Solaris on Sun Hardware Reference Manual Supplement

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Preface

The *Solaris on Sun Hardware Reference Manual Supplement* contains manual pages (man pages) for software provided to Sun hardware customers with the Solaris 8 product. These supplement the man pages provided in the general *Solaris 8 Reference Manual*.

Before you can access some of the information published in this book through the `man` command, you may need to install software from the Sun Microsystems Computer Systems Supplement CD for your Solaris release. In most cases, when you install a software cluster from the Sun Microsystems Computer Systems Supplement CD, man pages about the software in that cluster will be automatically installed. For information about installing the man page software, refer to the *Solaris 8 Sun Hardware Platform Guide.*

How This Book Is Organized

This manual contains man pages in alphabetical order within each man page category. Supplemental man pages are included for the following categories:

- System Administration Commands (1M)
- Device and Network Interfaces (7)

The man pages apply to the following products:

- SunFDDI network adapter software: `nf`, `nf_fddidaemon`, `nf_install_agents`, `nf_macid`, `nf_smtmon`, `nf_snmd`, `nf_snmd_kill`, `nf_stat`, `nf_sync`, `pf`, `pf_fddidaemon`, `pf_install_agents`, `pf_macid`, `pf_smtmon`, `pf_snmd`, `pf_snmd_kill`, `pf_stat`, `smt`
- Sun HSI/P (PCI bus) network adapter software: `hsip`, `hsip_init`, `hsip_loop`, `hsip_stat`

- Sun HSI/S (Sbus) network adapter software: `hsi`, `hsi_init`, `hsi_loop`, `hsi_stat`, `hsi_trace`
- Sun Remote System Control (RSC): `rscadm`
- SunVTS diagnostic software: `sunvts`, `vtsk`, `vtsprobe`, `vtstty`, `vtsui`, `vtsui.ol`

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NAME

hsi_init − set high speed serial line interface operating parameters.

SYNOPSIS

/opt/SUNWconn/bin/hsi_init *device* **[[** *baud_rate* **] | [** *keyword=value***, ...] | [** *single-word option* **]]**

DESCRIPTION

The hsi_init utility allows the user to modify some of the hardware operating modes common to high speed synchronous serial lines. This may be useful in troubleshooting a link, or necessary to the operation of a communications package.

If run without options, hsi_init reports the options as presently set on the port. If options are specified, the new settings are reported after they have been made.

OPTIONS

Options to hsi_init normally take the form of a keyword, followed by an equal sign and a value. The exception is that a baud rate may be specified as a decimal integer by itself. Keywords must begin with the value shown in the options table, but may contain additional letters up to the equal sign. For example, "loop=" and "loopback=" are equivalent.

Recognized options are listed in the table below.

Keyword	Value	Effect
loopback	no	Disable internal loopback mode. If no other clocking options have been specified, perform the equivalent of **txc=txc** and **rxc=rxc**.
	yes	Set the port to operate in **internal loopback** mode. The receiver is electrically disconnected from the DCE receive data input and tied to the outgoing transmit data line. Transmit data is available to the DCE. If no other clocking options have been specified, perform the equivalent of **txc=baud** and **rxc=baud**.
nrzi	no	Set the port to operate with **NRZ** data encoding. NRZ encoding maintains a constant voltage level when data is present (1) and does not return to a zero voltage (0) until data is absent. The data is decoded as an absolute value based on the voltage level (0 or 1).
	yes	Set the port to operate with **NRZI** data encoding. **NRZI** encoding does a voltage transition when data is absent (0) and no voltage transition (no return to zero) when data is present (1). Hence, the name non-return to zero inverted. The data is decoded using relational decoding.
txc	txc	Transmit clock source will be the **TxCI** signal.
	-txc	Transmit clock source will be the inverted **TxCI** signal.
	rxc	Transmit clock source will be the **RxC** signal.
	baud	Transmit clock source will be the internal **baud rate generator**.

rxc	rxc	Receive clock source will be the **RxC** signal.
	-rxc	Receive clock source will be the inverted **RxC** signal.
	baud	Receive clock source will be the internal **baud rate generator**.
mode	fdx	HDLC Full Duplex mode (Default mode).
	ibm-fdx	IBM Full Duplex mode (SDLC).
	ibm-hdx	IBM Half Duplex mode (SDLC).
	ibm-mpt	IBM Multipoint mode (SDLC).
signal	yes	Notify application of modem signal (RTS and CTS) changes.
	no	Don't notify application of modem signal (RTS and CTS) changes.
speed	*integer*	Set the baud rate to *integer* bits per second. The speed can be set from 300 bps to 2048000 bps.
mtu		Set the Maximum Transmission Unit. This is the packet size that is transmitted. The maximum mtu is 1600 bytes.
mru		Set the Maximum Receive Unit. This is the packet size that is received. The maximum mru is 1600 bytes.
txd		This flags is used for inverting transmit data on serial lines. You can switch the polarity of a link by setting this flag to be negative, i.e. -txd.
rxd		This flags is used for inverting receive data on serial lines. You can switch the polarity of a link by setting this flag to be negative, i.e. -rxd.
reset		Resets the board. Terminates all incoming and outgoing traffic.

There are also several single-word options that set one or more paramaters at a time:

Keyword	**Equivalent to Options:**
external	txc=txc rxc=rxc loop=no
sender	txc=baud rxc=rxc loop=no
stop	speed=0

EXAMPLES

The following command sets the first CPU port to loop internally, use internal clocking and operate at 38400 bps:

example# hsi_init hih0 38400 loop=yes
port=hih0 speed=38309, mode=fdx, loopback=yes, nrzi=no, mtu=1600, mru=1600, txc=baud, rxc=baud, txd=txd, rxd=rxd, signal=no.

The following command sets the same port's clocking, local loopback and bit rate settings to their default values:

example# hsi_init hih0 1536000 loop=no
port=hih0 speed=1536000, mode=fdx, loopback=no, nrzi=no, mtu=1600, mru=1600, txc=txc, rxc=rxc, txd=txd, rxd=rxd, signal=no.

SEE ALSO

hsi_loop(1M), hsi_stat(1M), hsi_trace(1M), Intro(2), hsi(7D)

DIAGNOSTICS

device **missing minor device number**
The name *device* does not end in a decimal number that can be used as a minor device number.

bad speed: *arg*
The string *arg* that accompanied the "speed=" option could not be interpreted as a decimal integer.

Bad arg: *arg*
The string *arg* did not make sense as an option.

ioctl failure code = *errno*
An **ioctl(2)** system called failed. The meaning of the value of *errno* may be found in the **Intro(2)** manual page.

WARNINGS

hsi_init should not be used on an active serial link, unless needed to resolve an error condition. It should not be run casually, or if the user is unsure of the consequences of its use.

NAME

hsi_loop − high speed synchronous serial loopback test program for high speed serial interface.

SYNOPSIS

/opt/SUNWconn/bin/hsi_loop [−cdlsvt] *device*

DESCRIPTION

The hsi_loop command performs several loopback tests that are useful in exercising the various components of a serial communications link.

Before running a test, hsi_loop opens the designated port and configures it according to command line options and the specified test type. It announces the names of the devices being used to control the hardware channel, the channel number (ppa) corresponding to the *device* argument, and the parameters it has set for that channel. It then runs the loopback test in three phases.

The first phase is to listen on the port for any activity. If no activity is seen for at least four seconds, hsi_loop proceeds to the next phase. Otherwise, the user is informed that the line is active and that the test cannot proceed, and the program exits.

In the second phase, called the "first-packet" phase, hsi_loop attempts to send and receive one packet. The program will wait for up to four seconds for the returned packet. If no packets are seen after five attempts, the test fails with an error message. If a packet is returned, the result is compared with the original. If the length and content do not match exactly, the test fails.

The final phase, known as the "multiple-packet" phase, attempts to send many packets through the loop. Because the program has verified the integrity of the link in the first-packet phase, the test will not fail after a particular number of timeouts. If a packet is not seen after four seconds, a message is displayed. Otherwise, a count of the number of packets received is updated on the display once per second. If it becomes obvious that the test is not receiving packets during this phase, the user may wish to stop the program manually. The number and size of the packets sent during this phase is determined by default values, or by command line options. Each returned packet is compared with its original for length and content. If a mismatch is detected, the test fails. The test completes when the required number of packets have been sent, regardless of errors.

After the multiple-packet phase has completed, the program displays a summary of the hardware event statistics for the channel that was tested. The display takes the following form:

Port	**CRC errors**	**Aborts**	**Overruns**	**Underruns**	In <-Drops-> Out	
hih0	**0**	**0**	**0**	**0**	0	0

This is followed by an estimated line speed, which is an approximation of the bit rate of the line, based on the number of bytes sent and the actual time that it took to send them. This is a very rough approximation and should not be used in bechmarking, because elapsed time includes time to print to the display.

OPTIONS

The options for hsi_loop are described in the following table:

Option	Parameter	Default	Description
−c	*packet_count*	100	Specifies the number of packets to be sent in the multiple-packet phase.
−d	*hex_data_byte*	*random*	Specifies that each packet will be filled with bytes with the value of *hex_data_byte*.
−l	*packet_length*	100	Specifies the length of each packet in bytes.
−s	*line_speed*	9600	Bit rate in bits per second.
−v			Sets verbose mode. If data errors occur, the expected and received data is displayed.
−t	*test_type*	*none*	A number, from 1 to 4, that specifies which test to perform. The values for *test_type* are as follows:

1 Internal loopback test. Port loopback is on. Transmit and receive clock sources are internal (baud rate generator).

2 External loopback test. Port loopback is off. Transmit and receive clock sources are internal. Requires a loopback plug suitable to the port under test.

3 External loopback test. Port loopback is off. Transmit and receive clock sources are external (modem). Requires that one of the local modem, the remote modem, or the remote system (not a Sun) be set in a loopback configuration.

4 Test using predefined parameters. User defines hardware configuration and may select port parameters using the **hsi_init(1M)** command.

All numeric options except **−d** are entered as decimal numbers (for example, **−s 19200**). If you do not provide the **−t** *test_type* option, hsi_loop prompts for it.

EXAMPLES

The following command causes hsi_loop to use a packet length of 512 bytes over the first CPU port:

example# hsi_loop −l 512 hih0

In response to the above command, hsi_loop prompts you for the test option you want.

The following command performs an internal loopback test on the first CPU port, using 5000 packets and a bit rate of 56Kbps :

example# hsi_loop −t 1 −s 56000 −c 5000 hih0

SEE ALSO

hsi_init(1M), hsi_stat(1M), hsi_trace(1M), hsi(7d)

DIAGNOSTICS

device **missing minor device number**
The name *device* does not end in a decimal number that can be used as a minor device number.

invalid packet length: *nnn*
The packet length was specified to be less than zero or greater than 1600.

poll: nothing to read
poll: nothing to read or write.
The **poll(2)** system call indicates that there is no input pending and/or that output would be blocked if attempted.

len *xxx* **should be** *yyy*
The packet that was sent had a length of *yyy*, but was received with a length of *xxx*.

nnn **packets lost in outbound queueing**
nnn **packets lost in inbound queueing**
A discrepancy has been found between the number of packets sent by hsi_loop and the number of packets the driver counted as transmitted, or between the number counted as received and the number read by the program.

WARNINGS

To allow its tests to run properly, as well as prevent disturbance of normal operations, hsi_loop should only be run on a port that is not being used for any other purpose at that time.

NAME

hsi_stat − report driver statistics from a high speed synchronous serial link port.

SYNOPSIS

/opt/SUNWconn/bin/hsi_stat [-f] -a|*num_of_ports*
/opt/SUNWconn/bin/hsi_stat -c [-f] -a|*num_of_ports*
/opt/SUNWconn/bin/hsi_stat [-f] *device* **[***period***]**
/opt/SUNWconn/bin/hsi_stat -c [-f] *device*

DESCRIPTION

The hsi_stat command reports the event statistics maintained by a high speed synchronous serial device driver. The report may be a single snapshot of the accumulated totals, or a series of samples showing incremental changes.

Event statistics are maintained by a driver for each physical channel that it supports. They are initialized to zero at the time the driver module is loaded into the system when one of the driver's entry points is first called.

The **device** argument is the name of the high speed serial device as it appears in the /dev directory. For example, **hih0** specifies the first on-board high speed serial device.

As an alternative, you can display or clear the statistics for multiple physical channels using **num_of_ports** argument. The hsi_stat program will then display statistics accumulated from device **hih0** to **hih(num_of_ports - 1)**. Additionally, statistics for all ports can be displayed or cleared by the use of the -a option. In this case, the command will be issued for all the ports on the system. This option is not available for sampling purposes.

The following is a breakdown of hsi_stat output:

speed The line speed the device has been set to operate at. It is the user's responsibility to make this value correspond to the modem clocking speed when clocking is provided by the modem.

ipkts The total number of input packets.

opkts The total number of output packets.

undrun The number of transmitter underrun errors.

ovrrun The number of receiver overrun errors.

abort The number of aborted received frames.

crc The number of received frames with CRC errors.

isize The average size (in bytes) of input packets.

osize The average size (in bytes) of output packets.

iutil Reports the input line utilization expressed as a percentage.

outil Reports the output line utilization expressed as a percentage.

Additional fields for the 'f' flag are listed below.

ierror Reports the input error count. Errors can be incomplete frames, empty frames, or receive clock (RxC) problems.

inactiv Reports the number of input packets received when receive is inactive.

ishort Reports the number of short input packets. This is the number of input packets with lengths less than the number of CRC bytes.

ilong Reports the number of long input packets. This is the number of input packets with lengths larger than the MRU.

oerror Reports the output error count. Errors that can be lost are clear to send (CTS) signals or transmit clock (TxC) problems.

olong Reports the number of long output packets. This is the number of output packets with lengths with lengths larger than the MTU.

ohung Reports the number of times the transmitter hangs, which is usually due to a missing clock.

OPTIONS

−f Select full set of accumulated statistics for the device specified. This is useful while debugging the **hsi** driver.

−c Clear the accumulated statistics for the device specified. This may be useful when it is not desirable to unload a particular driver, or when the driver is not capable of being unloaded.

num_of_ports
Specify the number of devices that you want to dump the statistics.

−a Specify all of the ports in the system, regardless of the number of HSI boards.

interval Cause hsi_stat to sample the statistics every *interval* seconds and report incremental changes. The output reports line utilization for input and output in place of average packet sizes. These are the relationships between bytes transferred and the baud rate, expressed as percentages. The loop repeats indefinitely, with a column heading printed every twenty lines for convenience.

EXAMPLES

example# **hsi_stat hih0**

speed	ipkts	opkts	undrun	ovrrun	abort	crc	isize
9600	15716	17121	0	0	1	3	98

example# **hsi_stat 5**

speed	ipkts	opkts	undrun	ovrrun	abort	crc	isize
hih0	9600	15716	10100	0	0	1	3
hih1	9600	15234	20100	0	0	1	3
hih2	9600	15123	18254	0	0	1	3
hih3	9600	15378	18234	0	0	1	3

example# **hsi_stat -a**

speed	ipkts	opkts	undrun	ovrrun	abort	crc	isize	osize

hih0	9600	15716	10100	0	0	1	3	98
hih1	9600	15234	20100	0	0	1	3	98
hih2	9600	15123	18254	0	0	1	3	98
hih3	9600	15378	18234	0	0	1	3	98
hih4	9600	13900	13000	0	0	1	3	98
hih5	9600	15218	13100	0	0	1	3	98
hih6	9600	15737	22100	0	0	1	3	98
hih7	9600	15143	11254	0	0	1	3	98

example# **hsi_stat -c hih0**

speed	ipkts	opkts	undrun	ovrrun	abort	crc	isize	osize
9600	0	0	0	0	0	0	0	0

example# **hsi_stat hih0 5**

ipkts	opkts	undrun	ovrrun	abort	crc	iutil	outil
12	10	0	0	0	0	5%	4%
22	60	0	0	0	0	3%	90%
36	14	0	0	0	1	51%	2%

(In this final example a new line of output is generated every five seconds.)

SEE ALSO **hsi_init(1M), hsi_loop(1M), hsi_trace(1M), hsi(7D)**

DIAGNOSTICS

device **missing minor device number**
The name *device* does not end in a decimal number that can be used as a minor device number.

hsi_stat: Can't sample multiple ports simultaneously.
Sampling is only available with one specified port, i.e. hsi_stat hih0 10.

WARNINGS

Underrun, overrun, frame-abort and CRC errors have a variety of causes. Communication protocols are typically able to handle such errors and initiate recovery of the transmission in which the error occurred. Small numbers of such errors are not a significant problem for most protocols. However, because the overhead involved in recovering from a link error can be much greater than that of normal operation, high error rates can greatly degrade overall link throughput. High error rates are often caused by problems in the link hardware, such as cables, connectors, interface electronics or telephone lines. They may also be related to excessive load on the link or the supporting system.

The percentages for input and output line utilization reported when using the *interval* option may occasionally be reported as slightly greater than 100% because of inexact sampling times and differences in the accuracy between the system clock and the modem clock. If the percentage of use greatly exceeds 100%, or never exceeds 50%, then the baud rate set for the device probably does not reflect the speed of the modem.

NAME

hsi_trace − Dump and Parse the HSI/S driver trace buffer. This is a development/field support only diagnostic utility.

SYNOPSIS

/opt/SUNWconn/bin/hsi_trace

DESCRIPTION

hsi_trace utility id for support and field personnel only. This utility prints out the trace of the incoming and outgoing packets at the hsi driver level.

There are two levels of traces that can be captured. This is controlled by setting a variable in the driver in the /etc/system file.

set HSI:hsi_trace=1

The driver maintains an internal circular buffer to store 24K frames (both in and out).

Then run hsi_trace on the driver to collect the trace data.

hsi_trace > hsi_trace.log

This trace is useful when the problem occurs rarely (typically a week or so) and we do not have enough file system space.

This trace collects the last 24K of frame data.

Then there is another trace ‘strace‘ which can be used to collect all the data from the driver. This can be enabled by setting ‘hsi_trace‘ as

set HSI:hsi_trace=2

Then run

#strace 18515 all all > hsi_trace.log

This collects all the data from the driver. This trace is useful when we know that the problem occurs within a short time.

The trace output is as follows

In the first case (‘hsi_trace‘ utility)

13:26:38 0000004f hih9 len=0100 R: 31323334 35363738 fm: I-FR P/F=1 Nr=1 Ns=1

The fields are as follows

1 st field: Time stamp

2 nd field: time difference in microsecs between the last frame and current frame.

3 rd field: port

4 th field: length of the frame.

5 th field: R: received data T: transmitted data

6 th and 7 th field: First 8 bytes of the data transmitted or received.

7 th field: The frame type (SABM, TEST, XID, RR, RNR....)

Some of the frame types are described below.

Keyword	Value	Effect
RR	Receive Ready	This frame is used as a polling command by the primary station to solicit information frames from the secondary station.
RNR	Receive Not Ready	This frame is used as a flow control command or response to indicate that the station transmitting the Receive Not Ready frame is not able to accept any information frames at this time.
REJ	Reject	This frame is sent by a station to indicate that it has received a frame out of the normal sequence. This may indicate the loss of an information frame containing user data.
SABM	Set Async Balanced Mode	An LLC non-data frame requesting the establishment of a connection over which numbered information frames may be sent.
SNRM	Set Normal Response Mode	This command is sent from the primary station to a secondary station to place the secondary in the initialized normal SDLC operating mode.
SNRME	SNRM Extended	SNRM with two more bytes in the control field. Used in SDLC.
DISC	Disconnect	This command is sent from the primary station to the secondary station to place the secondary station in the off-line disconnected mode.
SIM	Set Initialization Mode	This command is sent from the primary station to the secondary station to being the initialization process.
UA	Unnumbered Ack	This response is sent from the secondary station to the primary station in response to an SNRM, DISC, or SIM command.
DM	Disconnect Mode	This response is sent from the secondary station to the primary station in response to any command other than SNRM or DISC.
RD	Request Disconnect	This response is sent from the secondary to the primary station to request that the secondary station be placed in the off-line or disconnect mode.
RIM	Req Init Mode	This response is sent from the secondary to the primary station to request initialization.

FRMR	Frame Reject	This response is sent from the secondary station to the primary station to indicate that an abnormal condition has been detected or that an invalid frame has been received. It contains bits which indicate the reason for the rejection of the frame.
XID	Exchange Identification	This frame may be either a command sent by the primary station or a response sent by the secondary station. It contains information that is used to identify the secondary station.
TEST	TEST	This command is sent from the primary station to the secondary station and may contain some form of a message that may be used to test the seconary's ability to receive data and transmit the data back to the primary station.
UI	Unnumbered Inforation	This command allows the primary station to send data to the secondary station and the unnumbered information response allows the secondary station to send data to the primary station.
INFO	Information	This frame contains the information and data relevant to the higher SNA architecture layers. INFO frames consist of several variable-length or optional fields, depending upon the implementation.
UP	unnumbered Poll frame	Used by a primary to poll a secondary.
BCN	Beacon	This is a beacon frame which is usually an indication of a problem.
CFGR	Configure	This is a configuration frame.

'strace' is the normal unix strace output.

020809 13:34:31 001c1330 0 ... 18515 0 hih8 len=0100 T: 31323334 35363738 fm: I-FR P/F=1 Nr=1 Ns=1

SEE ALSO

hsi_init(1M), hsi_stat(1M), hsi_loop(1M), hsi(7d)

DIAGNOSTICS

NAME

hsip_init − set high speed serial line interface operating parameters.

SYNOPSIS

/opt/SUNWconn/bin/hsip_init *device* **[[** *baud_rate* **] | [** *keyword=value***, ...] | [** *single-word option* **]]**

DESCRIPTION

The hsip_init utility allows the user to modify some of the hardware operating modes common to high speed synchronous serial lines. This may be useful in troubleshooting a link, or necessary to the operation of a communications package.

If run without options, hsip_init reports the options as presently set on the port. If options are specified, the new settings are reported after they have been made.

OPTIONS

Options to hsip_init normally take the form of a keyword, followed by an equal sign and a value. The exception is that a baud rate may be specified as a decimal integer by itself. Keywords must begin with the value shown in the options table, but may contain additional letters up to the equal sign. For example, "loop=" and "loopback=" are equivalent.

Recognized options are listed in the table below.

Keyword	Value	Effect
loopback	yes	Set the port to operate in **internal loopback** mode. The receiver is electrically disconnected from the DCE receive data input and tied to the outgoing transmit data line. Transmit data is available to the DCE. If no other clocking options have been specified, perform the equivalent of **txc=baud** and **rxc=baud**.
	no	Disable internal loopback mode. If no other clocking options have been specified, perform the equivalent of **txc=txc** and **rxc=rxc**.
	echo	Set the port to operate in **auto-echo** mode. The port will echo incoming receive data on the transmit data pin. When the loopback is set for echo and no clocking option is given the clocking is set txc=txc and rxc=rxc. Other clocking options can be used but line errors may occur due to the loopback=echo implementation.
nrzi	no	Set the port to operate with **NRZ** data encoding. **NRZ** encoding maintains a constant voltage level when data is present (1) and does not not return to a zero voltage (0) until data is absent. The data is decoded as an absolute value based on the voltage level (0 or 1).

	yes	Set the port to operate with **NRZI** data encoding. **NRZI** encoding does a voltage transition when data is absent (0) and no voltage transition (no return to zero) when data is present (1). Hence, the name non-return to zero inverted. The data is decoded using relational decoding.
txc	txc	Transmit clock source will be the **TxCI** signal.
	rxc	Transmit clock source will be the **RxC** signal.
	baud	Transmit clock source will be the internal **baud rate generator**.
	pll	Transmit clock source will be the output of the **DPLL** circuit. This can only be set with NRZI data encoding.
	-txc	Transmit clock source will be the inverted **TxCI** signal.
rxc	rxc	Receive clock source will be the **RxC** signal.
	txc	Receive clock source will be the **TxCI** signal. This can only be used with transmit clock option txc=txc.
	baud	Receive clock source will be the internal **baud rate generator**.
	pll	Receive clock source will be the output of the **DPLL** circuit. This can only be set with NRZI data encoding.
	-rxc	Receive clock source will be the inverted **RxC** signal.
txd	txd	Transmit data is not inverted.
	-txd	Transmit data is inverted.
rxd	rxd	Receive data is not inverted.
	-rxd	Receive data is inverted.
mode	fdx	HDLC Full Duplex mode (Default mode).
	ibm-fdx	IBM Full Duplex mode (SDLC).
	ibm-hdx	IBM Half Duplex mode (SDLC).
	ibm-mpt	IBM Multipoint mode (SDLC).
signal	yes	Notify application of modem signal (RTS and CTS) changes.
	no	Do not notify application of modem signal (RTS and CTS) changes.
mtu	*integer*	Set the maximum transmit unit to *integer* bytes with 2064 bytes maximum.
mru	*integer*	Set the maximum receive unit to *integer* bytes with 2064 bytes maximum.
speed	*integer*	Set the baud rate to *integer* bits per second with a minimum rate of 9600 bps and a maximum of 2048000 bps. Zero is also valid when txc is set to txc or -txc.

There are also several single-word options that set one or more paramaters at a time:

Keyword	Equivalent to Options:
external	txc=txc rxc=rxc loop=no
sender	txc=baud rxc=rxc loop=no
internal	txc=pll rxc=pll loop=no
stop	speed=0

EXAMPLES

The following command sets the first port to loop internally, use internal clocking and operate at 38400 baud:

example# hsip_init hihp0 38400 loop=yes
port=hihp0
speed=38400,
mode=fdx, signal=no, loopback=yes, nrzi=no, mtu=2064, mru=2064,
txc=baud, rxc=baud, txd=txd, rxd=rxd

The following command sets the same port's clocking, local loopback and baud rate settings to their default values:

example# hsip_init hihp0 speed=1536000 loopback=no txc=txc rxc=rxc
port=hihp0
speed=1536000,
mode=fdx, signal=no, loopback=no, nrzi=no, mtu=2064, mru=2064,
txc=txc, rxc=rxc, txd=txd, rxd=rxd

SEE ALSO

hsip_loop(1M), hsip_stat(1M), Intro(2), hsip(7D)

DIAGNOSTICS

device **missing minor device number**
The name *device* does not end in a decimal number that can be used as a minor device number.

bad speed: *arg*
The string *arg* that accompanied the "speed=" option could not be interpreted as a decimal integer.

Bad arg: *arg*
The string *arg* did not make sense as an option.

ioctl failure code = *errno*
An **ioctl(2)** system called failed. The meaning of the value of *errno* may be found in the **Intro(2)** manual page.

WARNINGS

hsip_init should not be used on an active serial link, unless needed to resolve an error condition. It should not be run casually, or if the user is unsure of the consequences of its use.

NAME

hsip_loop − high speed synchronous serial loopback test program for high speed serial interface.

SYNOPSIS

/opt/SUNWconn/bin/hsip_loop [−cdlsvt] *device*

DESCRIPTION

The hsip_loop command performs several loopback tests that are useful in exercising the various components of a serial communications link.

Before running a test, hsip_loop opens the designated port and configures it according to command line options and the specified test type. It announces the names of the devices being used to control the hardware channel, the channel number (ppa) corresponding to the *device* argument, and the parameters it has set for that channel. It then runs the loopback test in three phases.

The first phase is to listen on the port for any activity. If no activity is seen for at least four seconds, hsip_loop proceeds to the next phase. Otherwise, the user is informed that the line is active and that the test cannot proceed, and the program exits.

In the second phase, called the "first-packet" phase, hsip_loop attempts to send and receive one packet. The program will wait for up to four seconds for the returned packet. If no packets are seen after five attempts, the test fails with an error message. If a packet is returned, the result is compared with the original. If the length and content do not match exactly, the test fails.

The final phase, known as the "multiple-packet" phase, attempts to send many packets through the loop. Because the program has verified the integrity of the link in the first-packet phase, the test will not fail after a particular number of timeouts. If a packet is not seen after four seconds, a message is displayed. Otherwise, a count of the number of packets received is updated on the display once per second. If it becomes obvious that the test is not receiving packets during this phase, the user may wish to stop the program manually. The number and size of the packets sent during this phase is determined by default values, or by command line options. Each returned packet is compared with its original for length and content. If a mismatch is detected, the test fails. The test completes when the required number of packets have been sent, regardless of errors.

After the multiple-packet phase has completed, the program displays a summary of the hardware event statistics for the channel that was tested. The display takes the following form:

Port	**CRC errors**	**Aborts**	**Overruns**	**Underruns**	In	<-**Drops**->	**Out**
hihp0	**0**	**0**	**0**	**0**	**0**		**0**

This is followed by an estimated line speed, which is an approximation of the bit rate of the line, based on the number of bytes sent and the actual time that it took to send them. This is a very rough approximation and should not be used in bechmarking, because elapsed time includes time to print to the display.

OPTIONS

The options for hsip_loop are described in the following table:

Option	Parameter	Default	Description
−c	*packet_count*	100	Specifies the number of packets to be sent in the multiple-packet phase.
−d	*hex_data_byte*	*random*	Specifies that each packet will be filled with bytes with the value of *hex_data_byte*.
−l	*packet_length*	100	Specifies the length of each packet in bytes with a maximum of 2064 bytes.
−s	*line_speed*	9600	Bit rate in bits per second, minimum of 9600 bps and a maximum of 2048000 bps.
−v			Sets verbose mode. If data errors occur, the expected and received data is displayed.
−t	*test_type*	*none*	A number, from 1 to 4, that specifies which test to perform. The values for *test_type* are as follows:

1 Internal loopback test. Port loopback is on. Transmit and receive clock sources are internal (baud rate generator).

2 External loopback test. Port loopback is off. Transmit and receive clock sources are internal. Requires a loopback plug suitable to the port under test.

3 External loopback test. Port loopback is off. Transmit and receive clock sources are external (modem). Requires that one of the local modem or the remote modem be set in a loopback configuration.

4 Test using predefined parameters. User defines hardware configuration and may select port parameters using the **hsip_init(1M)** command.

All numeric options except **−d** are entered as decimal numbers (for example, **−s 19200**). If you do not provide the **−t** *test_type* option, hsip_loop prompts for it.

EXAMPLES

The following command causes hsip_loop to use a packet length of 512 bytes over the first CPU port:

example# hsip_loop −l 512 hihp0

In response to the above command, hsip_loop prompts you for the test option you want.

The following command performs an internal loopback test on the first CPU port, using 5000 packets and a bit rate of 56000 bps :

example# hsip_loop −t 1 −s 56000 −c 5000 hihp0

SEE ALSO

hsip_init(1M), hsip_stat(1M), hsip(7D)

DIAGNOSTICS

device **missing minor device number**
The name *device* does not end in a decimal number that can be used as a minor device number.

invalid packet length: *nnn*
The packet length was specified to be less than zero or greater than 2064.

poll: nothing to read
poll: nothing to read or write.
The **poll(2)** system call indicates that there is no input pending and/or that output would be blocked if attempted.

len *xxx* **should be** *yyy*
The packet that was sent had a length of *yyy*, but was received with a length of *xxx*.

nnn **packets lost in outbound queueing**
nnn **packets lost in inbound queueing**
A discrepancy has been found between the number of packets sent by hsip_loop and the number of packets the driver counted as transmitted, or between the number counted as received and the number read by the program.

WARNINGS

To allow its tests to run properly, as well as prevent disturbance of normal operations, hsip_loop should only be run on a port that is not being used for any other purpose at that time.

NAME

hsip_stat − report driver statistics from a high speed synchronous serial link port.

SYNOPSIS

/opt/SUNWconn/bin/hsip_stat [-f] -a|*num_of_ports*
/opt/SUNWconn/bin/hsip_stat [-f] *device* **[***period***]**
/opt/SUNWconn/bin/hsip_stat -c [-f] -a|*num_of_ports*
/opt/SUNWconn/bin/hsip_stat -c [-f] *device*

DESCRIPTION

The hsip_stat command reports the event statistics maintained by a high speed synchronous serial device driver. The report may be a single snapshot of the accumulated totals, or a series of samples showing incremental changes.

Event statistics are maintained by a driver for each physical channel that it supports. They are initialized to zero at the time the driver module is loaded into the system when one of the driver's entry points is first called.

The **device** argument is the name of the high speed serial device as it appears in the /dev directory. For example, **hihp0** specifies the first on-board high speed serial device.

As an alternative, you can display or clear the statistics for multiple physical channels using **num_of_ports** argument. The hsip_stat program will then display statistics accumulated for the first **n** number of ports, where **n** is **num_of_ports**.

The following is a breakdown of hsip_stat output:

speed	The line speed the device has been set to operate at. It is the user's responsibility to make this value correspond to the modem clocking speed when clocking is provided by the modem.
ipkts	The total number of input packets.
opkts	The total number of output packets.
undrun	The number of transmitter underrun errors.
ovrrun	The number of receiver overrun errors.
abort	The number of aborted received frames.
crc	The number of received frames with CRC errors.
isize	The average size (in bytes) of input packets.
osize	The average size (in bytes) of output packets.
ierror	Input error count (errors: Incomplete Frame, Empty frame, Glitch on RxC).
oerror	Output error count (errors: CTS lost, Glitch on TxC).
iutil	Input line utilization expressed as a percentage.
outil	Output line utilization expressed as a percentage.

OPTIONS

−f Select a complete set of accumulated statistics for the device specified. This is useful while debugging the **hsip** driver.

−a Select all devices.

−c Clear the accumulated statistics for the device specified. This may be useful when it is not desirable to unload a particular driver, or when the driver is not capable of being unloaded.

num_of_ports
Specify the number of devices that you want to dump the statistics.

period Cause hsip_stat to sample the statistics every *period* seconds and report incremental changes. The output reports line utilization for input and output in place of average packet sizes. These are the relationships between bytes transferred and the speed, expressed as percentages. The loop repeats indefinitely, with a column heading printed every twenty lines for convenience.

EXAMPLES

example# **hsip_stat hihp0**

speed	ipkts	opkts	undrun	ovrrun	abort	crc	isize	osize
9600	15716	17121	0	0	1	3	98	89

example# **hsip_stat 5**

	speed	ipkts	opkts	undrun	ovrrun	abort	crc	isize	osize
hihp0	9600	15716	10100	0	0	1	3	98	89
hihp1	9600	15234	20100	0	0	1	3	98	89
hihp2	9600	15123	18254	0	0	1	3	98	89
hihp3	9600	15378	18234	0	0	1	3	98	89
hihp4	9600	13900	13000	0	0	1	3	98	89

example# **hsip_stat -c hihp0**

speed	ipkts	opkts	undrun	ovrrun	abort	crc	isize	osize
9600	0	0	0	0	0	0	0	0

example# **hsip_stat hihp0 5**

ipkts	opkts	undrun	ovrrun	abort	crc	iutil	outil
12	10	0	0	0	0	5%	4%
22	60	0	0	0	0	3%	90%
36	14	0	0	0	1	51%	2%

(In this final example a new line of output is generated every five seconds.)

SEE ALSO

hsip_init(1M), hsip_loop(1M), hsip(7D)

DIAGNOSTICS

bad interval: *arg*
The argument *arg* is expected to be an interval and could not be understood.

device **missing minor device number**

The name *device* does not end in a decimal number that can be used as a minor device number.

WARNINGS

Underrun, overrun, frame-abort and CRC errors have a variety of causes. Communication protocols are typically able to handle such errors and initiate recovery of the transmission in which the error occurred. Small numbers of such errors are not a significant problem for most protocols. However, because the overhead involved in recovering from a link error can be much greater than that of normal operation, high error rates can greatly degrade overall link throughput. High error rates are often caused by problems in the link hardware, such as cables, connectors, interface electronics or telephone lines. They may also be related to excessive load on the link or the supporting system.

The percentages for input and output line utilization reported when using the *interval* option may occasionally be reported as slightly greater than 100% because of inexact sampling times and differences in the accuracy between the system clock and the modem clock. If the percentage of use greatly exceeds 100%, or never exceeds 50%, then the baud rate set for the device probably does not reflect the speed of the modem.

NAME

nf_fddidaemon − start/stop the NF FDDI SMT/SNM daemon and its associated processes.

SYNOPSIS

nf_fddidaemon start | stop

AVAILABILITY

This command is available with the *SunFDDI* product.

DESCRIPTION

The **nf_fddidaemon** script starts/stops the SNM daemon and its associated processes.

OPTIONS

start Starts the SNM daemon

stop Stops the SNM daemon

You must be root to run this command.

SEE ALSO

nf_snmd (1M)

NAME

nf_install_agents − install SunNet Manager agents for SunFDDI

SYNOPSIS

nf_install_agents

AVAILABILITY

This command is available with the *SunFDDI* product.

DESCRIPTION

The **nf_install_agents** script copies the FDDI schema files to the directory in which the standard agents are installed and updates the configuration files for SunNet Manager

The **nf_install_agents** command takes no arguments.

You must be root to run this command.

SEE ALSO

nf_snmd (1M)

NAME

nf_macid − obtain MAC address from specified **nf** (SunFDDI) interface.

SYNOPSIS

nf_macid *interface*

AVAILABILITY

This command is available only with the *SunFDDI* product.

DESCRIPTION

This command queries the IDPROM on the SunFDDI SBus card associated with a **nf** interface to obtain the MAC address resident there. This address is a globally unique, 48-bit address that is drawn from the same pool from which Ethernet addresses are taken.

The **nf_macid** command does not allow you to set a MAC address, either on the SBus card or for an interface. Use **ifconfig** with the **ether** argument to assign the MAC address you obtain with **nf_macid** to an SunFDDI interface.

Normally, you use the host-resident MAC address for all network interfaces on a machine. You would only use the MAC address obtained with **nf_macid** under unusual circumstances.

You can be normal user (not root) to run this command.

OPTIONS

interface Specifies the FDDI interface (**nf**<*num*>). The default (which you can omit) is **nf0.**

EXAMPLE

Obtain the MAC address for **nf0:**

% nf_macid
8:0:20:3e:da:5

Set the **nf0** interface to have the MAC address in the SBus card IDPROM:

ifconfig nf0 ether ‘nf_macid‘

You would follow the preceding command with an **ifconfig** command to assign an IP address to **nf0** and bring up that interface. Normally, such **ifconfig** commands would be run from a startup file.

SEE ALSO

ifconfig (1M)

NAME

nf_smtmon − the SMT monitor.

SYNOPSIS

nf_smtmon [−**i** *interface*] [**-x**] [**-h**] [*frametype*]

AVAILABILITY

This command is available with the *SunFDDI* product.

DESCRIPTION

nf_smtmon is used to display received SMT frames. You should run this command on the FDDI proxy system if the Console does not receive a response from a request for SMT MIB information.

You must be root to run this command.

OPTIONS

−**i** *interface* Specifies the FDDI interface (**nf***num* for SunFDDI). If this option is not specified, frames for all FDDI interfaces are displayed.

-x Displays the received frames in hex.

-h Displays the usage of this command.

frametype Specifies one or more types of SMT frames to be displayed. If this option is not specified, all types of frames are displayed. You can specify the following types of frames to be displayed:

ecf Echo Frame. Request and response frames are used for SMT-to-SMT loopback testing on an FDDI ring.

esf Extended Service Frame. Request, response, and announcement frames are used to extend new SMT services.

nif Neighborhood Information Frame. Request, response, and announcement frames are used to communicate station addresses and descriptions.

pmf_get Parameter Management Frame (PMF) Get Request. Request and response frames are used to retrieve SMT Management Information Base (MIB) attribute values.

rdf Request Denied Frame (response only). Sent in response to an unsupported or unknown request.

sifconfig Status Information Frame (SIF) Configuration. Request and response frames are used to retrieve configuration parameters for one or more stations on the ring.

sifoperation Status Information Frame (SIF) Operation. Request and response frames are used to retrieve operation information for one or more stations on the ring.

srf Status Report Frame. Announcement frame used to report Station Status. The current version of the SMT

daemon does not send out SRFs; however, any received SRFs are passed on to SNM as traps.

EXAMPLES

nf_smtmon -i nf0 nif sifconfig
displays the NIF and SIF configuration frames received in non-hex format on the **nf0** (SunFDDI) interface.

nf_smtmon -i nf1 -x ecf
displays, in hex, ECF frames received on the **nf1** (SunFDDI) interface.

SEE ALSO

smtd (1M)

NAME

nf_snmd − start the station management (SMT) to SunNet Manager daemon.

SYNOPSIS

nf_snmd [−**d**] [**-v5**]

AVAILABILITY

This command is available with the *SunFDDI* product.

DESCRIPTION

Upon invocation, the SNM daemon starts up station management processes that allow the station to communicate with other stations using the SMT protocol, and collect and return FDDI statistics to a SunNet Manager (SNM) Console. The daemon also receives SMT requests and SMT responses. The daemon also sends out SMT requests to other stations on the ring on behalf of SNM. The SMT daemon also forwards received Status Report Frames (SRFs) to the SNM management station in the form of traps.

The processes started by the SNM daemon include two SNM agents: a local agent (fddi) and a proxy agent (fddismt). Like other SNM agents, the local agent and proxy agent communicate with the SNM management station using RPC. The local agent responds to SNM requests with FDDI statistics gathered on the local machine. These statistics are equivalent to those displayed with the **nf_stat** and **nf_stat -m** commands.

The proxy agent can return two types of SMT information to the SNM Console: actual SMT frames (ECF, ESF, NIF, SIF Configuration, or SIF Operation), and attribute values for selected SMT MIB groups. The proxy agent gathers information from target stations by issuing SMT request frames and receiving SMT response frames. The proxy uses PMF Get request and response frames to retrieve MIB attribute values from the target station.

If the target station does not support PMF Get frames, it returns an RDF response to the proxy system. If a Console request for MIB attributes values is not successful, run the SMT monitor on the proxy system to see if an RDF frame has been received from the target station. If PMF Get frames are not supported by the target station, you may be able to use NIF, SIF Configuration or SIF Operation frames to return the desired attribute values.

The SMT MIB attributes groups MAC, PATH, and PORT contain index parameters. If you send a Quick Dump request from the Console for attribute values from one of these groups, only the values associated with the first index are returned (from the Console's point of view, the key value associated with the request is 1). If you want to see attribute values associated with other indexes, you must send a Data Report request with the Key field in the request set to the desired index.

If you make any changes to the **/etc/opt/snm/snm.conf** file on the station (for example, you add an additional hostname to the **na.fddi.trap-rendez** entry), you must kill the SNM daemon with **nf_snmd_kill** and then restart it in order for the change(s) to take effect.

You must be root to run this command.

OPTIONS

-d (debug mode) Displays a one-line entry in the window where **nf_snmd** is started for each frame that the station sends or receives. If this option is not specified, you are returned to the system prompt and there is no display. Use of this option is not recommended if the **nf_snmd** command is included in **/etc/rc2.d/S98nf_fddidaemon .**

SEE ALSO

nf_snmd_kill (1M), nf_stat (1M)

NAME

nf_snmd_kill − kill the station management (SMT) to SunNet Manager daemon and its associated processes.

SYNOPSIS

nf_snmd_kill

AVAILABILITY

This command is available with the *SunFDDI* product.

DESCRIPTION

The **nf_snmd_kill** script kills the SNM daemon and its associated processes. This command also kills the two SNM agents which are started by the SNM daemon: the local agent (fddi) and the proxy agent (fddismt). This command should not be used if the SNM daemon is not already running.

The **nf_snmd_kill** command takes no arguments.

You must be root to run this command.

SEE ALSO

nf_snmd (1M)

NAME

nf_stat − display SunFDDI interface statistics.

SYNOPSIS

nf_stat [−**m**][*interface*][*interval*][*count*]

AVAILABILITY

This command is available with the *SunFDDI* product.

DESCRIPTION

The **nf_stat** utility displays statistics for the SunFDDI interface. Some statistics relate to the SunFDDI implementation of the ANSI FDDI Connection Management standard (CMT), while others contain packet throughput, or station neighbor information.

This utility can report, on a periodic basis, packet throughput statistics, reconfiguration events, and interface exceptions. It also reports the identity of neighboring stations, information on its PHYs, and some FORMAC error counters. Several of the counters and status variables are periodically passed to the host from the hardware during the heartbeat signal. These statistics are available when invoking the command without the *-m* option. Issuing the command without an *interval* value displays the accumulated statistics; issuing the command with an *interval* value displays any differences between values since the previous display.

OPTIONS

−**m** Dumps the current nearest neighbor information and FDDI/S timer settings (described below). The *interval* and *count* arguments have no effect when used with this option. Note that you must be root to invoke **nf_stat** with the **-m** option.

interface Specifies which SunFDDI interface, **nf***num.*

interval Specifies the interval in seconds at which to display the statistics.

count Specifies the number of times to display the statistics. If no count is provided, the utility runs forever. It can be terminated by typing ^C (Control-C).

USAGE

You invoke **nf_stat** *with* the **-m** option to display information about neighboring stations. It generates a columnar display containing the following categories of data:

PhyA On a machine running SunFDDI Dual, shows the PHY type of the neighboring station that is connected to PHYA. Values are **A**, **B**, **S**, **M**, and **None** (if no connection). This column does not appear on a machine running SunFDDI SAS - Single Attached Station. (See Chapter 9 of the document ANSI/FDDI Station Management (SMT) Rev7.2 (25 June 1992)).

PhyB On a machine running SunFDDI Dual, shows the PHY type of the neighboring station that is connected to PHYB. Values are **A**, **B**, **S**, **M**, and **None** (if no connection). This column does not appear on a machine running SunFDDI SAS. (See Chapter 7 of the document ANSI/FDDI Station Management (SMT) Rev7.2 (25 June 1992)).

PhyS On a machine running SunFDDI SAS, shows the PHY type of the neighboring station that is connected to PHYS. Values are **A**, **B**, **S**, **M**, and **None** (if no connection). If connected to a concentrator, this will be **M.** This column

does not appear on a machine running SunFDDI Dual.

Frame FDDI MAC standard counter, frames received.

Error FDDI MAC standard counter, frame with the E bit first detected at this station.

Lost Frames whose reception is aborted.

SA MAC address; the unique 48-bit address of the SunFDDI interface. Where an IP hostname exists, it is displayed; otherwise, the 48-bit MAC address is used.

UNA The address of this station's upstream neighbor, using the SMT NIF protocol.

DNA The address of this station's downstream neighbor, using the SMT NIF protocol.

Display status information : You invoke **nf_stat** without the *-m* option, or with values for *interface* or *interval*, to display status information. Issuing the command without an *interval* value displays the accumulated statistics; issuing the command with an *interval* value displays any differences between values since the previous display.

One use of **nf_stat** without the **-m** option is to monitor the **Ring_OP** (Ring Operational) column; if it indicates more than one ring_op per second, there are media problems that must be fixed.

When invoked without the **-m** option, **nf_stat** generates a columnar display containing the following categories of data:

Ring Indicates whether the ring is up or down (that is, the Claim has succeeded).

Note: The following five fields use terms described in the SMT document, Chapter 9.

ECM (**ec_state**). Shows the current state of the ECM state machine. Valid values are: **Out**, **In**, **Trace**, **Leave**, **Path_Test**, **Insert**, **Check**, and **Deinsert**.

RMT (**rmt_state**). Shows the current state of the RMT state machine. Valid values are: **Isolated**, **Non_Op**, **Ring_Op**, **Detect**, **Non_Op_Dup**, **Ring_Op_Dup**, **Directed**, and **Rm_Trace**.

PCMA/PCMB (for SunFDDI Dual) **PCMS** (for SunFDDI SAS)
(**pc_state**). Is a variable from PCM to other management entities containing the current state of the PCM state machine. Current valid values are: **Off (O)**, **Break (B)**, **Reject (R)**, **Connect (C)**, **Next (N)**, **Signal (S)**, **Join (J)**, **Verify (V)**, **Active (A)**, and **Maint (M)**.

Ring_OP (**Ring Operational**). Indicates the number of times the ring has come up (and therefore implies the number of times the ring has gone down).

XmitP The number of packets transmitted.

RecvP The number of packets received.

SEE ALSO **netstat (1M)**

NAME

nf_sync − configure SunFDDI interface to operate in synchronous mode.

SYNOPSIS

nf_sync *nf<inst>* [*tsync sap*]

AVAILABILITY

This command is available with the *SunFDDI* product.

DESCRIPTION

The **nf_sync** utility is used to configure SunFDDI interfaces to operate in synchronous mode. By default, the SunFDDI interface configure to carry asynchronous traffic only.

OPTIONS

nf<inst>	Specifies the FDDI interface,
tsync	Specifies synchronous timer in nanoseconds, 400000 nanoseconds minimum,
sap	Specifies the service access point (SAP) for synchronous operation.

USAGE

Running nf_sync without specifying values for *tsync* and *sap* returns current configuration of the interface.

To reconfigure SAP for asynchronous operations, specify tsync=0

EXAMPLES

nf_sync nf0

displays current configuration on the **nf0** (SunFDDI) interface.

nf_sync nf0 1000000 800

configures SAP 800 for synchronous operation with a clock rate 1000000 nanoseconds (1ms)

NAME

pf_fddidaemon − start / stop the PF FDDI SMT / SNM daemon and its associated processes.

SYNOPSIS

pf_fddidaemon start | stop

AVAILABILITY

This command is available with the *SunFDDI* product.

DESCRIPTION

The **pf_fddidaemon** script starts / stops the SNM daemon and its associated processes.

OPTIONS

start Starts the SNM daemon

stop Stops the SNM daemon

You must be root to run this command.

SEE ALSO

pf_snmd (1M)

NAME

pf_install_agents − install SunNet Manager agents for SunFDDI

SYNOPSIS

pf_install_agents

AVAILABILITY

This command is available with the *SunFDDI* product.

DESCRIPTION

The **pf_install_agents** script copies the FDDI schema files to the directory in which the standard agents are installed and updates the configuration files for SunNet Manager

The **pf_install_agents** command takes no arguments.

You must be root to run this command.

SEE ALSO

pf_snmd (1M)

NAME

pf_macid − obtain MAC address from specified **pf** (SunFDDI/P) interface.

SYNOPSIS

pf_macid *interface*

AVAILABILITY

This command is available only with the *SunFDDI* product.

DESCRIPTION

This command queries the IDPROM on the SunFDDI card associated with a **pf** interface to obtain the MAC address resident there. This address is a globally unique, 48-bit address that is drawn from the same pool from which Ethernet addresses are taken.

The **pf_macid** command does not allow you to set a MAC address, either on the PCI card or for an interface. Use **ifconfig** with the **ether** argument to assign the MAC address you obtain with **pf_macid** to an SunFDDI interface.

Normally, you use the host-resident MAC address for all network interfaces on a machine. You would only use the MAC address obtained with **pf_macid** under unusual circumstances.

You can be normal user (not root) to run this command.

OPTIONS

interface Specifies the FDDI interface (**pf**<*num*>). The default (which you can omit) is **pf0.**

EXAMPLE

Obtain the MAC address for **pf0:**

% pf_macid
8:0:20:3e:da:5

Set the **pf0** interface to have the MAC address in the PCI card IDPROM:

ifconfig pf0 ether ‘pf_macid‘

You would follow the preceding command with an **ifconfig** command to assign an IP address to **pf0** and bring up that interface. Normally, such **ifconfig** commands would be run from a startup file.

SEE ALSO

ifconfig (1M)

NAME

pf_smtmon − the SMT monitor.

SYNOPSIS

pf_smtmon [−**i** *interface*] [**-x**] [**-h**] [*frametype*]

AVAILABILITY

This command is available with the *SunFDDI/P* product.

DESCRIPTION

pf_smtmon is used to display received SMT frames. You should run this command on the FDDI proxy system if the Console does not receive a response from a request for SMT MIB information.

You must be root to run this command.

OPTIONS

−**i** *interface* Specifies the FDDI interface (**pf***num* for SunFDDI/P). If this option is not specified, frames for all FDDI interfaces are displayed.

-x Displays the received frames in hex.

-h Displays the usage of this command.

frametype Specifies one or more types of SMT frames to be displayed. If this option is not specified, all types of frames are displayed. You can specify the following types of frames to be displayed:

ecf Echo Frame. Request and response frames are used for SMT-to-SMT loopback testing on an FDDI ring.

esf Extended Service Frame. Request, response, and announcement frames are used to extend new SMT services.

nif Neighborhood Information Frame. Request, response, and announcement frames are used to communicate station addresses and descriptions.

pmf_get Parameter Management Frame (PMF) Get Request. Request and response frames are used to retrieve SMT Management Information Base (MIB) attribute values.

rdf Request Denied Frame (response only). Sent in response to an unsupported or unknown request.

sifconfig Status Information Frame (SIF) Configuration. Request and response frames are used to retrieve configuration parameters for one or more stations on the ring.

sifoperation Status Information Frame (SIF) Operation. Request and response frames are used to retrieve operation information for one or more stations on the ring.

srf Status Report Frame. Announcement frame used to report Station Status. The current version of the SMT

daemon does not send out SRFs; however, any received SRFs are passed on to SNM as traps.

EXAMPLES

pf_smtmon -i pf0 nif sifconfig
displays the NIF and SIF configuration frames received in non-hex format on the **pf0** (SunFDDI/P) interface.

pf_smtmon -i pf1 -x ecf
displays, in hex, ECF frames received on the **pf1** (SunFDDI/P) interface.

SEE ALSO

smtd (1M)

NAME

pf_snmd − start the station management (SMT) to SunNet Manager daemon.

SYNOPSIS

pf_snmd [−**d**] [**-v5**]

AVAILABILITY

This command is available with the *SunFDDI/P* product.

DESCRIPTION

Upon invocation, the SNM daemon starts up station management processes that allow the station to communicate with other stations using the SMT protocol, and collect and return FDDI statistics to a SunNet Manager (SNM) Console. The daemon also receives SMT requests and SMT responses. The daemon also sends out SMT requests to other stations on the ring on behalf of SNM. The SMT daemon also forwards received Status Report Frames (SRFs) to the SNM management station in the form of traps.

The processes started by the SNM daemon include two SNM agents: a local agent (fddi) and a proxy agent (fddismt). Like other SNM agents, the local agent and proxy agent communicate with the SNM management station using RPC. The local agent responds to SNM requests with FDDI statistics gathered on the local machine. These statistics are equivalent to those displayed with the **pf_stat** and **pf_stat -m** commands.

The proxy agent can return two types of SMT information to the SNM Console: actual SMT frames (ECF, ESF, NIF, SIF Configuration, or SIF Operation), and attribute values for selected SMT MIB groups. The proxy agent gathers information from target stations by issuing SMT request frames and receiving SMT response frames. The proxy uses PMF Get request and response frames to retrieve MIB attribute values from the target station.

If the target station does not support PMF Get frames, it returns an RDF response to the proxy system. If a Console request for MIB attributes values is not successful, run the SMT monitor on the proxy system to see if an RDF frame has been received from the target station. If PMF Get frames are not supported by the target station, you may be able to use NIF, SIF Configuration or SIF Operation frames to return the desired attribute values.

The SMT MIB attributes groups MAC, PATH, and PORT contain index parameters. If you send a Quick Dump request from the Console for attribute values from one of these groups, only the values associated with the first index are returned (from the Console's point of view, the key value associated with the request is 1). If you want to see attribute values associated with other indexes, you must send a Data Report request with the Key field in the request set to the desired index.

If you make any changes to the **/etc/opt/snm/snm.conf** file on the station (for example, you add an additional hostname to the **na.fddi.trap-rendez** entry), you must kill the SNM daemon with **pf_snmd_kill** and then restart it in order for the change(s) to take effect.

You must be root to run this command.

OPTIONS

-d (debug mode) Displays a one-line entry in the window where **pf_snmd** is started for each frame that the station sends or receives. If this option is not specified, you are returned to the system prompt and there is no display. Use of this option is not recommended if the **pf_snmd** command is included in **/etc/rc2.d/S98pf_fddidaemon .**

SEE ALSO

pf_snmd_kill (1M), pf_stat (1M)

NAME

pf_snmd_kill − kill the station management (SMT) to SunNet Manager daemon and its associated processes.

SYNOPSIS

pf_snmd_kill

AVAILABILITY

This command is available with the *SunFDDI/P* product.

DESCRIPTION

The **pf_snmd_kill** script kills the SNM daemon and its associated processes. This command also kills the two SNM agents which are started by the SNM daemon: the local agent (fddi) and the proxy agent (fddismt). This command should not be used if the SNM daemon is not already running.

The **pf_snmd_kill** command takes no arguments.

You must be root to run this command.

SEE ALSO

pf_snmd (1M)

NAME

pf_stat − display SunFDDI/P interface statistics.

SYNOPSIS

pf_stat [−**m**][*interface*][*interval*][*count*]

AVAILABILITY

This command is available with the *SunFDDI/P* product.

DESCRIPTION

The **pf_stat** utility displays statistics for the SunFDDI/P interface. Some statistics relate to the SunFDDI/P implementation of the ANSI FDDI Connection Management standard (CMT), while others contain packet throughput, or station neighbor information.

This utility can report, on a periodic basis, packet throughput statistics, reconfiguration events, and interface exceptions. It also reports the identity of neighboring stations, information on its PHYs, and some FORMAC error counters. Several of the counters and status variables are periodically passed to the host from the hardware during the heartbeat signal. These statistics are available when invoking the command without the *-m* option. Issuing the command without an *interval* value displays the accumulated statistics; issuing the command with an *interval* value displays any differences between values since the previous display.

OPTIONS

−**m** Dumps the current nearest neighbor information and FDDI/S timer settings (described below). The *interval* and *count* arguments have no effect when used with this option. Note that you must be root to invoke **pf_stat** with the **-m** option.

interface Specifies which SunFDDI/P interface, **pf***num.*

interval Specifies the interval in seconds at which to display the statistics.

count Specifies the number of times to display the statistics. If no count is provided, the utility runs forever. It can be terminated by typing ^C (Control-C).

USAGE

You invoke **pf_stat** *with* the **-m** option to display information about neighboring stations. It generates a columnar display containing the following categories of data:

PhyA On a machine running SunFDDI/P Dual, shows the PHY type of the neighboring station that is connected to PHYA. Values are **A**, **B**, **S**, **M**, and **None** (if no connection). This column does not appear on a machine running SunFDDI/P SAS - Single Attached Station. (See Chapter 9 of the document ANSI/FDDI Station Management (SMT) Rev7.2 (25 June 1992)).

PhyB On a machine running SunFDDI/P Dual, shows the PHY type of the neighboring station that is connected to PHYB. Values are **A**, **B**, **S**, **M**, and **None** (if no connection). This column does not appear on a machine running SunFDDI/P SAS. (See Chapter 7 of the document ANSI/FDDI Station Management (SMT) Rev7.2 (25 June 1992)).

PhyS On a machine running SunFDDI/P SAS, shows the PHY type of the neighboring station that is connected to PHYS. Values are **A**, **B**, **S**, **M**, and **None**

(if no connection). If connected to a concentrator, this will be **M.** This column does not appear on a machine running SunFDDI/P Dual.

Frame FDDI MAC standard counter, frames received.

Error FDDI MAC standard counter, frame with the E bit first detected at this station.

Lost Frames whose reception is aborted.

SA MAC address; the unique 48-bit address of the SunFDDI/P interface. Where an IP hostname exists, it is displayed; otherwise, the 48-bit MAC address is used.

UNA The address of this station's upstream neighbor, using the SMT NIF protocol.

DNA The address of this station's downstream neighbor, using the SMT NIF protocol.

Display status information : You invoke **pf_stat** without the *-m* option, or with values for *interface* or *interval*, to display status information. Issuing the command without an *interval* value displays the accumulated statistics; issuing the command with an *interval* value displays any differences between values since the previous display.

One use of **pf_stat** without the **-m** option is to monitor the **Ring_OP** (Ring Operational) column; if it indicates more than one ring_op per second, there are media problems that must be fixed.

When invoked without the **-m** option, **pf_stat** generates a columnar display containing the following categories of data:

Ring Indicates whether the ring is up or down (that is, the Claim has succeeded).

Note: The following five fields use terms described in the SMT document, Chapter 9.

ECM (**ec_state**). Shows the current state of the ECM state machine. Valid values are: **Out**, **In**, **Trace**, **Leave**, **Path_Test**, **Insert**, **Check**, and **Deinsert**.

RMT (**rmt_state**). Shows the current state of the RMT state machine. Valid values are: **Isolated**, **Non_Op**, **Ring_Op**, **Detect**, **Non_Op_Dup**, **Ring_Op_Dup**, **Directed**, and **Rm_Trace**.

PCMA/PCMB (for SunFDDI/P Dual) **PCMS** (for SunFDDI/P SAS)
(**pc_state**). Is a variable from PCM to other management entities containing the current state of the PCM state machine. Current valid values are: **Off (O)**, **Break (B)**, **Reject (R)**, **Connect (C)**, **Next (N)**, **Signal (S)**, **Join (J)**, **Verify (V)**, **Active (A)**, and **Maint (M)**.

Ring_OP (**Ring Operational**). Indicates the number of times the ring has come up (and therefore implies the number of times the ring has gone down).

XmitP The number of packets transmitted.

RecvP The number of packets received.

SEE ALSO **netstat (1M)**

NAME

rscadm − administer SUN(tm) Remote System Control (RSC)

SYNOPSIS

```
rscadm help
rscadm resetrsc [-s]
rscadm set variable value
rscadm download [boot] file
rscadm show [variable]
rscadm date [-s] | [[mmdd]HHMM | mmddHHMM[cc]yy[.SS]
rscadm send_event [-c] message
rscadm modem_setup
rscadm useradd username
rscadm userdel username
rscadm usershow [username]
rscadm userpassword username
rscadm userperm username [cuar]
```

DESCRIPTION

rscadm administers the SUN(tm) Remote System Console (RSC). It allows the host server to interact with the RSC. The following operations are supported:

rscadm help
: Displays a usage screen.

rscadm resetrsc
: Reset the RSC. There are two types of reset allowed, a "hard" reset and a "soft" reset. The hard reset is done by default. The soft reset can be selected by using the -s option.

rscadm set
: Set RSC configuration variables. Examples of RSC configuration variables include RSC IP address and RSC hostname. See the RSC documentation for a complete list of RSC configuration variables.

rscadm download
: Program the RSC's firmware. There are two parts to the firmware, the boot monitor and the main image. By default, rscadm download programs the main firmware image. The boot option selects programming of the boot monitor.

rscadm show
: View the current RSC configuration variable settings. If no variable is specified, rscadm shows all variable settings.

rscadm date
: Show or set RSC's time and date. The -s options can be used to set RSC's time and date to the hosts time and date.

rscadm send_event
: Send a text based event to RSC. RSC may forward the event based on its event configuration.

rscadm modem_setup
: Direct connection to the RSC modem. This allows the user to enter AT commands to configure the modem. "~." returns to prompt.

rscadm useradd
: Add user account to RSC. RSC can support up to four separate users.

rscadm userdel
: Delete a user account from RSC.

rscadm usershow
: Show details on the specified user account. If a username is not specified, all user accounts will be shown.

rscadm userpassword
: Set a password for the user account specified. This password overrides any existing password currently set. There is no verification of the old password before setting the new password. See the RSC documentation on valid password formats.

rscadm userperm
: Set the authorization profile for the user. See the userperm options section in this man page for more detail.

OPTIONS

The following options are supported for rscadm:

rscadm resetrsc

[-s] Perform a "soft" reset instead of a "hard" reset. A hard reset physically resets the RSC hardware. The RSC software jumps to the boot firmware, simulating a reset, for a soft reset.

rscadm download

[boot] Program the boot monitor portion of the flash. The main portion of the flash is usually programmed.

rscadm show

[variable] Show the value of that particular variable.

rscadm date

[-s] Set the date to the hosts time and date.

[[mmdd]HHMM | mmddHHMM[cc]yy][.SS]
: the date.

  mm - month
  dd - day
  HH - hour
  MM - minute
  cc - the first two digits of the four digit year
  yy - last 2 digits of the year number
  SS - seconds

rscadm send_event

[-c] Send a critical event. Without the -c, send_event sends a warnings. Warnings are only logged in the RSC event log and not forwarded further.

rscadm usershow

[username] RSC account name to display info on. If no username is given, all accounts will be displayed.

rscadm userperm

[cuar] Set permissions for RSC account. If no permissions are specified, all four permissions will be disabled. The options are to; allow user to connect to (c)onsole, allow user to use the (u)ser commands to modify RSC accounts, allow user to (a)dminister/change the RSC configuration variables, allow the user to (r)eset RSC and to power on/off the host.

OPERANDS

The following operands are supported for rscadm:

rscadm set

variable RSC configuration variable to set. See the RSC documentation for a list of configuration variables.

value Value to set RSC configuration variable to. See the RSC documentation for a list of valid values.

rscadm download

file Firmware file to download. The file should contain the RSC boot monitor image or RSC main image.

rscadm send_event

message Text message to describe event. Should be enclosed in quotes.

rscadm useradd

username Username for new RSC account.

rscadm userdel

username RSC account to be removed.

rscadm userpassword

username RSC account to have password set.

rscadm userperm

username RSC account to have permissions changed.

EXIT STATUS

= 0 on success
!= 0 on failure (with status message)

EXAMPLES

```
# rscadm date
# rscadm date -s
# rscadm date 050113101998
```

```
# rscadm set hostname rsc15
# rscadm show
# rscadm show hostname
# rscadm send_event -c "The UPS signaled a loss in power!"
# rscadm send_event "The disk is close to full capacity"
# rscadm useradd rscroot
# rscadm userdel olduser
# rscadm usershow
# rscadm usershow rscroot
# rscadm userperm rscroot cuar
# rscadm userperm newuser c
# rscadm userperm newuser
```

NOTES

rscadm modem_setup - "~." will only work after a new line.

rscadm MUST be run as root.

BUGS

None known.

NAME

sunvts − Invokes the SunVTS kernel and its user interface

SYNOPSIS

sunvts [−**lepqstv**] [−**o** *option_file*] [−**f** *log_dir*] [−**h** *hostname*]

AVAILABILITY

SUNWvts

DESCRIPTION

The **sunvts** command is used to invoke the SunVTS user interface and kernel on the same system. It could be used to start the user interface on the local system and connect to the SunVTS kernel on the remote system. By default, it displays CDE Motif graphic interface for CDE environment, OpenLook graphic interface for OpenWindows environment, or TTY interface for non-windowing system.

OPTIONS

−**l** Displays SunVTS OpenLook graphic interface.

−**e** Disables the security checking feature.

−**f** *log_dir*
Specifies an alternative log_file directory. The default log_file directory is **/var/opt/SUNWvts/logs.**

−**h** *hostname*
Starts the SunVTS user interface on the local system, which connects to or invokes the SunVTS kernel on the specified host after security checking succeeds.

−**o** *option_file*
Starts the SunVTS kernel with the test options loaded from the specified *option_file,* which by default is located in **/var/opt/SUNWvts/options.**

−**p** Starts the SunVTS kernel **vtsk (1M)** such that it does not probe the test system's devices.

−**q** Automatically quits both the SunVTS kernel and the user interface when testing stops.

−**s** Automatically starts testing from a selected group of tests. The flag must be used with the −**o** *option_file* flag.

−**t** Starts **vtstty (1M),** a TTY based interface, instead of CDE or OpenLook interface.

−**v** Displays version information from **vtsui**(1M) and **vtsk**(1M).

NOTES

If **vtsk (1M)** is already running on the test system, the **sunvts** command ignores the −**e,** −**o,** −**f,** −**q,** −**p,** and −**s** options.

SEE ALSO

vtsk(1M), **vtstty**(1M), **vtsui**(1M), **vtsui.ol**(1M), **vtsprobe**(1M)

NAME

vtsk − SunVTS diagnostic kernel

SYNOPSIS

vtsk [−**epqsv**] [−**o** *options_file*] [−**f** *logfile_directory*]

AVAILABILITY

SUNWvts

DESCRIPTION

The **vtsk** command starts up the SunVTS diagnostic kernel as a background process. There can only be one copy of **vtsk** running at a time. Only the superuser can execute this command.

Normally, **vtsk** is automatically started up by the **sunvts (1M)** command if it is not already running. **vtsk** will also be invoked by **inetd (1M)** when there is a connection request from vtsui or vtsui.ol. In that case, the security file, **.sunvts_sec,** will be checked for the permission before running vtsk on the target host specified by **vtsui**(1M) or **vtsui.ol**(1M).

OPTIONS

−**e** Enables the security checking for all connection requests.

−**p** Starts SunVTS diagnostic kernel, but does not probe system configuration.

−**q** Quits both the SunVTS diagnostic kernel and the attached User Interfaces when the testing is completed.

−**s** Runs enabled tests immediately after started.

−**v** Display SunVTS diagnostic kernel's version information only.

−**o** *options_file*
Starts the SunVTS diagnostic kernel and sets the test options according to the option file named *options_file.*

−**f** *logfile_directory*
Specifies an alternative logfile directory, other than the default.

EXIT STATUS

The following exit values are returned:

0 Successful completion.

−**1** An error occurred.

FILES

/var/opt/SUNWvts/options default option file directory.
/var/opt/SUNWvts/logs default log file directory.

SEE ALSO

sunvts(1M), **vtsui**(1M), **vtsui.ol**(1M), **vtstty**(1M), **vtsprobe**(1M)

NAME

vtsprobe − prints the device probe information from the SunVTS kernel

SYNOPSIS

vtsprobe [−**m**] [−**h** *hostname*]

AVAILABILITY

SUNWvts

DESCRIPTION

vtsprobe is a utility that displays the device and configuration information contained in the SunVTS kernel. The output includes the SunVTS assigned group for the device, the device name, the device instance, the testname attached to this device, and the configuration information obtained from the device-specific test probe.

OPTIONS

−**m** Specifies manufacturing mode, which displays the probe information in a format that is easy to read using script files.

−**h** *hostname*
Specifies the *hostname* to connect to and get the device and configuration information. If not specified, the current host will be used.

USAGE

After the SunVTS kernel is up and running, you may type **vtsprobe** at the shell prompt to get the probe output. (See the **sunvts (1M)** man page for more information on how to start up SunVTS.

EXAMPLE

Running **vtsprobe** on a sun4m SPARCclassic produces the following output:

```
% vtsprobe

Processor(s)
        system(systest)
                System Configuration=sun4m SPARCclassic
                System clock frequency=50 MHz
                SBUS clock frequency=25 MHz
        fpu(fputest)
                Architecture=sparc
                Type=TI TMS390S10 or TMS390S15 microSPARC chip
Memory
        kmem(vmem)
                Total: 143120KB
        mem(pmem)
                Physical Memory size=24 Mb
SCSI-Devices(esp0)
        c0t2d0(rawtest)
                Capacity: 638.35MB
                Controller: esp0
                Vendor: MICROP
                SUN Id: 1588-15MBSUN0669
                Firmware Rev: SN0C
```

```
            Serial Number: 1588-15MB103
        c0t2d0(fstest)
            Controller: esp0
        c0t3d0(rawtest)
            Capacity: 404.65MB
            Controller: esp0
            Vendor: SEAGATE
            SUN Id: ST1480   SUN0424
            Firmware Rev: 8628
            Serial Number: 00836508
        c0t3d0(fstest)
            Capacity: 404.65MB
            Controller: esp0
            Vendor: SEAGATE
            SUN Id: ST1480   SUN0424
            Firmware Rev: 8628
            Serial Number: 00836508
        c0t3d0(fstest)
            Controller: esp0
        c0t6d0(cdtest)
            Controller: esp0
        tape1(tapetest)
            Drive Type: Exabyte EXB-8500 8mm Helical Scan
Network
        isdn0(isdntest)
            NT Port  TE Port
        le0(nettest)
            Host_Name: ctech84
            Host Address: 129.146.210.84
            Host ID: 8001784b
            Domain Name: scsict.Eng.Sun.COM
Comm.Ports
        zs0(sptest)
            Port a -- zs0  /dev/term/a : /devices/ ... a
            Port b -- zs1  /dev/term/b : /devices/ ... b
Graphics
        cgthree0(fbtest)

OtherDevices
        bpp0(bpptest)
            Logical name: bpp0
        sound0(audio)
            Audio Device Type: AMD79C30
        sound1(audio)
            Audio Device Type: DBRI Speakerbox
```

spd0(spdtest)
Logical name: spd0

NOTES

The output of **vtsprobe** is highly dependent on the device being correctly configured into the system (so that a SunVTS probe for the device can be run successfully on it) and on the availability of a device-specific test probe.

If the device is improperly configured or if there is no probing function associated with this device, **vtsprobe** cannot print any information associated with it.

SEE ALSO

sunvts(1M), **vtsk**(1M), **vtsui**(1M), **vtsui.ol**(1M), **vtstty**(1M)

NAME

vtstty − TTY interface for SunVTS

SYNOPSIS

vtstty [−**qv**] [−**h** *hostname*]

AVAILABILITY

SUNWvts

DESCRIPTION

vtstty is the default interface for SunVTS in the absence of a windowing environment. It can be used in a non-windowing environment such as a terminal connected to the serial port of the system. However, its use is not restricted to this; **vtstty** can also be used from shell window.

OPTIONS

−**q** The "auto-quit" option automatically quits when the conditions for SunVTS to quit are met.

−**v** Prints the **vtstty** version. The interface is not started when you include this option.

−**h** *hostname*
Connects to the SunVTS kernel running on the host identified by *hostname.*

USAGE

The **vtstty** screen consists of four panels: main control, status, test groups, and console. The panels are used to display choices that the user can select to perform some function and/or to display information. A panel is said to be "in focus" or in a "selected" state when it is surrounded by asterisks and the current item is highlighted. In order to choose from the items in a panel, the focus should be shifted to that panel first.

The following are the different types of selection items that can be present in a panel:

Text string	Describes a choice that, when selected, either pops up another panel or performs a function. For example, "stop" will stop the SunVTS testing.
Data entry field	To enter or edit numeric or textual data.
Checkbox	Represented as "[ ]". Checkboxes are associated with items and indicate whether the associated item is selected or not. A checkbox can be in one of the following two states: Deselected [ ] or Selected [*].

The key assignments given below describe the keys for shifting focus, making a selection, and performing other functions:

TAB or <CTRL>W	Shift focus to another panel
RETURN	Select current item
Spacebar	Toggle checkbox
Up arrow or <CTRL>U	Move up one item
Down arrow or <CTRL>N	Move down one item

Left arrow or <CTRL>P	Move left one item
Right arrow or <CTRL>R	Move right one item
Backspace	Delete text in a data entry field
ESC	Dismiss a pop-up
<CTRL>F	Scroll forward in a scrollable panel
<CTRL>B	Scroll backward in a scrollable panel
<CTRL>X	Quit **vtstty** but leave the SunVTS kernel running
<CTRL>L	Refresh the **vtstty** screen

NOTES

1. To run **vtstty** from a telnet session, carry out the following steps:

   a. Before telnet-ing, determine the values for "rows and "columns". (See **stty**(1)).

   b. Set term to the appropriate type after telnet-ing(for example, **set term=vt100**

   c. Set the values of columns and rows to the value noted above. (See **stty**(1)).

2. Before running **vtstty** ensure that the environment variable describing the terminal type is set correctly.

SEE ALSO

sunvts(1M), **vtsk**(1M), **vtsui**(1M), **vtsui.ol**(1M), **vtsprobe**(1M)

NAME

vtsui − SunVTS Graphic User Interface (CDE)

SYNOPSIS

vtsui [−**qv**] [−**h** *hostname*]

AVAILABILITY

SUNWvts

DESCRIPTION

The **vtsui** command starts up the CDE Motif version of SunVTS graphic user interface. There can be multiple instances of **vtsui** running at the same time, all connected to one SunVTS diagnostic kernel, **vtsk**(1M). The name of the host machine running the diagnostic kernel, **vtsk**(1M), will be displayed in the title bar of the graphical user interface window.

vtsui is automatically started up by the **sunvts (1M)** command. **vtsui can** be also used to start **vtsk (1M)** if **inetd (1M)** is in operation. In that case, the security file, **sunvts_sec,** will be checked for the permission before running **vtsk** on the target host.

See the "SunVTS User's Guide" for a complete description on using the graphical user interface.

OPTIONS

−**q** Quits the SunVTS graphic user interface when testing has terminated.

−**v** Displays graphic user interface version information only.

−**h** *hostname*
Starts the SunVTS graphic user interface and connects to the SunVTS diagnostic kernel running on *hostname*, or invokes the kernel if not running, after security checking succeeds. If *hostname* not specified, the local host is assumed.

EXIT STATUS

The following exit values are returned:

0 Successful completion.

1 An error occurred.

SEE ALSO

sunvts(1M), **vtsk**(1M), **vtsui.ol**(1M), **vtstty**(1M), **vtsprobe**(1M)

NAME

vtsui.ol − SunVTS Graphic User Interface (OpenLook)

SYNOPSIS

vtsui.ol [−**qv**] [−**h** *hostname*]

AVAILABILITY

SUNWvts

DESCRIPTION

The **vtsui.ol** command starts up the OpenLook version of **SunVTS** graphic user interface. There can be multiple instances of **vtsui.ol** running at the same time, all connected to one **SunVTS** diagnostic kernel, **vtsk**(1M). The name of the host machine running the diagnostic kernel, **vtsk**(1M), will be displayed in the title bar of the graphic user interface window.

vtsui.ol can be used to start **vtsk**(1M) if **inetd**(1M) is in operation. In that case, the security file, **.sunvts_sec,** will be checked for the permission before running **vtsk** on the target host. **vtsui.ol** is also automatically started up by the **sunvts**(1M) command.

See the "SunVTS User's Guide" for a complete description on using the graphic user interface.

OPTIONS

−**q** Quits the SunVTS graphic user interface when testing has terminated.

−**v** Displays graphic user interface version information only.

−**h** *hostname*
Starts the SunVTS graphic user interface and connects to the **SunVTS** diagnostic kernel running on *hostname*, or invokes the kernel if not running, after security checking succeeds. If *hostname* not specified, the local host is assumed.

EXIT STATUS

The following exit values are returned:

0 Successful completion.

1 An error occurred.

SEE ALSO

sunvts(1M), **vtsk**(1M), **vtsui**(1M), **vtstty**(1M), **vtsprobe**(1M)

NAME

ge − GEM Gigabit-Ethernet device driver

SYNOPSIS

/dev/ge

DESCRIPTION

The **ge Sun** Gigabit-Ethernet driver is a multi-threaded, loadable, clonable, STREAMS hardware driver supporting the connectionless Data Link Provider Interface, **dlpi**(7P), over **GEM SBus and PCI** Gigabit-Ethernet add-in Adapters. Multiple **GEM based** adapters installed within the system are supported by the driver. The **ge** driver provides basic support for the **GEM based Ethernet** hardware and it is used to handle the **SUNW,sbus-gem (SBus GEM) and pci108e,2bad** (PCI GEM) devices. Functions include chip initialization, frame transmit and receive, multicast and promiscuous support, and error recovery and reporting. The **GEM** device provides 1000BASE-SX networking interfaces using the **GEM ASIC,** external SERDES and Fiber optical Transceiver. The GEM ASIC provides the appropriate bus interface, MAC functions and the Physical code sub-layer (PCS) functions. The external SERDES connects to a fiber transceiver and provides the physical connection.

The 1000Base-SX standard specifies an “auto-negotiation” protocol to automatically select the mode of operation. In addition to to the duplex mode of the operation, the GEM ASIC can auto-negotiate for IEEE 802.3x Frame Based Flow Control capabilities. The GEM PCS is capable of doing “auto-negotiation” with the remote-end of the link (Link Partner) and receives the capabilities of the remote end. It selects the **Highest Common Denominator** mode of operation based on the priorities. It also supports **forced-mode** of operation where the driver can select the mode of operation.

APPLICATION PROGRAMMING INTERFACE

The cloning character-special device **/dev/ge** is used to access all **ge** controllers installed within the system.

ge and DLPI

The **ge** driver is a “style 2” Data Link Service provider. All **M_PROTO** and **M_PCPROTO** type messages are interpreted as **DLPI** primitives. Valid **DLPI** primitives are defined in <**sys/dlpi.h**>**.** Refer to **dlpi**(7P) for more information. An explicit **DL_ATTACH_REQ** message by the user is required to associate the opened stream with a particular device (**ppa**). The **ppa** ID is interpreted as an **unsigned long** data type and indicates the corresponding device instance (unit) number. An error (**DL_ERROR_ACK**) is returned by the driver if the **ppa** field value does not correspond to a valid device instance number for this system. The device is initialized on first attach and de-initialized (stopped) at last detach.

The values returned by the driver in the **DL_INFO_ACK** primitive in response to the **DL_INFO_REQ** from the user are as follows:

- The maximum SDU is **1500** (**ETHERMTU** - defined in <sys/ethernet.h>).
- The minimum SDU is **0**.
- The **dlsap** address length is **8.**
- The MAC type is **DL_ETHER**.
- The **sap** length values is **−2** meaning the physical address component is followed immediately by a 2 byte **sap** component within the DLSAP address.

- The service mode is **DL_CLDLS**.
- No optional quality of service (QOS) support is included at present so the QOS fields are **0**.
- The provider style is **DL_STYLE2**.
- The version is **DL_VERSION_2**.
- The broadcast address value is Ethernet/IEEE broadcast address (**0xFFFFFF**).

Once in the **DL_ATTACHED** state, the user must send a **DL_BIND_REQ** to associate a particular SAP (Service Access Pointer) with the stream. The **ge** driver interprets the **sap** field within the **DL_BIND_REQ** as an Ethernet "type" therefore valid values for the **sap** field are in the [**0-0xFFFF**] range. Only one Ethernet type can be bound to the stream at any time.

If the user selects a **sap** with a value of **0**, the receiver will be in "802.3 mode". All frames received from the media having a "type" field in the range [**0-1500**] are assumed to be 802.3 frames and are routed up all open Streams which are bound to **sap** value **0**. If more than one Stream is in "802.3 mode" then the frame will be duplicated and routed up multiple Streams as **DL_UNITDATA_IND** messages.

In transmission, the driver checks the **sap** field of the **DL_BIND_REQ** if the **sap** value is **0**, and if the destination type field is in the range [**0-1500**]. If either is true, the driver computes the length of the message, not including initial **M_PROTO** mblk (message block), of all subsequent **DL_UNITDATA_REQ** messages and transmits 802.3 frames that have this value in the MAC frame header length field.

The **ge** driver **DLSAP** address format consists of the 6 byte physical (Ethernet) address component followed immediately by the 2 byte **sap** (type) component producing an 8 byte **DLSAP** address. Applications should *not* hard code to this particular implementation-specific **DLSAP** address format but use information returned in the **DL_INFO_ACK** primitive to compose and decompose **DLSAP** addresses. The **sap** length, full **DLSAP** length, and **sap**/physical ordering are included within the **DL_INFO_ACK**. The physical address length can be computed by subtracting the **sap** length from the full **DLSAP** address length or by issuing the **DL_PHYS_ADDR_REQ** to obtain the current physical address associated with the stream.

Once in the **DL_BOUND** state, the user may transmit frames on the Ethernet by sending **DL_UNITDATA_REQ** messages to the **ge** driver. The **ge** driver will route received Ethernet frames up all those open and bound streams having a **sap** which matches the Ethernet type as **DL_UNITDATA_IND** messages. Received Ethernet frames are duplicated and routed up multiple open streams if necessary. The **DLSAP** address contained within the **DL_UNITDATA_REQ** and **DL_UNITDATA_IND** messages consists of both the **sap** (type) and physical (Ethernet) components.

In addition to the mandatory connectionless **DLPI** message set the driver additionally supports the following primitives.

ge Primitives

The **DL_ENABMULTI_REQ** and **DL_DISABMULTI_REQ** primitives enable/disable reception of individual multicast group addresses. A set of multicast addresses may be iteratively created and modified on a per-stream basis using these primitives. These

primitives are accepted by the driver in any state following **DL_ATTACHED**.

The **DL_PROMISCON_REQ** and **DL_PROMISCOFF_REQ** primitives with the **DL_PROMISC_PHYS** flag set in the **dl_level** field enables / disables reception of all ("promiscuous mode") frames on the media including frames generated by the local host.
When used with the **DL_PROMISC_SAP** flag set this enables / disables reception of all **sap** (Ethernet type) values. When used with the **DL_PROMISC_MULTI** flag set this enables / disables reception of all multicast group addresses. The effect of each is always on a per-stream basis and independent of the other **sap** and physical level configurations on this stream or other streams.

The **DL_PHYS_ADDR_REQ** primitive returns the 6 octet Ethernet address currently associated (attached) to the stream in the **DL_PHYS_ADDR_ACK** primitive. This primitive is valid only in states following a successful **DL_ATTACH_REQ**.

The **DL_SET_PHYS_ADDR_REQ** primitive changes the 6 octet Ethernet address currently associated (attached) to this stream. The credentials of the process which originally opened this stream must be superuser. Otherwise **EPERM** is returned in the **DL_ERROR_ACK**. This primitive is destructive in that it affects all other current and future streams attached to this device. An **M_ERROR** is sent up all other streams attached to this device when this primitive is successful on this stream. Once changed, all streams subsequently opened and attached to this device will obtain this new physical address. Once changed, the physical address will remain until this primitive is used to change the physical address again or the system is rebooted, whichever comes first.

ge DRIVER

By default, the ge driver performs "auto-negotiation" to select the **mode** and **flow control capabilities** of the link.

The link can be in one of the *4* following modes:

- 1000 Mbps, full-duplex
- 1000 Mbps, half-duplex
- Symmetric Pause
- Asymmetric Pause

These speeds and modes are described in the 1000Base-TX standard.

The *auto−negotiation* protocol automatically selects:

- Operation mode (half-duplex or full-duplex)
- Flow Control Capability (Symmetric and / or Asymmetric)

The auto−negotiation protocol does the following:

- Gets all the modes of operation supported by the Link Partner
- Advertises its capabilities to the Link Partner
- Selects the highest common denominator mode of operation based on the priorities

The *GEM Hardware* is capable of all of the operating modes listed above, when by *default*, auto-negotiation is used to bring up the link and select the common mode of operation with the Link Partner. The PCS also supports *forced-mode* of operation in

which the driver can select the mode of operation and the flow control capabilities, using the *ndd* utility.

The **GEM** device also supports programmable **"IPG"** (Inter-Packet Gap) parameters **ipg1** and **ipg2**. By default, the driver sets **ipg1** to 8 **byte-times** and **ipg2** to 4 **byte-times** (which are the standard values). Sometimes, the user may want to alter these values from the standard 1000 Mpbs **IPG** set to 0.096 microseconds.

ge Parameter List

The ge driver provides for setting and getting various parameters for the **GEM** device. The parameter list includes **current transceiver status**, **current link status**, **inter-packet gap**, **PCS capabilities** and **link partner capabilities**.

The PCS has two set of capabilities: one set reflects the capabilities of the **hardware**, which are **read-only (RO)** parameters and the second set reflects the values chosen by the user and is used in **speed selection**. There are **read/write (RW)** capabilities. At boot time, these two sets of capabilities will be the same. The Link Partner capabilities are also read only parameters because the current default value of these parameters can only be read and cannot be modified.

FILES

/dev/ge	**ge** special character device.
/kernel/drv/ge.conf	System wide default device driver properties

SEE ALSO

ndd(1M), **netstat**(1M), **driver.conf**(4), **dlpi**(7P), **ie**(7D), **le**(7D) **hme**(7D) **qfe**(7D)

NAME

hsi − S-Bus based high speed serial line interface.

SYNOPSIS

#include <fcntl.h>
open(/dev/hih*n*, mode);
open(/dev/hih, mode);

DESCRIPTION

The **hsi** module is a loadable and unloadable STREAMS driver that implements the sending and receiving of data packets such as HDLC frames over synchronous serial lines. The **hsi** driver is a standalone driver that supports HSI/S S-Bus based serial interface hardware and provides physical level data transfer services for upper data link layer protocols (e.g. HDLC or SDLC).

The **hih***n* devices provide what is known as a **data path** which supports the transfer of data via **read**(2) and **write**(2) system calls, as well as **ioctl**(2) calls. Data path opens are exclusive in order to protect against injection or diversion of data by another process.

The **hih** device provides a separate **control path** for use by programs that need to configure or monitor a connection independent of any exclusive access restrictions imposed by data path opens. Up to three control paths may be active on a particular serial channel at any one time. Control path accesses are restricted to **ioctl**(2) calls only; no data transfer is possible.

When used in synchronous modes, the Z16C35 ISCC supports several options for **clock sourcing** and data encoding. Both the transmit and receive clock sources can be set to be the external receive clock (RTxC) and the internal baud rate generator (BRG). Additionally, the transmit clock source can be set to the external transmit clock (TRxC).

The **baud rate generator** is a programmable divisor that derives a clock frequency from the PCLK input signal to the ISCC. A programmed baud rate is translated into a 16-bit **time constant** that is stored in the ISCC. When using the BRG as a clock source the driver may answer a query of its current speed with a value different from the one specified. This is because baud rates translate into time constants in discrete steps, and reverse translation shows the change. If an exact baud rate is required that cannot be obtained with the BRG, an external clock source must be selected.

A **local loopback mode** is available, primarily for use by the **hsi_loop(1M)** utility for testing purposes, and should not be confused with **SDLC loop mode,** which is not supported on this interface. This option should be selected casually, or left in use when not needed.

The **hsi** driver keeps running totals of various hardware generated events for each channel. These include numbers of packets and characters sent and received, abort conditions detected by the receiver, receive CRC errors, transmit underruns, receive overruns, input errors and output errors, and message block allocation failures. Input errors are logged whenever an incoming message must be discarded, such as when an abort or CRC error is detected, a receive overrun occurs, or when no message block is available to store incoming data. Output errors are logged when the data must be discarded due to underruns, CTS drops during transmission, CTS timeouts, or excessive watchdog timeouts caused by a cable break.

IOCTLS

The **hsi** driver supports several **ioctl()** commands, including:

S_IOCGETMODE — Return a **struct scc_mode** containing parameters currently in use. These include the transmit and receive clock sources, boolean loop-back and NRZI mode flags and the integer baudrate.

S_IOCSETMODE — The argument is a **struct scc_mode** from which the ISCC channel will be programmed.

S_IOCGETSTATS — Return a **struct hs_stats** containing the current totals of hardware-generated events. These include numbers of packets and characters sent and received by the driver, aborts and CRC errors detected, transmit underruns, and receive overruns.

S_IOCCLRSTATS — Clear the hardware statistics for this channel.

S_IOCGETSPEED — Returns the currently set baudrate as an integer. This may not reflect the actual data transfer rate if external clocks are used.

S_IOCGETMCTL — Returns the current state of the CTS and DCD incoming modem interface signals as an integer.

The following structures are used with **hsi** ioctl() commands:

```
struct scc_mode {
    charsm_txclock; /* transmit clock sources */
    charsm_rxclock; /* receive clock sources */
    charsm_iflags;  /* data and clock inversion flags (non-zsh) */
    u_char      sm_config;  /* boolean configuration options */
    int  sm_baudrate; /* real baud rate */
    int  sm_retval; /* reason codes for ioctl failures */
};

struct hs_stats {
    unsigned int ipack; /* input packets */
    unsigned int opack; /* output packets */
    unsigned int ichar; /* input bytes */
    unsigned int ochar; /* output bytes */
    int  abort;    /* abort received */
    int  crc;      /* CRC error */
    int  cts;      /* CTS timeouts */
    int  dcd;      /* Carrier drops */
    int  overrun;  /* receive overrun */
    int  underrun; /* transmit underrun */
    int  ierror;   /* input error */
    int  oerror;   /* output error */
    int  nobuffers; /* rcv side memory allocation failure */
  int ishort;      /* input packet too short ( < CRC-bytes+1) */
  int ilong;       /* input packet too long (> mru) */
  int inactive;    /* input packet rcvd when rcv is inactive */
  int idma;        /* receive dma error */
```

```
    int olong;      /* output packet too long (> mtu) */
    int ohung;      /* transmit hung (usually missing clock) */
    int odma;       /* transmit dma error */
};
```

ERRORS

An **open()** will fail if a STREAMS message block cannot be allocated, or:

ENXIO	The unit being opened does not exist.
EBUSY	The device is in use by another serial protocol.

An **ioctl()** will fail if:

EINVAL	An attempt was made to select an invalid clocking source.
EINVAL	The baud rate specified for use with the baud rate generator would translate to a null time constant in the ISCC's registers.

FILES

/dev/hih[0-n], /dev/hih
Character-special devices.

/usr/include/sys/ser_sync.h
Header file specifying synchronous serial communication definitions.

SEE ALSO

hsi_init(1M), hsi_loop(1M), hsi_stat(1M), hsi_trace(1M)

Refer to the *Zilog Z16C35 ISCC Serial Communications Controller Technical Manual* for details of the ISCC's operation and capabilities.

DIAGNOSTICS

hih data open failed, no memory, rq=*nnn*
hih clone open failed, no memory, rq=*nnn* A kernel memory allocation failed for one of the private data structures. The value of *nnn* is the address of the read queue passed to open(2).

hih_open: can't alloc message block
The open could not proceed because an initial STREAMS message block could not be made available for incoming data.

hih: clone device *d* **must be attached before use!**
An operation was attempted through a control path before that path had been attached to a particular serial channel.

hih*n***: invalid operation for clone dev.**
An inappropriate STREAMS message type was passed through a control path. Only M_IOCTL and M_PROTO message types are permitted.

hih*n***: not initialized, can't send message**
An M_DATA message was passed to the driver for a channel that had not been programmed at least once since the driver was loaded. The ISCC's registers were in an unknown state. The S_IOCSETMODE ioctl command performs the programming operation.

hih*n***: transmit hung**
The transmitter was not successfully restarted after the watchdog timer

expired.

hihN: **Bad PPA = N.**
SunHSI/S driver received a DL_ATTACH_REQ, which has an out-of-range PPA number N, from upper layers.

hihN: **port N not installed.**
The SunHSI/S port N, which is referenced by the PPA number in a received DL_ATTACH_REQ message, is not installed in the system.

hihN: **out of STREAMS mblocks.**
Running out of streams mblocks for SunHSI/S port N.

hihN: **xmit hung.**
Transmission hung on SunHSI/S port N. This usually happens because of cabling problems or due to missing clocks from the CSU/DSU or modem.

hihN: <**hih_rxsoft**> **no buffers - rxbad.**
Running out of streams mblocks for SunHSI/S port N in hih_rxsoft() routine.

WARNING: **hih_init**: **changed baudrate from 100000 to 99512.**
The baud rate specified was rounded to a value the SunHSI/S hardware can support.

NAME

hsip − PCI-Bus based high speed serial line interface.

SYNOPSIS

#include <fcntl.h>
#include </usr/include/sys/ser_sync.h>
open(/dev/hihp*n*, mode);
open(/dev/hihp, mode);

DESCRIPTION

The **hsip** module is a loadable and unloadable STREAMS driver that implements the sending and receiving of data packets such as HDLC frames over synchronous serial lines. The **hsip** driver is a standalone driver that supports HSI/P PCI-Bus based serial interface hardware and provides phsipcal level data transfer services for upper data link layer protocols (e.g. HDLC or SDLC).

The **hihp***n* devices provide what is known as a **data path** which supports the transfer of data via **read**(2) and **write**(2) system calls, as well as **ioctl**(2) calls. Data path opens are exclusive in order to protect against injection or diversion of data by another process.

The **hihp** device provides a separate **control path** for use by programs that need to configure or monitor a connection independent of any exclusive access restrictions imposed by data path opens. Up to three control paths may be active on a particular serial channel at any one time. Control path accesses are restricted to **ioctl**(2) calls only; no data transfer is possible.

The HSIP ports support several options for **clock sourcing** and data encoding. Both the transmit and receive clock sources can be set to be the external transmit clock (TxC), external receive clock (RxC), the internal baud rate generator (BRG), or the output of the SCC's Digital Phase-Lock Loop (DPLL).

The **baud rate generator** is a programmable divisor that derives a clock frequency from the PCLK input signal to the SCC. A programmed baud rate is translated into a 16-bit **time constant** that is stored in the SCC. When using the BRG as a clock source the driver may answer a query of its current speed with a value different from the one specified. This is because baud rates translate into time constants in discrete steps, and reverse translation shows the change. If an exact baud rate is required that cannot be obtained with the BRG, an external clock source must be selected.

Use of the DPLL option requires the selection of NRZI data encoding and the setting of a non-zero value for the baud rate, because the DPLL uses the BRG as its reference clock source.

A **local loopback mode** is available, primarily for use by the **hsip_loop(1m)** utility for testing purposes, and should not be confused with **SDLC loop mode,** which is not supported on this interface. Also, an **auto-echo** feature may be selected that causes all incoming data to be routed to the transmit data line, allowing the port to act as the remote end of a digital loop. Neither of these options should be selected casually, or left in use when not needed.

The **hsip** driver keeps running totals of various hardware generated events for each channel. These include numbers of packets and characters sent and received, abort conditions detected by the receiver, receive CRC errors, transmit underruns, receive overruns, input errors and output errors. Input errors are logged whenever an incoming message must be discarded, such as when an abort or CRC error is detected, a receive overrun occurs, or when no message block is available to store incoming data. Output errors are logged when the data must be discarded due to underruns, CTS drops during transmission, CTS timeouts, or excessive watchdog timeouts caused by a cable break.

IOCTLS

The **hsip** driver supports several **ioctl()** commands, including:

S_IOCGETMODE — Return a **struct scc_mode** containing parameters currently in use. These include the transmit and receive clock sources, boolean loopback and NRZI mode flags and the integer baudrate.

S_IOCSETMODE — The argument is a **struct scc_mode** from which the SCC channel will be programmed.

S_IOCGETSTATS — Return a **struct sl_stats** containing the current totals of hardware-generated events. These include numbers of packets and characters sent and received by the driver, aborts and CRC errors detected, transmit underruns, and receive overruns.

S_IOCCLRSTATS — Clear the hardware statistics for this channel.

S_IOCGETSPEED — Returns the currently set baudrate as an integer. This may not reflect the actual data transfer rate if external clocks are used.

S_IOCGETMCTL — Returns the current state of the CTS and DCD incoming modem interface signals as an integer.

The following structures are used with **hsip** ioctl() commands:

```
struct scc_mode {
        char    sm_txclock;     /* transmit clock sources */
        char    sm_rxclock;     /* receive clock sources */
        char    sm_iflags;      /* data and clock inversion flags (non-zsh) */
        u_char  sm_config;      /* boolean configuration options */
        int     sm_baudrate;    /* real baud rate */
        int     sm_retval;      /* reason codes for ioctl failures */
};

struct sl_stats {
        int     ipack;          /* input packets */
        int     opack;          /* output packets */
        int     ichar;          /* input bytes */
        int     ochar;          /* output bytes */
        int     abort;          /* abort received */
        int     crc;            /* CRC error */
        int     cts;            /* CTS timeouts */
```

```
        int     dcd;            /* Carrier drops */
        int     overrun;        /* receive overrun */
        int     underrun;       /* transmit underrun */
        int     ierror;         /* input error */
        int     oerror;         /* output error */
        int     nobuffers;      /* receive side memory allocation failure */
};
```

ERRORS

An **open()** will fail if a STREAMS message block cannot be allocated, or:

ENXIO — The unit being opened does not exist.

EBUSY — The device is in use by another serial protocol.

An **ioctl()** will fail if:

EINVAL — An attempt was made to select an invalid clocking source.

EINVAL — The baud rate specified for use with the baud rate generator would translate to a null time constant in the SCC's registers.

FILES

/dev/hihp[0-n], /dev/hihp
Character-special devices.

/usr/include/sys/ser_sync.h
Header file specifying synchronous serial communication definitions.

SEE ALSO

hsip_init(1M), hsip_loop(1M), hsip_stat(1M),

Refer to the *Motorola MC68360 Quad Integrated Communications Controller Technical Manual* for details of the SCC's operation and capabilities.

DIAGNOSTICS

hihp data open failed, no memory, rq=*nnn*
hihp clone open failed, no memory, rq=*nnn* A kernel memory allocation failed for one of the private data structures. The value of *nnn* is the address of the read queue passed to open(2).

hihp_open: can't alloc message block
The open could not proceed because an initial STREAMS message block could not be made available for incoming data.

hihp: clone device *d* **must be attached before use!**
An operation was attempted through a control path before that path had been attached to a particular serial channel.

hihp*n***: invalid operation for clone dev.**
An inappropriate STREAMS message type was passed through a control path. Only M_IOCTL and M_PROTO message types are permitted.

hihp*n***: not initialized, can't send message**
An M_DATA message was passed to the driver for a channel that had not been programmed at least once since the driver was loaded. The S_IOCSETMODE ioctl command performs the programming operation.

hihp*n*: **transmit hung**
The transmitter was not successfully restarted after the watchdog timer expired.

NAME

nf − FDDI device driver

SYNOPSIS

#include <**sys/nf.h**>
#include <**sys/dlpi.h**>

DESCRIPTION

nf is a multi-threaded, loadable, clonable, STREAMS hardware device driver supporting the connectionless Data Link Provider Interface, **dlpi**(7), over DP83265A (BSI-2) FDDI controller in the SBus card. There is no fixed limitation on the number of FDDI cards supported by the driver. The **nf** driver provides basic support for the BSI-2, BMAC and PLAYER+ hardware. Functions include chip initialization, frame transmit and receive, multicast and promiscuous support, and error recovery and reporting.

The cloning character-special device **/dev/nf** is used to access BSI-2 controller installed within the system.

nf and DLPI

The **nf** driver is a "style 2" Data Link Service provider. All M_PROTO and M_PCPROTO type msgs are interpreted as DLPI primitives. An explicit DL_ATTACH_REQ message by the user is required to associate the opened stream with a particular device (**ppa**). The **ppa** ID is interpreted as an **unsigned long** and indicates the corresponding device instance (unit) number. An error (DL_ERROR_ACK) is returned by the driver if the **ppa** field value does not correspond to a valid device instance number for this system. The device is initialized on first attach and de-initialized (stopped) on last detach.

The values returned by the driver in the DL_INFO_ACK primitive in response to the DL_INFO_REQ from the user are as follows:

- The max SDU is 4352 (FDDIMTU).
- The min SDU is 0.
- The **dlsap** address length is 8.
- The MAC type is DL_FDDI.
- The **sap** length value is −2 meaning the physical address component is followed immediately by a 2 byte **sap** component within the DLSAP address.
- The service mode is DL_CLDLS.
- No optional quality of service (QOS) support is included at present so the QOS fields are 0.
- The provider style is DL_STYLE2.
- The version is DL_VERSION_2.
- The broadcast address value is Ethernet/IEEE broadcast address (0xFFFFFF).

Once in the DL_ATTACHED state, the user must send a DL_BIND_REQ to associate a particular SAP (Service Access Pointer) with the stream. The **nf** driver interprets the **sap** field within the DL_BIND_REQ as an Ethernet "type" therefore valid values for the **sap** field are in the [0-0xFFFF] range. Only one Ethernet type can be bound to the stream at any time.

In addition to Ethernet V2 service, an "802.3 mode" is provided by the driver and works as follows. **sap** value 0 is treated as equivalent and represent a desire by the user for "802.3 mode". If the value of the **sap** field of the DL_BIND_REQ is 0, then the driver computes the length of the message, not including initial M_PROTO mblk, of all subsequent DL_UNITDATA_REQ messages and transmits 802.3 frames having this value in the MAC frame header length field and a value of 0xaaaa030000 in the snap header. All frames received from the media having a "type" field in the range [0-1500] are assumed to be 802.3 frames and are routed up all open streams which are bound to **sap** value 0. If more than one stream is in "802.3 mode" then the frame will be duplicated and routed up multiple streams as DL_UNITDATA_IND messages.

The **nf** driver DLSAP address format consists of the 6 byte physical (FDDI) address component followed immediately by the 2 byte **sap** (type) component producing an 8 byte DLSAP address. Applications should *not* hardcode to this particular implementation-specific DLSAP address format but use information returned in the DL_INFO_ACK primitive to compose and decompose DLSAP addresses. The **sap** length, full DLSAP length, and **sap**/physical ordering are included within the DL_INFO_ACK. The physical address length can be computed by subtracting the **sap** length from the full DLSAP address length or by issuing the DL_PHYS_ADDR_REQ to obtain the current physical address associated with the stream.

Once in the DL_BOUND state, the user may transmit frames on the FDDI ring by sending DL_UNITDATA_REQ messages to the **nf** driver. The **nf** driver will route received FDDI frames up all those open and bound streams having a **sap** which matches the type as DL_UNITDATA_IND messages. Received FDDI frames are duplicated and routed up multiple open streams if necessary. The DLSAP address contained within the DL_UNITDATA_REQ and DL_UNITDATA_IND messages consists of both the **sap** (type) and physical (FDDI) components.

nf Primitives

In addition to the mandatory connectionless DLPI message set the driver additionally supports the following primitives.

The DL_ENABMULTI_REQ and DL_DISABMULTI_REQ primitives enable/disable reception of individual multicast group addresses. A set of multicast addresses may be iteratively created and modified on a per-stream basis using these primitives. These primitives are accepted by the driver in any state following DL_ATTACHED.

The DL_PROMISCON_REQ and DL_PROMISCOFF_REQ primitives with the DL_PROMISC_PHYS flag set in the dl_level field enables/disables reception of all ("promiscuous mode") frames on the media including frames generated by the local host. When used with the DL_PROMISC_SAP flag set this enables/disables reception of all **sap** (Ethernet type) values. When used with the DL_PROMISC_MULTI flag set this enables/disables reception of all multicast group addresses. The effect of each is

always on a per-stream basis and independent of the other **sap** and physical level configurations on this stream or other streams.

The DL_PHYS_ADDR_REQ primitive return the 6 octet MAC address currently associated (attached) to the stream in the DL_PHYS_ADDR_ACK primitive. This primitive is valid only in states following a successful DL_ATTACH_REQ.

The DL_SET_PHYS_ADDR_REQ primitive changes the 6 octet MAC address currently associated (attached) to this stream. The credentials of the process which originally opened this stream must be superuser or EPERM is returned in the DL_ERROR_ACK. This primitive is destructive in that it affects all other current and future streams attached to this device. An M_ERROR is sent up all other streams attached to this device when this primitive on this stream is successful. Once changed, all streams subsequently opened and attached to this device will obtain this new physical address. Once changed, the physical address will remain so until this primitive is used to change the physical address again or the system is rebooted, whichever comes first.

By default the first interface will use the systems MAC address but subsequent interfaces will use the FDDI local address.

FILES **/dev/nf**

SEE ALSO **smt**(7), **dlpi**(7),

NAME

pf − FDDI device driver

SYNOPSIS

#include <**sys/pf.h**> **#include** <**sys/dlpi.h**>

DESCRIPTION

pf is a multi-threaded, loadable, clonable, STREAMS hardware device driver supporting the connectionless Data Link Provider Interface, **dlpi**(7), over PBS FDDI controller in the PCI card. The driver also provides support for Applications to get statistics and status of Station Management. There is no fixed limitation on the number of FDDI cards supported by the driver. The **pf** driver provides basic support for the PBS, BMAC and PLAYER+ hardware. Functions include chip initialization, LLC/SMT frame transmit and receive, multicast and promiscuous support, and error recovery and reporting.

The cloning character-special device **/dev/pf** is used to access PBS controller installed within the system.

pf and DLPI

The **pf** driver is a "style 2" Data Link Service provider. All M_PROTO and M_PCPROTO type msgs are interpreted as DLPI primitives. An explicit DL_ATTACH_REQ message by the user is required to associate the opened stream with a particular device (**ppa**). The **ppa** ID is interpreted as an **unsigned long** and indicates the corresponding device instance (unit) number. An error (DL_ERROR_ACK) is returned by the driver if the **ppa** field value does not correspond to a valid device instance number for this system. The device is initialized on first attach and de-initialized (stopped) on last detach.

The values returned by the driver in the DL_INFO_ACK primitive in response to the DL_INFO_REQ from the user are as follows:

- The max SDU is 4352 (FDDIMTU).
- The min SDU is 0.
- The **dlsap** address length is 8.
- The MAC type is DL_FDDI.
- The **sap** length value is −2 meaning the physical address component is followed immediately by a 2 byte **sap** component within the DLSAP address.
- The service mode is DL_CLDLS.
- No optional quality of service (QOS) support is included at present so the QOS fields are 0.
- The provider style is DL_STYLE2.
- The version is DL_VERSION_2.
- The broadcast address value is Ethernet/IEEE broadcast address (0xFFFFFF).

Once in the DL_ATTACHED state, the user must send a DL_BIND_REQ to associate a particular SAP (Service Access Pointer) with the stream. The **pf** driver interprets the **sap** field within the DL_BIND_REQ as an Ethernet "type" therefore valid values for the **sap** field are in the [0-0xFFFF] range. Only one Ethernet type can be bound to the stream at any time.

In addition to Ethernet V2 service, an "802.3 mode" is provided by the driver and works as follows. **sap** value 0 is treated as equivalent and represent a desire by the user for "802.3 mode". If the value of the **sap** field of the DL_BIND_REQ is 0, then the driver computes the length of the message, not including initial M_PROTO mblk, of all subsequent DL_UNITDATA_REQ messages and transmits 802.3 frames having this value in the MAC frame header length field and a value of 0xaaaa030000 in the snap header. All frames received from the media having a "type" field in the range [0-1500] are assumed to be 802.3 frames and are routed up all open streams which are bound to **sap** value 0. If more than one stream is in "802.3 mode" then the frame will be duplicated and routed up multiple streams as DL_UNITDATA_IND messages.

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Once in the DL_BOUND state, the user may transmit frames on the FDDI ring by sending DL_UNITDATA_REQ messages to the **pf** driver. The **pf** driver will route received FDDI frames up all those open and bound streams having a **sap** which matches the type as DL_UNITDATA_IND messages. Received FDDI frames are duplicated and routed up multiple open streams if necessary. The DLSAP address contained within the DL_UNITDATA_REQ and DL_UNITDATA_IND messages consists of both the **sap** (type) and physical (FDDI) components.

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In addition to the mandatory connectionless DLPI message set the driver additionally supports the following primitives.

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The DL_PHYS_ADDR_REQ primitive return the 6 octet MAC address currently associated (attached) to the stream in the DL_PHYS_ADDR_ACK primitive. This primitive is valid only in states following a successful DL_ATTACH_REQ.

The DL_SET_PHYS_ADDR_REQ primitive changes the 6 octet MAC address currently associated (attached) to this stream. The credentials of the process which originally opened this stream must be superuser or EPERM is returned in the DL_ERROR_ACK. This primitive is destructive in that it affects all other current and future streams attached to this device. An M_ERROR is sent up all other streams attached to this device when this primitive on this stream is successful. Once changed, all streams subsequently opened and attached to this device will obtain this new physical address. Once changed, the physical address will remain so until this primitive is used to change the physical address again or the system is rebooted, whichever comes first.

By default the first interface will use the systems MAC address but subsequent interfaces will use the FDDI local address.

pf and SMT

The driver provides information on its PHYs and some FORMAC error counters.

The user has to include these two lines in the program before the line '#include <pfsmt.h>'

```
#define     SMT7_2      0
#define     CFG_YES      1
```

The cloning character special device **/dev/pf** is used to access the driver. An explicit DL_ATTACH_REQ message by the user is required to associate the opened stream with a particular device(ppa) where ppa corresponds to the interface instance number.

Once in the DL_ATTACHED state, the user need not send a DL_BIND_REQ. The user can interact with the driver with **ioctl(2)** calls. The arguments for the ioctl are

```
ioctl (int fd, int request, SMTCB *smtp)
```

The request is **smt** driver specific and can be SMT_GET or SMT_ACT. SMTCB is defined as follows in the header file pfsmt.h

```
typedef struct {
        int         command;
        int         sub_command;
        int         param1;
        int         param2;
        int         param3;
        char        *where;
        int         length;
} SMTCB;
```

SMT_GET:

SMT_GET provides a variety of functions such as to read the HPC registers and to get the smt status. command field of smtp should be initialized to one of the following values

```
HPC_BMAC1_REGS      : To read the BMAC registers
HPC_READ            : To read the HPC registers
HPC_PORT1_REGS      : To read RMT port1
and HPC_PORT2_REGS    and port2 registers
```

Some of the commands provide sub commands. The field sub_command should be initialzed to these sub commands.

1. HPC_BMAC1_REGS

HPC_BMAC1_REGS enables the user to read the BMAC registers. HPC_BMAC1_REGS provides two sub commands GET_COUNTER_GROUP and GET_NEIGHBOR_ADDR. GET_COUNTER_GROUP is used to get various SMT counter values.

GET_COUNTER_GROUP needs the SMTCB *smtp to be initialized as follows

```
COUNTER_GROUP  ct;

smtp->command = HPC_BMAC1_REGS;
smtp->sub_command = GET_COUNTER_GROUP;
smtp->where = (char *) &ct;
smtp->length = sizeof (ct);
```

GET_NEIGHBOR_ADDR enables the user to get the MAC address of the Neighbour station. GET_NEIGHBOR_ADDR needs the SMTCB *smtp to be initialized as follows

```
char        addr_buf[12];

smtp->command = HPC_BMAC1_REGS;
smtp->sub_command = GET_NEIGHBOR_ADDR;
smtp->where = addr_buf;
smtp->length = 12;
```

2. HPC_READ

HPC_READ enables the user to read the HPC registers. HPC_READ does not provide any sub commands. HPC_READ needs the SMTCB *smtp to be initialized as follows

```
smtp->command = HPC_READ;
smtp->param1 = HPC_READ | HPC_SIZE_BYTE
                        | <HPC_reg_offset>;
smtp->where = (char *) smtp;
```

where HPC_register_offset offset is set of register space provided by the HPC. For the set of reister offsets refer to the file pfsmt.h

3. HPC_PORT1_REGS and HPC_PORT2_REGS

HPC_PORT1_REGS enables the user to get the status of the Connection Management. HPC_PORT2_REGS is for the second port if the interface is a DAS. The sub command for HPC_PORT1_REGS is GET_PORT_GROUP. HPC_PORT1_REGS needs the SMTCB *smtp to be initialized as follows

```
FDDI_PORT_GROUP port; smtp->command = HPC_PORT1_REGS;
smtp->sub_command = GET_PORT_GROUP;
smtp->where = (char *) &port;
smtp->length = sizeof (port);
```

The two important status returned in the structure port are port.ecm_state and port.pcm_state. port.ecm_state corresponds to the current state of the ECM state machine. The valid values are OUT, IN, TRACE, PATHTEST, INSERT, CHECK and DEINSERT. The value returned in port.ecm_state is the index into the list of the ECM States. port.pcm_state corresponds to the current state of the PCM state machine. The Valid values are OFF, BREAK, TRACE, CONNECT, NEXT, SIGNAL, JOIN, VERIFY, ACTIVE, MAINT. The value returned in port.pcm_state in an index into the list of PCM States.

SMT_ACT:

SMT_ACT is supported to set the state of the smt driver. The command field should always be set to SMT_CTL. SMT_ACT provides two sub commands SMT_ACCEPT_FRAME and SMT_CLOSE. SMT_ACCEPT_FRAME needs to be used when any SMT API client is active.

```
smtp->command = SMT_CTL;
smtp->sub_command = SMT_ACCEPT_FRAME;
```

SMT_CLOSE needs to be used when the API client exits.

```
smtp->command = SMT_CTL;
smtp->sub_command = SMT_CLOSE;
```

To transmit SMT NSA frames the user should bind to FDDI_NSA sap. To transmit other SMT frames the user may bind to FDDI_SMTINFO sap.

FILES **/dev/pf**

SEE ALSO **dlpi**(7)

NAME

smt − FDDI SMT Apps Interface device driver

SYNOPSIS

#include <sys/nfsmt.h>

DESCRIPTION

smt is a multi-threaded, loadable, clonable, STREAMS device driver supporting Data Link Provider Interface, **dlpi**(7), for Application programs to get the statistics and status of the Station Management. smt driver provides packet throughput statistics, reconfiguration events and interface exceptions. It also provides the information on its PHYs and some FORMAC error counters.

The user has to include these two lines in the program before the line '#include <nfsmt.h>'

```
#define     SMT7_2      0
#define     CFG_YES     1
```

The cloning character special device **/dev/smt** is used to access the driver. An explicit DL_ATTACH_REQ message by the user is required to associate the opened stream with a particular device(ppa) where ppa corresponds to the interface instance number.

Once in the DL_ATTACHED state, the user need not send a DL_BIND_REQ. The user can interact with the driver with **ioctl(2)** calls. The arguments for the ioctl are

```
ioctl (int fd, int request, SMTCB *smtp)
```

The request is **smt** driver specific and can be SMT_GET or SMT_ACT. SMTCB is defined as follows in the header file nfsmt.h

```
typedef struct {
        int         command;
        int         sub_command;
        int         param1;
        int         param2;
        int         param3;
        char        *where;
        int         length;
} SMTCB;
```

SMT_GET:

SMT_GET provides a variety of functions such as to read the HPC registers and to get the smt status. command field of smtp should be initialized to one of the following values

```
HPC_BMAC1_REGS      : To read the BMAC registers
HPC_READ            : To read the HPC registers
HPC_PORT1_REGS      : To read RMT port1
and HPC_PORT2_REGS      and port2 registers
```

Some of the commands provide sub commands. The field sub_command should be initialzed to these sub commands.

1. HPC_BMAC1_REGS

HPC_BMAC1_REGS enables the user to read the BMAC registers. HPC_BMAC1_REGS provides two sub commands GET_COUNTER_GROUP and GET_NEIGHBOR_ADDR. GET_COUNTER_GROUP is used to get various SMT counter values.

GET_COUNTER_GROUP needs the SMTCB *smtp to be initialized as follows

```
COUNTER_GROUP  ct;

smtp->command = HPC_BMAC1_REGS;
smtp->sub_command = GET_COUNTER_GROUP;
smtp->where = (char *) &ct;
smtp->length = sizeof (ct);
```

GET_NEIGHBOR_ADDR enables the user to get the MAC address of the Neighbour station. GET_NEIGHBOR_ADDR needs the SMTCB *smtp to be initialized as follows

```
char          addr_buf[12];

smtp->command = HPC_BMAC1_REGS;
smtp->sub_command = GET_NEIGHBOR_ADDR;
smtp->where = addr_buf;
smtp->length = 12;
```

2. HPC_READ

HPC_READ enables the user to read the HPC registers. HPC_READ does not provide any sub commands. HPC_READ needs the SMTCB *smtp to be initialized as follows

```
smtp->command = HPC_READ;
smtp->param1 = HPC_READ | HPC_SIZE_BYTE
                        | <HPC_reg_offset>;
smtp->where = (char *) smtp;
```

where HPC_register_offset offset is set of register space provided by the HPC. For the set of reister offsets refer to the file nfsmt.h

3. HPC_PORT1_REGS and HPC_PORT2_REGS

HPC_PORT1_REGS enables the user to get the status of the Connection Management. HPC_PORT2_REGS is for the second port if the interface is a DAS. The sub command for HPC_PORT1_REGS is GET_PORT_GROUP. HPC_PORT1_REGS needs the SMTCB *smtp to be initialized as follows

```
FDDI_PORT_GROUP port;

smtp->command = HPC_PORT1_REGS;
smtp->sub_command = GET_PORT_GROUP;
smtp->where = (char *) &port;
smtp->length = sizeof (port);
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The two important status returned in the structure port are port.ecm_state and port.pcm_state. port.ecm_state corresponds to the current state of the ECM state machine. The valid values are OUT, IN, TRACE, PATHTEST, INSERT, CHECK and DEINSERT. The value returned in port.ecm_state is the index into the list of the ECM

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SMT_ACT is supported to set the state of the smt driver. The command field should always be set to SMT_CTL. SMT_ACT provides two sub commands SMT_ACCEPT_FRAME and SMT_CLOSE. SMT_ACCEPT_FRAME needs to be used when any SMT API client is active.

```
smtp->command = SMT_CTL;
smtp->sub_command = SMT_ACCEPT_FRAME;
```

SMT_CLOSE needs to be used when the API client exits.

```
smtp->command = SMT_CTL;
smtp->sub_command = SMT_CLOSE;
```

FILES **/dev/smt**

SEE ALSO **nf**(7), **dlpi**(7),

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