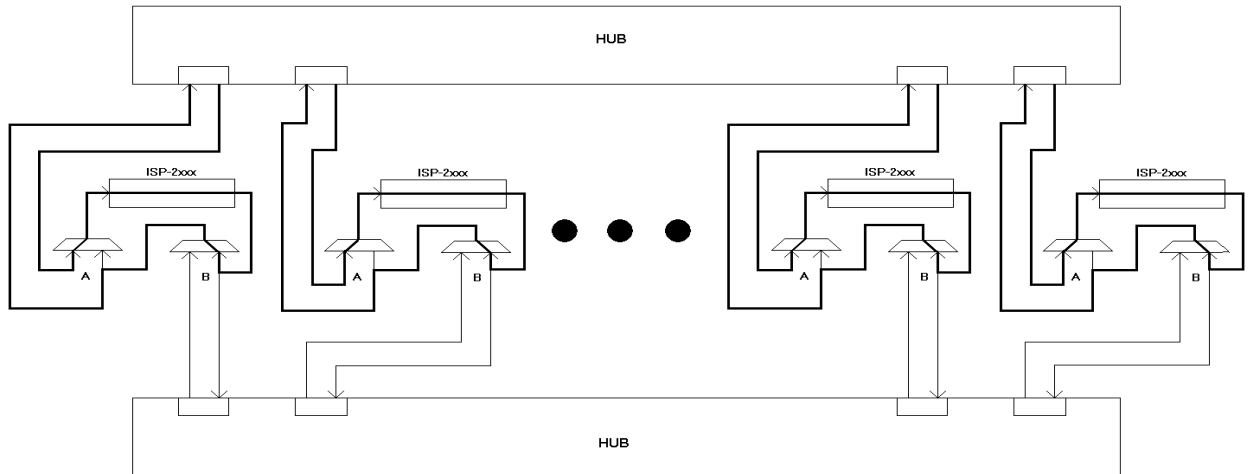


Figure A-8 2 Node Redundant Hubs Primary A Redundant B, Fault Tolerant

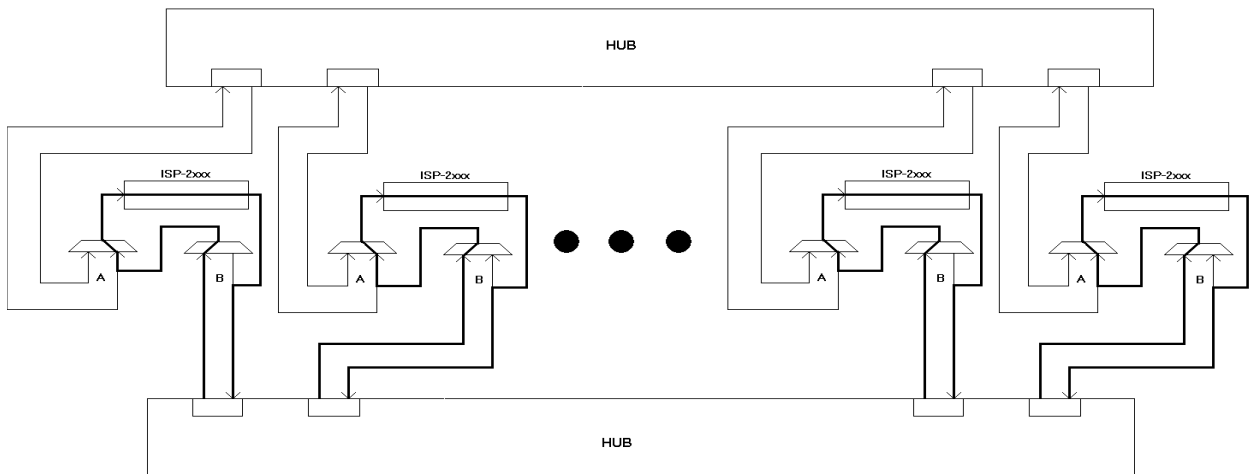


Figure A-9 2 Node Redundant Hubs Primary A Failed, Switch to B

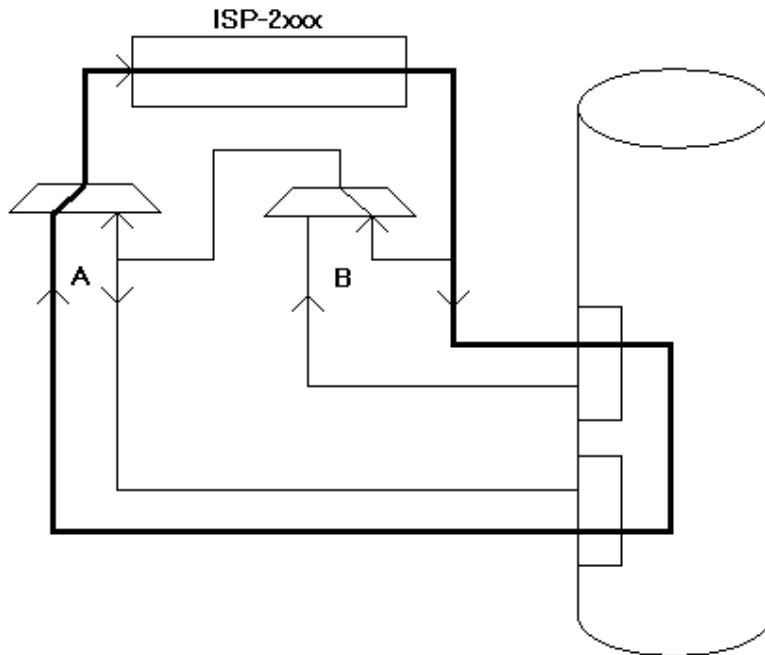


Figure A-10 1 Node Redundant Primary A Connected to Dual Port JBOD

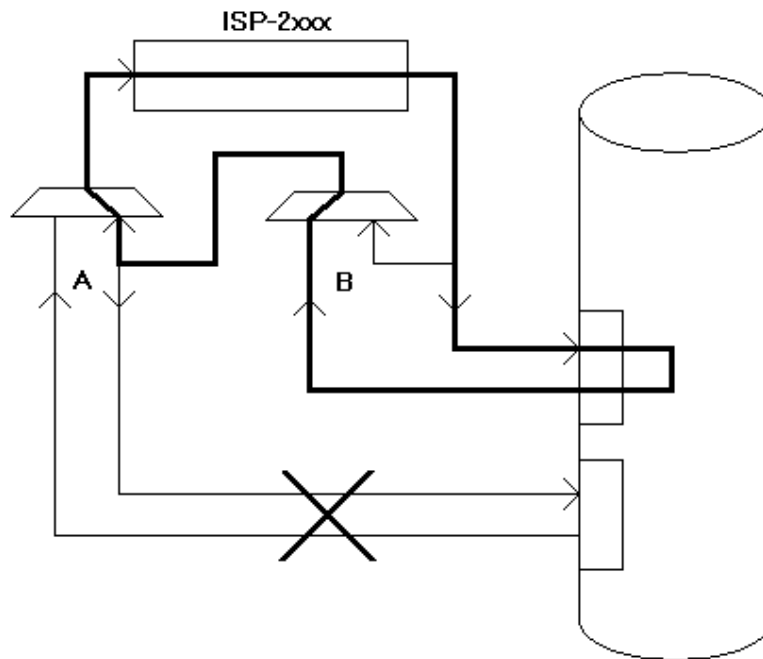


Figure A-11 1 Node Redundant Primary A Connected after A failed



Manual Mode

In *Manual* mode, either port A or port B is connected to the local port, regardless of the state of the receive signal.



5664 Redundant Port Utility

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Introduction

This appendix provides installation and usage instructions for the **5664 Redundant Port Utility**.



The 5664 Redundant Port Utility

The VMISFT-566x-ABC-000 and VMISFT-566x-ABC-005 Fibre Channel drivers are delivered with the **5664 Redundant Port Utility**, which enables you to specify the operating mode of the VMIPMC-5664 on the Windows NT and Sun Solaris platforms, respectively. You can specify a unique operation mode for each board in your system.

Windows NT

The following sections discuss the installation and use of the **5664 Redundant Port Utility** on the Windows NT platform.

Installation Instructions

The **5664 Redundant Port Utility** is delivered in the `vmi5664RPU` directory on your VMISFT-566x-ABC-000 driver CD.

To install the utility:

1. Select **Start > Run** and key in `[drive]:\vmi5664RPU\setup.exe`

(where `[drive]` is the letter assigned to your CD-ROM drive).

The **Welcome** dialog box displays.

2. Click **Next** on the **Welcome** dialog box.

The **Choose Destination Location** dialog box displays.

3. Click **Browse** and choose a destination directory, and then click **Next**.

-or-

Click **Next** to accept the default directory.

The **Select Program Folder** dialog box displays.

4. Specify a program folder, and then click **Next**.

-or-

Click **Next** to accept the default program folder.

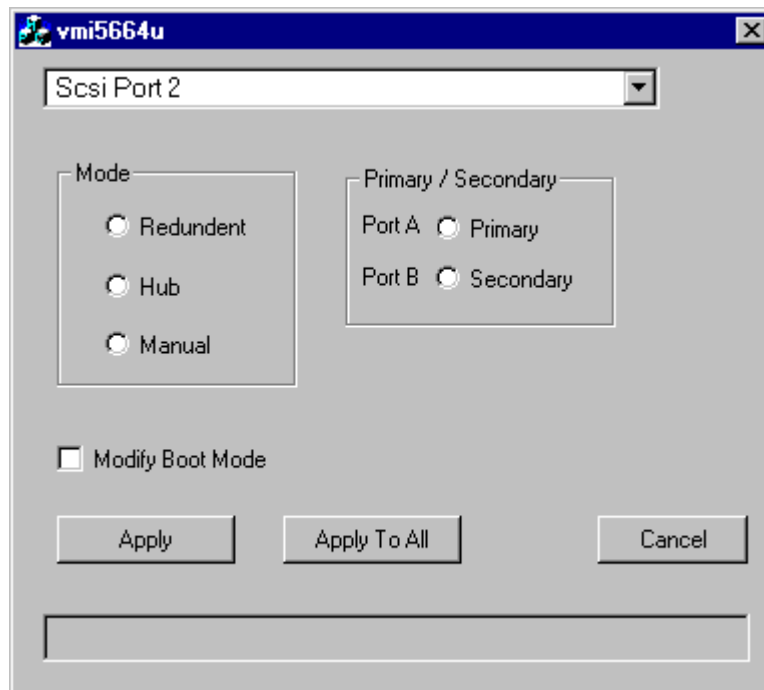
The **5664 Redundant Port Utility** installs. When the installation is finished, the **Setup Complete** dialog box displays.

5. Click **Finish**.

Using the 5664 Redundant Port Utility

1. Select **Start > Programs > VMIC > vmi5664 > vmi5664RPU**.

The **vmi5664u** dialog box displays.



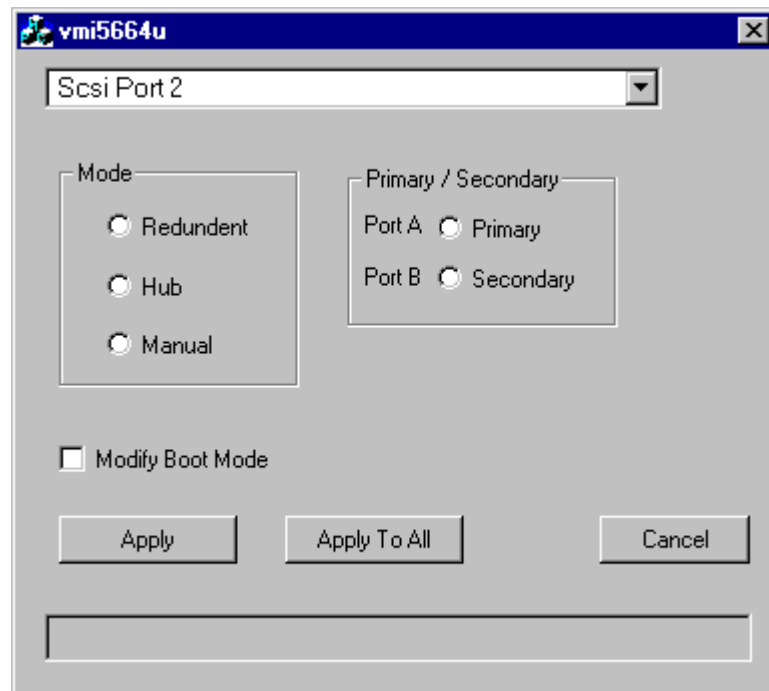
The software scans for boards on the system. Any boards found display in the drop-down list. You can then select a board and specify the operation of its ports, or specify the setting for all boards in the system.

2. Select a board from the drop-down list.
3. Select a mode.
4. Select the setting for Port A and Port B:
 - If you specified **Redundant** mode above, select a primary and secondary port.
 - If you specified **Manual** mode above, select an enabled and disabled port.
5. Select the **Modify boot mode** option to write any applied settings to the host's registry file.
6. Click **Apply** to accept the dialog box settings. Continue to Step 7.
- or -
Click **Apply To All** to change the settings of all boards in the drop-down list. Go to Step 8.

7. Repeat Steps 2 through 6 to change the settings of any other boards.
8. Click **Close** to close the **vmi5664u** dialog box.

vmi5664u Dialog Box

Use the **vmi5445u** dialog box to specify external port settings for boards in your system.



The **vmi5664u** dialog box contains the following options:

Boards

Displays the names of the PCI boards in all connected devices as they appear in the **Device Map** field on the **CardInfo** tab (**Start > Control Panel > SCSI Adapters > SCSI Adapters** dialog box > **Devices** tab > **Properties** button).

The drop-down list is blank if the board's driver is not installed properly. See "The VMISFT-566x-ABC-000 Windows NT Driver" on page 85 for driver installation information.

Mode

Specifies the operating mode of the VMIPMC-5664's ports with the specified connected device's board.

- **Redundant** -- In *Redundant* mode, only one of the two external ports is active at a time. However, both port transmitters remain active. The board will automatically switch from the primary port to the secondary port if the primary fails to detect valid data (i.e., the light shuts off and/or the signal terminates).

If you select this option, you must specify which external port will be primary and which will be secondary in the **Primary/Secondary** area.

- **Hub** -- The VMIPMC-5664 enables multiple host bus adapters (HBAs) to be daisy chained together to form a local Fibre Channel loop, or *Hub*. Any port that does not receive valid data (i.e., the light shuts off and/or the signal terminates) is automatically bypassed so that the loop remains functional for the other nodes in the loop.

If you select this option, the **Port Settings** area is unavailable.

- **Manual** -- In *Manual* mode, the host can manually enable or disable either of the redundant ports regardless of the state of the FAILn-signal through direct PCI bus commands.

If you select this option, you must specify which port will be enabled and which will be disabled in the **Primary/Secondary** area.

For more information on modes, see "VMIPMC-5664 Modes" on page 97.

Port Settings

This area is used to specify the settings of each of the VMIPMC-5664 ports (**Port A** and **Port B**). The options and their availability vary depending on the **Mode** selected.

Mode	Options
Redundant	Primary/Secondary -- Specifies that Port A is the primary port and Port B is the secondary port, or vice versa.
Hub	None available
Manual	Enabled/Disabled -- Specifies that Port A is the enabled port and Port B is the disabled port, or vice versa.



Modify Boot Mode

Writes applied dialog box settings to the host's registry boot settings. If this check box is not selected when a dialog box setting is applied, the setting will be lost when the host is rebooted.

Apply

Applies changes to the specified board.

Apply To All

Applies the dialog box settings to all boards in the system.

Cancel

Closes the **vmi5664u** dialog box.

Solaris

The VMISFT-566x-ABC-000 (SPARC/x86 SCSI) and VMISFT-566x-ABC-005 (SPARC/x86 IP) Fibre Channel driver packages include driver configuration files for configuring the boot-time settings of the VMIPMC-5664 on the Solaris operating system. The port connection option for the ISP2200 and ISP2300 HBAs, the IP MTU size and the ISP2300 data rate selection can each be modified by editing the configuration files.

Additionally, the VMIPMC-5664 (v566xip32 and v566xip64) includes a redundant port mode that can be modified using one of the following methods:

- Editing the configuration file
- At run-time using the **v5664util** utility

The utility and configuration files are installed during the Fibre Channel driver installation process. For more information, see "Installation Procedure" on page 59.

Editing the Configuration File

A set of configuration files is loaded into the `/kernel/drv` directory when you install either of the Solaris Fibre Channel drivers. The configuration files loaded will vary, depending on the driver you install.

Depending on the version of Solaris you are running, you will need to edit the appropriate configuration file.

VMISFT-566x-ABC-000 Driver (Solaris SPARC/x86 SCSI):

The VMISFT-566x-ABC-000 driver is loaded with the following configuration files:

- `v566x32.conf`
- `v566x64.conf`

The following lists a sample of the delivered source code in the `v566x32.conf` and `v566x64.conf` configuration files for the SCSI driver:

```

# Copyright (c) 2001 VMIC. All rights reserved.
#
# VMISFT-566X Fibre-Channel IP driver configuration
#
# Redundant Port Modes:
#   Redundant Port A = 0x7
#   Redundant Port B = 0xB
#   Manual Port A    = 0x4
#   Manual Port B    = 0x8
#   Manual Ports AB  = 0xC
#   Manual Ports off = 0x0
#   HUB Mode         = 0xE
#
redundant-port-mode=0xE;
#
# Port Connection Options:
#   Loop only                    = 0x0
#   Point-to-Point only         = 0x10
#   Loop preferred, otherwise Point-to-Point = 0x20
#   Point-to-Point preferred, otherwise Loop = 0x30
#
port-connection-option=0x30;

```

VMISFT-566x-ABC-005 Driver (Solaris SPARC/x86 IP):

The VMISFT-566x-ABC-005 driver is loaded with the following configuration files.

- For the ISP2200 Driver:
 - v566xip32.conf
 - v566xip64.conf
- For the ISP2300 Driver:
 - v566xip2x32.conf
 - v566xip2x64.conf

The following lists a sample of the delivered source code in the v566xip32.conf, v566xip64.conf, v566xip2x32.conf and v566xip2x64.conf configuration files for the IP driver:

```

#
# Copyright (c) 2001 VMIC. All rights reserved.
#
# VMISFT-566X Fibre-Channel IP driver configuration
#
# Redundant Port Modes:
#   Redundant Port A = 0x7
#   Redundant Port B = 0xB
#   Manual Port A    = 0x4
#   Manual Port B    = 0x8
#   Manual Ports AB  = 0xC
#   Manual Ports off = 0x0
#   HUB Mode         = 0xE
#

```

```
redundant-port-mode=0xE;
#
# Port Connection Options:
#   Loop only = 0x0
#   Point-to-Point only = 0x1
#   Loop preferred, otherwise Point-to-Point = 0x2
#   Point-to-Point preferred, otherwise Loop = 0x3 (Not valid for ISP2300/VMIPMC-5666)
#
isp2200-port-connection-option=0x3;
isp2300-port-connection-option=0x2;
#
# IP MTU size: range 140-65280
#
ip-mtu-size=8192;
#
# VMIPMC-5666 (ISP2300) Data rate definition:
#   1 gigabit/sec= 0x0;
#   2 gigabits/sec= 0x1;
#   Auto-negotiated= 0x2;
#
isp2300-data-rate=0x2;
```

The following configuration file parameters can be edited:

- The `redundant-port-mode` parameter identifies the boot-time mode for the 5664 HBA. The default boot-mode for the 5664 is HUB Mode (0xE).
- The `isp2200-port-connection-option` and the `isp2300-port-connection-option` parameter identifies the boot-time-specified connection preference for the HBA.
 - The default boot-time setting for the `isp2200-port-connection-option` is Point-to-Point preferred, otherwise Loop (0x3).
 - The default boot-time setting for the `isp2300-port-connection-option` is Loop preferred, otherwise Point-to-Point (0x2).

NOTE: A setting of Point-to-Point preferred, otherwise Loop (0x3) is not valid for an ISP2300 driver.

- The `ip-mtu-size` parameter identifies the default message transmission unit size used for IP driver configuration. It is recommended that all integrated systems operate using an identical MTU size for interoperability, especially when message sizes exceed the MTU size. Messages can be discarded from unmatched systems.
- The `isp2300-data-rate` parameter identifies the data rate selection for the ISP2300 HBA. The default mode is Auto-negotiated. Fixed modes can be selected using this parameter.

To modify the boot-time mode or boot-time-specified connection preference:

1. Log into the console window as root (#).
2. Change directories to /kernel/dev.
3. Edit and save the file.
4. Reboot the system.

Examples

To specify Redundant Port A as the boot-time mode, edit the `redundant-port-mode` line as below:

```
redundant-port-mode=0x7;
```

To specify Loop only as the boot-time-specified connection preference, edit the `port-connection-option` line as below:

```
port-connection-option=0x0;
```

Using the 5664 Redundant Port Mode Utility (v5664util)

The redundant port mode can also be modified at run-time using the `/usr/bin/v5664util` utility.

NOTE: The changes made using the `v5664util` utility are applied during run-time *only*. If the Solaris host is booted after running this utility, the 5664 HBA will assume the mode defined in the `v566x32.conf` (Solaris 32-bit systems) or `v566x64.conf` (Solaris 7 and 8 64-bit systems) boot-time configuration file.

To enable the `v5664util` utility, perform the following:

1. Log into a console window as root (#).
2. Change directories to /etc.
3. Add the following line to the `devlink.tab` file for the VMISFT-566x-ABC-000 (Solaris SPARC/x86 SCSI) driver:

```
type=v566x      v566x\N0
```

-or-

Add the following lines to the `devlink.tab` file for the VMISFT-566x-ABC-005 (Solaris SPARC IP) driver:

```
type=v566xip    v566xip\N0
```

NOTES:

The `\N0` option causes board instances to be assigned starting at 0, and incrementing for further board assignments (1, 2, 3, etc.). For example, if two PCI cards are present, links named `/dev/v566x0` and `/dev/v566x1` (for the Solaris SPARC/x86 SCSI driver) or `/dev/v566xip0` and `/dev/v566xip1` (for the Solaris SPARC IP driver) are created when the host is rebooted.

Instances in the `/dev` directory do not necessarily correlate to actual PCI card instances.

Solaris allocates and maintains PCI card instances in the order that they were originally assigned. That is, the slot into which the first PCI card is inserted following a new Solaris load becomes logical slot 0.

To check the correlation, you can inspect the link in `/dev` using the command:

```
ls -l /dev/<link><#>
```

where `<link>` is the link type (`v566x` for the Solaris SPARC/x86 SCSI driver or `v566xip` for the Solaris SPARC IP driver) and `<#>` is the link number. For example, to inspect link 0 using the Solaris SPARC IP driver, enter the following at the prompt in a console window:

```
ls -l /dev/v566xip0
```

The following message displays in the console window:

```
lrwxrwxrwx  1 root      other          42 Dec  3 13:18
              /dev/v566xip0 -> ../devices/pci@1f,4000/scsi@2:pci1077,2200
```

In the above example, the `/dev/v566xip0` link points to PCI board instance 2.

When editing the `/etc/devlink.tab` file, use the `TAB` key to insert spaces. Do *not* use the space bar to add spaces within the file.

4. Reboot the system using the reconfigure option (`boot -r`).

Upon reboot, the HBA driver creates an entry specified by `devlink.tab` file data named `/dev/v566x<instance#>` (for Solaris SPARC/x86 SCSI) or `/dev/v566xip<instance#>` (for Solaris SPARC IP), where `<instance#>` indicates the instance number of the PCI HBA card. The mode can then be modified by using the utility.

5. For the Solaris SPARC/x86 driver:
 - a. Run the **5664 Redundant Port Utility** by entering the following:
`v5664util`
The **5664 Redundant Port Utility** menu requests the HBA instance number.
 - b. Type the HBA instance number and then press RETURN.
6. Type one of the following numbers and then press RETURN to perform the corresponding action:

Number	Action
1	Read Redundant Port State
2	Select Redundant Port A
3	Select Redundant Port B
4	Select Manual Port A
5	Select Manual Port B
6	Select Manual Ports AB
7	Select Manual Ports Off
8	Select Hub Mode
9	Exit Menu

7. Type 9 and then press RETURN to exit the **v5664util** utility.

v5664util Example

The following is an example of the operation of the 5664 Redundant Port Utility. The following actions occur in this example:

- Port 1 is selected as the PCI instance
- The state of the redundant port is read and written to the console window
- The mode is changed from Hub Mode to Manual Port A
- The 5664 Redundant Port Utility is exited

```
$ v5664util
VMISFT-566x Redundant Port Control Utility
Copyright (C) 2001 VMIC. All rights reserved.
The PCI instance number (#) is identified by /dev/v566x#ip.
Enter 5664 host bus adapter PCI instance number:
1
```

```
Enter the VMIC-5664 Redundant Port Control selection for PCI instance 1:
-----
```

```
1. Read Redundant Port State
2. Select Redundant Port A
3. Select Redundant Port B
4. Select Manual Port A
5. Select Manual Port B
6. Select Manual Ports AB
7. Select Manual Ports Off
8. Select Hub Mode
9. Exit Menu
Enter number of selection (1..9)>1
```

```
Current Mode:HUB MODE SELECTED
```

```
Enter the VMIC-5664 Redundant Port Control selection for PCI instance 1:
-----
```

```
1. Read Redundant Port State
2. Select Redundant Port A
3. Select Redundant Port B
4. Select Manual Port A
5. Select Manual Port B
6. Select Manual Ports AB
7. Select Manual Ports Off
8. Select Hub Mode
9. Exit Menu
Enter number of selection (1..9)>4
```

MANUAL PORT A SELECTED

Enter the VMIC-5664 Redundant Port Control selection for PCI instance 1:

1. Read Redundant Port State
2. Select Redundant Port A
3. Select Redundant Port B
4. Select Manual Port A
5. Select Manual Port B
6. Select Manual Ports AB
7. Select Manual Ports Off
8. Select Hub Mode
9. Exit Menu

Enter number of selection (1..9)>9

\$

