VME/ISA Synchronous Communications Administrator's Guide

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Introduction

The *VME/ISA Synchronous Communications Administrator's Guide* describes how to configure and operate the software for the VME and ISA Synchronous Communication boards.

The following provides an overview of this guide.

"Introduction" provides an overview of this guide, describes typographical conventions that are used in text, and points to manuals that are related to the VME and ISA Sync boards.

Chapter 1, "VME/ISA Sync Board Overview," describes the operation of the VME/ISA Sync board and how it relates to a network.

Chapter 2, "Configuring Software for the VME/ISA Sync Board," contains the procedures to configure the software for the board to operate in the CHALLENGE™ M, CHALLENGE L, and XL systems.

Chapter 3, "Operating the VME/ISA Sync Board," tells how to operate the board, including performing a reset and obtaining status.

Appendix A, "Software Messages and Error Recovery," describes the informational and error messages that may be displayed by the software and suggests actions to take to resolve them, if necessary.

Related Documentation

The manuals in this section may be helpful to obtain additional information.

- The operating system guides you received with your computer system contain information pertaining to system kernel reconfiguration.
- *VME Sync Board Installation Instructions* describes the procedure for installing the VME Sync board in your system.
- *ISA Sync Board Installation Instructions* describes the procedure for installing the ISA Sync board in your system.

The following manuals can be used to configure and run X.25 once the VME/ISA Sync board is operating:

- *SX.25 Administrator's Guide* describes how to configure and troubleshoot the SX.25 menu-driven software.
- *SX.25 User's Guide* describes how to use the X.25 commands that allow you to connect to a host on a local area network (LAN) or wide area network (WAN). The guide also describes the packet assembler/disassembler (*pad*) terminal program that is included with SX.25.

The following manual can be used to configure and run SNA once the VME/ISA Sync board is operating:

- *IRIS SNA SERVER Administration Guide* describes how to configure, operate, and troubleshoot the IRIS SNA SERVER software.

Typographical Conventions

These type conventions and symbols are used in this guide:

Italics	Filenames, variables, IRIX command arguments, command flags, titles of publications, icon names
`Screen type`	Code examples, file excerpts, and screen displays (including error messages)
`Bold Screen type`	User input
()	(Parentheses) Following IRIX commands, they surround the reference page (man page) section where the command is described
[]	(Brackets) Surrounding optional syntax statement arguments
#	IRIX shell prompt for the superuser (*root*)

Product Support

Silicon Graphics offers a comprehensive product support and maintenance program for their products. For information about using support services for this product, refer to the release notes that accompany it.

Chapter 1

VME/ISA Sync Board Overview

This chapter describes the VME and ISA Sync boards, including where and how they are typically used within a networking environment.

The VME and ISA Sync boards are similar in function and use, but are installed in either a VMEbus- or PC ISA bus-based system, respectively.

The VME Sync board uses a Motorola 68020 microprocessor to off-load the processing involved in controlling serial communications; the ISA Sync board uses a Motorola 68340 microprocessor.

The VME/ISA[1] Sync board is optimized for the front-end processing necessary for gateway communications and master-slave support functions.

Typical Use of the VME/ISA Sync Board

The VME Sync board is installed in the CHALLENGE L (deskside) and XL (rackmount) systems. The ISA Sync board is installed in the CHALLANGE M system.

The board and its software allow clusters of user terminals and printers connected to the host system to communicate in a data communications packet network environment by running protocols such as X.25 and SNA. As a communications link, the board connects with high-speed lines that are attached to other computers, modems, or other communications systems.

[1] Throughout this guide, references to "the VME/ISA Sync board" mean "the VME or ISA Sync board."

The VME/ISA Sync board and its software process data packets, such as those used in X.25 and SNA, and route them to and from other network nodes.

In the case of an X.25 WAN, the system containing the VME/ISA Sync board functions as data terminal equipment (DTE) in the X.25 network. It exchanges data with other network nodes, called data circuit-terminating equipment (DCE), which in turn route the data to other DTEs.

X.25 Communications

When the VME/ISA Sync board is configured to run in the X.25 network, it provides the following protocol standards:

- The host system (CHALLENGE M, L, or XL, depending on the installed board) meets the X.29 and X.3 packet assembly/disassembly (PAD) standard.
- Terminals connected to the host system meet the X.28 and X.3 PAD standard that allow them to run X.25.
- Channels on the VME Sync board meet the EIA-232-C, V.35, or X.21 transmission standards.
- Channels on the ISA Sync board meet the EIA-232-C transmission standard.

To run the X.25 protocol, the system must have the optional SX.25 product installed. For information on the SX.25 product, refer to the following documentation:

- *SX.25 Administrator's Guide* describes how to configure and troubleshoot the SX.25 menu-driven software.
- *SX.25 User's Guide* describes how to use the X.25 commands that allow you to connect to a host on a local area network (LAN) or wide area network (WAN).

SNA Communications

With the installation of the optional IRIS SNA products (IRIS SNA SERVER and IRIS SNA LU6.2) and the optional IRIS 3270 product, the VME/ISA Sync board can be configured to run in SNA networks and provide:

- channels on the VME Sync board that meet the EIA-232-C, V.35, or X.21 transmission standards
- channels on the ISA Sync board that meet the EIA-232-C transmission standard
- IBM® Low Entry Networking (LEN) nodes with the IRIS SNA SERVER software
- an application programming interface to IBM Advanced Program-to-Program Communication (APPC) protocol with the IRIS SNA LU6.2 software
- 3270 sessions to IBM hosts using a variety of networking protocols including SNA with the IRIS 3270 software

Board Configuration Options

The VME/ISA Sync board comes in a variety of configurations, as described in this section.

The allowable configurations for the VME Sync board are:

- One to four boards can be installed in the CHALLENGE L or XL systems for all electrical interfaces.
- A board can support only one of the following types of electrical interfaces:
  - one to four channels (ports) running from 9.6 to 64 kilobytes per second (kbs) for EIA-232-C, V.35, or X.21 (default configuration)
  - two channels (ports) running at speeds from 64 kbs to T1 (1.54 Mb/second) for V.35 or X.21 (this configuration adds a mezzanine board)

Note: The VME Sync board must be installed and its hardware configured by a qualified Silicon Graphics system support engineer (SSE).

The configurations for the ISA Sync board are:

- One board can be installed in the CHALLENGE M system.
- The board supports a maximum of two EIA-232-C channels (ports) running at 56 kilobytes per second.

Make a note the following information for later use in creating the board configuration files, as described in Chapter 2, "Configuring Software for the VME/ISA Sync Board."

- number of VME/ISA Sync boards in your system
- the board electrical interface type
- number of channels on the board connected to leased lines

Chapter 2

Configuring Software for the VME/ISA Sync Board

This chapter provides information for configuring the software for the VME/ISA Sync board. Included are procedures that configure the board for the first time and reconfigure the board to change the current setup. Additionally, this chapter describes how to create a system script that configures and starts the board automatically on subsequent system boots.

This chapter contains these sections:

- "Initially Configuring the VME/ISA Sync Board."
- "Reconfiguring the VME/ISA Sync Board."
- "Configuring the VME/ISA Sync Board for an Automatic System Boot."

Note: Throughout this guide, references to "the VME/ISA Sync board" mean "the VME or ISA Sync board."

Initially Configuring the VME/ISA Sync Board

This section provides a procedure for initially configuring the VME/ISA Sync board. It describes downloading files to the board that allow the board to communicate with the host system. Additionally, it describes configuring the board to run the SX.25 and SNA gateway applications.

Overview of the Configuration Procedure

Following are the major tasks for configuring software so the VME/ISA board can communicate with the host system and ultimately run a synchronous protocol such as X.25 or SNA.

1. Check your system's hardware and software.
2. Install the VME/ISA Sync board software on your system.
3. Create the ASCII configuration files.
4. Create binary images of the configuration files.
5. Reset the board.
6. Download the microcode image file.
7. Download the configuration files.
8. Prepare the networking protocol software to use the VME/ISA Sync board.

Preparing to Configure the VME/ISA Sync Board

The first step in configuring the VME/ISA Sync board is to ensure that your system has the correct hardware and software installed:

- The VME/ISA Sync board has been installed in the system and the jumpers and other hardware on the board have been configured correctly. Follow the procedure in the *VME Sync Board Installation Instructions* or the *ISA Sync Board Installation Instructions.*
- The IRIX 5.2 (or later) operating system software is running on your system. For installation instructions, refer to the *IRIS® Software Installation Guide*, which came with your system.
- To use the VME/ISA Sync board for X.25 communications, the SX.25 software is installed on your system. For installation instructions, refer to the *SX.25 Administrator's Guide*.
- To use the VME/ISA Sync board for SNA communications, check that the IRIS SNA SERVER software is installed on your system. For installation instructions, refer to the *IRIS® Software Installation Guide* and the *IRIS SNA SERVER Release Notes*.

Installing the VME/ISA Sync Board Software

Follow this procedure to install the VME/ISA Sync board software from the distribution media onto your system:

1. Power-on your system, open up a shell, and become superuser.
2. Insert the VME/ISA Sync board CD-ROM and use *inst* to install the software. For example,

   ```
   inst -f /CDROM/dist
   ```

3. Rebuild the kernel by entering the following command at the shell prompt as superuser:

   ```
   autoconfig -v
   ```

   This command announces the presence or absence of all optional boards in the system as follows:

   ```
   exprobe spaced vc adapter n
   vc, adapter n exprobe space
   ```

   Note: The variable n indicates the bus or board number. If there are four VME Sync boards installed in the system, there should be four different adapter numbers.

4. Reboot the system and continue by creating the configuration files.

All VME/ISA Sync board software utilities are installed in the directory */opt/vcom/bin*.

Creating the Configuration Files

You need an ASCII configuration file for each channel (or port) that is to be active on the VME/ISA Sync board.

Sample configuration files are located in the directory */opt/vcom/etc* and are named *wan_sample*.*. You can rename and copy these files into */var/opt/vcom/cfg* or create your own files within */var/opt/vcom/cfg* by using a system editor and using the naming conventions and content recommendations as follows.

Naming Conventions

Each configuration file must be named using the format */var/opt/vcom/cfg/xcf_input*.<*BoardnumChannel*>.

The naming conventions for the configuration files are:

- Each file must reside in the directory */var/opt/vcom/cfg*.
- Each file must use the same basename (that is, *xcf_input*).
- The file extension is determined by the channel location on the board and comprises the board number (0-3) and channel letter (A-D). The channel letter must be uppercase.

For example, the filename for the second port on the third board is named */var/opt/vcom/cfg/xcf_input.2B*.

File Contents

The ASCII configuration files *xcf_input*.* contain parameters and values in the format *PARAMETER=VALUE*. Each file must contain these parameters and values:

```
MAXFRAME=1024
BAUD=0
PHY_IP=DTE
SDLC_ENC=NRZ
```

These parameters and their values define the behavior of the port. The parameters and their values are case insensitive. Their meaning and permissible values are:

- *MAXFRAME=1024*—Defines the maximum length of the frame. Permissible values are from 134-4104. The default value is 262.
- *BAUD=0*—Defines the baud rate of the channel. This value should be set to *0*. Setting this value to 0 causes the board to use the external clock on the modem to set this value. (This is the recommended setting. It should be changed by Silicon Graphics SSEs only.)

- *PHY_IP=DTE*—Defines the channel as a DTE. (This is the recommended setting. It should be changed by Silicon Graphics SSEs only.)
- *SDLC_ENC=NRZ*—Defines the channel as NRZ (non-return to zero). (This is the default setting.) The other permissible value is NRZI (non-return to zero inverted).

After you have made a configuration file for each port on each board that is to be used, continue by running the *xcf*(1M) preprocessor on these files, as described in the next section.

Creating the Binary Image Files

The *xcf*(1M) utility processes the configuration information in the *xcf_input*.* ASCII configuration file and transforms the text into a binary image. Later, this image is downloaded to the VME/ISA Sync board using the *vcom_cfg*(1M) utility, as described in the section "Downloading the Configuration Files to the Board."

The location of *xcf* is */opt/vcom/bin/xcf*. The syntax of the *xcf* command is

`xcf` [**`-b`***Boardnum*] [**`-c`***Channel*]

where:

`-b`*Boardnum*	Specifies the board number to be configured. The range of board numbers is 0-3. If this option is not specified, all boards will be configured.
`-c`*Channel*	Specifies the channel in the range A-D to be configured. If this option is not specified, all channels will be configured.

The input configuration filename is */var/opt/vcom/cfg/xcf_input.<BoardnumChannel>* where *Boardnum* is the board number (0-3) and *Channel* is the channel (A-D). For details about creating these files, refer to "Creating the Configuration Files."

With no arguments, *xcf* generates 16 binary configuration files: one for each of four boards times the four channels, using the default values.

Note: These 16 files are created regardless of the number of boards that are present in the system or the number of existing configuration files.

The *xcf* command creates output binary image files in the directory */var/opt/vcom/etc*. The output filename uses the same suffix as the input filename, and the *wancfg* basename is used instead of *xcf_input*. The format of the output filenames is

wancfg.<BoardnumChannel>

Caution: The files */var/opt/vcom/etc/XNET* and */var/opt/vcom/etc/XNET.lck* are also created by *xcf* and are used by the VME/ISA Sync board software utilities to retrieve information about the board configuration. Do not modify or remove either of these files.

Resetting the Board

Reset the board using the *vcom_rst*(1M) command. The location of the *vcom_rst* command is the directory */opt/vcom/bin*. The syntax of the command is

`vcom_rst -b`*Boardnum*

where *Boardnum* specifies the board you want to reset.

Continue by downloading the board microcode image, as described in the section "Downloading the Microcode Image File to the Board."

Downloading the Microcode Image File to the Board

Before the board can run, it must have its processing code downloaded from the Silicon Graphics host system. The *vcom_vld*(1M) command downloads this image file, which, by default, is contained in the file */opt/vcom/mcode/x25.lod*. The syntax of the *vcom_vld* command is

vcom_vld [**-a**] [**-c**] [*mcode_file* [*Boardnum* ...]]

where:

-a	downloads the microcode image file to all boards
-c	configures the board by automatically executing *vcom_cfg*(1M)

Hint: Using the **-c** option allows you to skip the procedure in the next section, "Downloading the Configuration Files to the Board."

mcode_file	the microcode image file, by default, */opt/vcom/mcode/x25.lod*
Boardnum ...	one or more board numbers to be downloaded. This option must be used if the *-a* option is omitted

Some *vcom_vld* Command Examples

Following are examples of the *vcom_vld* command.

Example 1

To load all boards in the system, type

```
vcom_vld -a
```

Note: Be sure to continue to the next section, "Downloading the Configuration Files to the Board," if you did not use the *-c* option.

Example 2

To load and configure all boards in the system, type

```
vcom_vld -a -c
```

Downloading the Configuration Files to the Board

The board and channel configuration information is contained in binary image files (*wancfg*.*) that were created with *xcf*. (Refer to "Creating the Binary Image Files," for more information.) These files can be downloaded in one of two ways:

- Using the *-c* option to the *vcom_vld*(1M) command (refer to "Downloading the Microcode Image File to the Board," for more information).
- Using the *vcom_cfg*(1M) command, as described in this section.

The *vcom_cfg* utility must be run before any synchronous communication can occur, or to reconfigure ports at any time. The location of *vcom_cfg* is in the directory */opt/vcom/bin*. The syntax of the *vcom_cfg* command is

`vcom_cfg` [**`-a`**]

or

`vcom_cfg` [*Boardnum*[*Channel*]]

where:

`-a`	loads all ports on all boards
Boardnum	loads one or a range of specified boards (0-3)
Channel	loads one or a range of specified ports (A-D)

Some *vcom_cfg* Command Examples

The following shows some examples of the *vcom_cfg* command.

Example 1

To load all ports on all boards in the system, type

```
vcom_cfg -a
```

Example 2

To load board 1, ports A-C, type

```
vcom_cfg 1 A B C
```

Preparing for the Networking Protocol Software

Once the board software has been configured and downloaded, as described in the preceding sections, a protocol such as X.25 or SNA can be configured to run on the VME/ISA Sync board.

The VME/ISA Sync board can be used in an X.25 network using the optional SX.25 product. The procedure for configuring X.25 to run on the VME/ISA Sync board is fully described in the *SX.25 Administrator's Guide*.

For SNA networking, the VME/ISA Sync board runs the optional IRIS SNA SERVER software. The procedure for configuring the IRIS SNA SERVER software to run on the VME/ISA Sync board is fully described in the *IRIS SNA SERVER Administration Guide*.

Reconfiguring the VME/ISA Sync Board

Occasionally, you may find it necessary to change a board configuration. This could happen, for example, if you wanted to change a parameter within one of the ASCII configuration files or if you decided to change the number of channels you use on a board.

Reconfiguring a board is similar to configuring a board. The following steps outline the procedure. Reference the associated sections if you need a detailed explanation of the step.

1. Become superuser (*root*).
2. Bring down any application (such as SX.25 or SNA) that may be running on the board. Refer to the application's documentation for this procedure.

3. Terminate the *snetd*(1M) daemon process. From the shell prompt type

   ```
   killall snetd
   ```

4. Modify the ASCII board configuration files as described in "Creating the Configuration Files," if necessary.

   Note: This step is optional.

5. Create binary images of the configuration files by running the *xcf*(1M) preprocessor on the configuration files as described in "Creating the Binary Image Files."

6. Reset the board with the *vcom_rst*(1M) utility as described in "Resetting the Board."

7. Run the *vcom_vld*(1M) utility to download the microcode image to the board's processor as described in "Downloading the Microcode Image File to the Board."

   Hint: You can use the -c configuration option to the *vcom_vld* command and skip the next step.

8. Run the *vcom_cfg*(1M) utility to download the configuration files to the board, as described in "Downloading the Configuration Files to the Board."

9. Start the *snetd*(1M) daemon. From the shell prompt type

   ```
   snetd
   ```

10. Bring up the optional network protocol application such as the SX.25 or IRIS SNA SERVER as described in "Preparing for the Networking Protocol Software."

Configuring the VME/ISA Sync Board for an Automatic System Boot

A system startup file automatically downloads and configures board software each time the system is rebooted. It assumes the binary configuration files are current and complete, as described in "Creating the Configuration Files."

Note: The script contains commands described in the sections "Resetting the Board," and "Downloading the Microcode Image File to the Board." Be sure to refer to these sections for the complete command syntax and descriptions.

The script file is named */etc/init2.d/vcom* or */etc/rc2.d/S29vcom*.

Following is the contents of an example script:

```
/opt/vcom/bin/vcom_rst -b 1-4
/opt/vcom/bin/vcom_vld -a -c
```

These commands reset and load the microcode and channel configurations to all boards.

Note: Be sure to use your current configuration parameters in place of the example values listed above.

Operating the VME/ISA Sync Board

This chapter provides information for operating the VME/ISA Sync board once it has been installed and configured. This chapter contains these sections:

- "Starting and Stopping the VME/ISA Sync Board"
- "Resetting the VME/ISA Sync Board"
- "Obtaining VME/ISA Sync Board Status"

If you have not already configured the VME/ISA Sync board, go back to Chapter 2, "Configuring Software for the VME/ISA Sync Board" and perform the procedures described there.

Starting and Stopping the VME/ISA Sync Board

Once the software for the VME/ISA Sync board has been completely configured, as described in Chapter 2, "Configuring Software for the VME/ISA Sync Board," the board automatically starts up when your computer is booted. (The board is now ready to start an application such as SX.25 or IRIS SNA SERVER.)

The board stops operating once power to the computer is turned off.

Resetting the VME/ISA Sync Board

The VME/ISA Sync board can be reset using either a hardware switch or a software command. A pause of about 12 seconds occurs after the reset while the board reinitializes its memory.

After the board is reset, it must then be downloaded and configured before it can operate. For more information, see Chapter 2, "Configuring Software for the VME/ISA Sync Board."

Caution: Be sure all applications, such as SX.25 or IRIS SNA SERVER, have been stopped before resetting the board.

Hardware Reset

The VME Sync board is reset with the three-position front panel toggle switch. Push the switch toward the label **RESET** and release it to perform a board reset.

The ISA Sync board is reset with the **RST** switch, which is on the board and inaccessible once the board is installed.

Software Reset

The utility *vcom_rst* resets the board. The location of *vcom_rst* is in the directory */opt/vcom/bin*. The syntax for *vcom_rst* is

`vcom_rst -b`*Boardnum*

where:

`-b` designates the board number named by *Boardnum*.

Note: If the board is reset without first stopping application processes, the board may hang. If this happens, try a hardware reset of the board. (See "Hardware Reset.") If that doesn't work, your system must be rebooted to clear the error.

Obtaining VME/ISA Sync Board Status

You can determine board status by looking at the front panel LED lights or by issuing the *vcom_stat* command to retrieve a detailed display of error and configuration information.

Reading the VME/ISA Sync Board Front Panel LED Lights

The ISA Sync board front panel contains two LED lights that indicate board status. They are the green RUN and red HALT.

The VME Sync board front panel contains three LED lights that indicate board status. They are the green RUN, red HALT, and red SYSFAIL indicators. Board status can be determined through a combination of these LEDs being off, on, or dimmed. Table 3-1 shows the possible status conditions for the three LEDs.

Table 3-1 VME Sync Board LED Status Conditions

RUN (Green)	HALT (Red)	SYSFAIL (Red)	Status of Board
OFF	OFF	OFF	The power to the board is off; the board CPU has received a stop instruction; or the CPU is in a cache loop
OFF	OFF	ON	Board timeout
OFF	ON	OFF	CPU HALT due to a bus fault, HALT command, or retry cycle
OFF	ON	ON	Same as above condition, except the SYSFAIL LED was on when the HALT occurred or a “watchdog” timeout occurred
ON	OFF	OFF	Normal operation
ON	OFF	ON	Board power-on or reset; software has not turned off the SYSFAIL condition
DIM	DIM	OFF	Board bus accesses alternating with VMEbus accesses

Table 3-1 VME Sync Board LED Status Conditions

RUN (Green)	HALT (Red)	SYSFAIL (Red)	Status of Board
DIM	DIM	ON	Same as above, but BRDFAIL bit of SRC not cleared
ON	ON	ON	Not expected to occur

Retrieving VME/ISA Sync Board Status

The utility *vcom_stat* retrieves detailed information about the board software status. Its output is a grouping of status messages, which is listed by category and described in "vcom_stat Status Messages," in Appendix A. The location of *vcom_stat* is in the directory */opt/vcom/bin* and its syntax is

`vcom_stat` [**`-e`**] *Boardnum*

or

`vcom_stat` [**`-p`**] *Boardnum*

where:

`-e`	displays error information
`-p`	displays error, memory partition, and pooled network buffer (PNB) configuration information

Note: This command allows only one of the options to be used on the command line.

Software Messages and Error Recovery

This appendix lists the messages produced by the VME/ISA Sync board and suggests user responses. The messages are organized into sections according to message type.

- VME/ISA Sync board utility error messages
- VME/ISA Sync board driver messages

VME/ISA Sync Board Utility Error Messages

Following are error messages produced by the VME/ISA Sync board software utilities.

xcf Error Messages

```
ABORT: illegal adapter number <boardnum>.
ABORT: illegal channel ID <channel>
WARNING: input file foo not found - using defaults
WARNING: Bits foo and bar both set - ignored
WARNING: invalid keyword = FOO
FOO: value out of range, must be between [x, y].
```

Generally, out of range values and illegal combinations cause the utility to set the parameter to the default value and a warning message to be printed to stderr.

vcom_stat Status Messages

```
Original kernel initialization
Restarted
Board is downloaded and configured
```

VME/ISA Sync Board Driver Messages

This section lists the error messages that are produced by the VME/ISA Sync board software drivers. In these messages, "%d" is a decimal number and "%x" or "0x%x" is a hexadecimal number.

Following are messages that may be corrected by re-executing the start- up procedure. If that does not clear the error condition, report the message to SGI Customer Support.

```
VSC #%d, unconfigured but downloaded board
VSC: board #%d is not on line
VSC: attempt to open board #%d before downloading
VSC: do not use the cloneopen mechanism
```

Following are status messages that require no action.

```
PNB_ALLOC ( free=0x%x, amount=%d)
PNB_ALLOCB ( free=0x%x, bufsize=%d, pri=0x%x)
PNB_BCREL (free=0x%x)
PNB_BUFCALL ( free=0x%x bufsize=%d pri=0x%x func=0x%x arg=0x%x)
PNB_FREE ( free=0x%x mp=0x%x)
PNB_FREEB ( free=0x%x mp=0x%x)
PNB_FREEMSG ( free=0x%x, mp=0x%x)
PNB_INIT: vc_bcarray at 0x%x, bcfree at 0x%x
vc_open: q 0x%x devp 0x%x dev 0x%x flags 0x%x sflags 0x%x
vc: open emajor=%d, imajor=%d
vc: opened proto=DLD_PROTO, brd=%d.
vc: successful open, proto=%s_PROTO, brd=%d, sm=%d, *devp=0x%x.
vc: closed proto=DLD_PROTO, brd=%d.
vc: closed: brdno=%d, sm=%d, q=0x%x
vc: re-opened stream, %s_PROTO, brd=%d, sm=%d
vc: clone device=0x%x opening, q=0x%x:
vc_sendclose: allocate failed
vc_putdown: mbcopytosrv failed on 0x%x bytes
vc_promsg: M_ERROR rptr 0x%x
vc_close: q 0x%x flags 0x%x
```

Following are messages which should be reported to SGI Customer Support.

```
VSC #%d aborted, illegal board size = 0x%x
VSC #%d missing, mbx failure
VSC #%d missing, MGO failure
VSC #%d missing, mem window failure
VSC #%d aborted, not processing slave SHM queues
VSC #%d aborted, not processing host SHM queues
VCOM ABORT - kernel unable to allocate any message buffers
M_IOCTL: cmd 0x%x bp 0x%x mlen %d
vc_do_sysmap( brdno=%d ) failed,
setup_shmqs( brdno=%d ) failed,
chk_presence( brdno=%d ) failed,
get_vector() = 0 failed,
vme_ivec_set(vec=0x%x)=-1 failed,
vme_ivec_alloc()=-1 failed, brdno=%d,
pio_mapalloc() = 0 failed,
pio_badaddr() != 0 failed,
pio_mapalloc() = 0 failed,
pio_badaddr() != 0 failed,
setup_shmqs( brd=%d ) = 0x%x failing ***
map_short_pio( brd=%d ) = 0x%x failing ***
map_ram_pio( brd=%d ) = 0x%x failing ***
get_vector( brd=%d ) = 0x%x failing ***
board %d power-up tests timed out. ***
aborted, failed power-up tests, sts=0x%x ***
do_sysmap( brdno=%d ) = 0x%x failing ***
#%d aborted, not responding to sysmap ***
vc_edtinit( brdno=%d ) failing, retval = %d ***
```

Glossary

CCITT

The International Consultative Committee for Telephony and Telegraphy, the X.25 regulatory body.

DCE

Data circuit-terminating equipment.

DTE

Data terminal equipment. The user equipment (computer, terminal, etc.) connected to a network.

ISO

International Standards Organization. An international organization comprising the standards bodies of each country. ISO has issued standards on many topics, including the OSI Reference Model for networking.

LAN

A local area network, where several hosts and devices are located near one another and connected physically by cables.

OSI Reference Model

Open System Interconnection Reference Model. A seven-layer model describing desirable network services and how and where they should be provided.

PAD

Packet assembler/disassembler. A means of interfacing a character terminal to an X.25-based network.

SNA

Systems Network Architecture. A set of communications protocols developed by IBM for synchronous transmission of data.

WAN

A wide area network. Computers with long distances between them connected by, for example, telephone lines.

X.25

The CCITT recommendations covering network access protocols for ISO layers 1, 2, and 3 made in 1980, 1984, and 1988.

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