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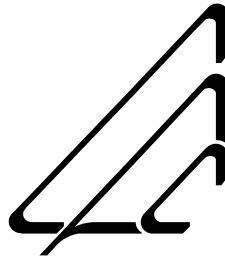
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QuickKit Telephony[®] PCI

DPT4, DPT5 & DPT6

Utilities and Diagnostics Manual

Version 1.5.5



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West Chester, PA (USA)

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1 DPT Utility and Diagnostic Manual

1.1 Overview of the Utility and Diagnostic Manual

1.1.1 Program objectives

This utility and diagnostic manual describes a series of application programs developed by Communication Automation Corporation and Woodward McCoach software programming staff for internal use by our staff. Over time, we have found that our customers used these utilities or diagnostic programs to simplify elements of software development or for troubleshooting.

1.1.2 Program types

These application programs range from support programs for initializing or controlling the boards, to samples or example programs of specific actions or functionality. They fall into four groups.

- DPT Utility Programs
- DPT Diagnostic Programs
- DPT Demonstration programs
- DPT Examples

2 DPT Utility Programs

2.1 DPT Utility Programs Overview

Utility programs fall into two groups. The programs either set information on the board or to access and display information from the board. These programs are installed in the directory \$CAC/bin – by default /usr/cac/bin.

A brief summary follows:

dplock	set/change the clock rates
dpcons	intended for developer use.
dpdumpcfg	displays the contents of the PCI configuration space registers
dpeunlock	clears the lock bit in JTAG Control register.
dpfind	queries the system to find installed boards and displays information about each board.
dpflashdump	displays the contents of the specified flash sectors of a board.
dpflashup	update firmware
dpinfo	Displays information about one or more boards.
dpinit	performs initialization on the board each time it is powered on
dpled	flashes the internal LEDs on a board
dprun	start/halt the processor
dpserial	update/display serialization info
dps2pci	translates a serial number for an installed board into its device name or lists a table of all serial number / device name pairs.
dptp12config	programs host FPGA

2.2 DPT Utility Programs Description

2.2.1 dpclock

Set or change the clock rates on a CAC QuicKit Telephony - PCI Board

SYNOPSIS

dpclock *clock_file* *dpt_dev*

DESCRIPTION

dpclock programs the clock rate on a QuicKit Telephony - PCI board. This command should only be used under the direction of CAC technical support.

OPTIONS

-d	path	specifies the directory to look for pll files in.
-f	pll file name	name of pll file to load
-h		displays help message
-q		quiet

SEE ALSO

dpflashup, dptp12config

BUGS

Board may hang the system on next access unless power is cycled.

2.2.2 dpcons

Diagnostic utility for communicating with embedded processor.

SYNOPSIS

```
dpcons dpt_dev
```

DESCRIPTION

dpcons is intended for developer use. CAC technical support personal may direct customers to use it to diagnose problems in the field.

OPTIONS

none

SEE ALSO

2.2.3 dpdumpcfg

Display PCI configuration space data for a CAC QuicKit Telephony - PCI Board

SYNOPSIS

dpdumpcfg dpt_dev

DESCRIPTION

dpdumpcfg displays the contents of the PCI configuration space registers for a CAC QuicKit Telephony - PCI board. This command is intended to be used under the direction of CAC technical support.

OPTIONS

-a		Show module 'A' configuration
-b		Show module 'B' configuration
-e		Show expansion bridge configuration
-r		Show raw data
-t	file	Write trace data to file (- indicates stderr)
-d	file	Write trace data to file (- indicates stderr), no data transfer
-l	address	Limit configuration access to addresses less than 'address'

2.2.4 dpeeunlock

Clears the lock bit in JTAG Control register.

SYNOPSIS

```
dpeeunlock dpt_dev
```

DESCRIPTION

The lock bit in the JTAG Control register is used to prevent race conditions updating the values in the EEROM. If the bit is inadvertently left in a locked state then further updates cannot be performed until the board is power cycled. This program will clear the bit.

OPTIONS

none

SEE ALSO

2.2.5 dpfind

Queries the system to find installed boards and displays information about each DPT board.

SYNOPSIS

dpfind

DESCRIPTION

The specific information displayed for each board includes the board type, serial number, revision, burn-in hours, clock rates for the MIPS processor, local PCI clock (for DPT5 and DPT6) or MUX clock for DPT4 and the smPCI module bus clock, and the FPGA configuration and MIPS loader and application versions. In verbose mode, the PCI slot location is also shown.

The following is an example output from dpfind:

```
Key:
Board:Type,S/N,Rev,BurnHrs,MIPSCk,PCI/MuxCk,smPCICk,PLD,FPGA1,FPGA2,Code,App
dpt0: DPT4,50200146,3,0080,30.88,30.00,30.00,1-4-0,1-4-5,1-4-1,1-4-0,1-4-10
dpt1: DPT5,50210006,0,0087,66.00,50.00,30.00,1-5-1,1-5-2,1-5-2,1-4-0,1-4-10
```

This listing indicates that board dpt0 (a DTP4 board) and dpt1 (a DTP5 board) are configured and installed. No other DPT boards were found in the system.

OPTIONS

-i identify boards by blinking LEDs
-v verbose mode

SEE ALSO

dpinfo

2.2.6 dpflashdump

Show contents of flash on a CAC QuicKit Telephony PCI board

SYNOPSIS

dpflashdump dpt_dev sector [sector [sector...]]

DESCRIPTION

dpflashdump displays the contents of the specified flash sectors of a CAC QuicKit Telephony PCI board. This command is primarily intended to be used under the direction of CAC technical support.

OPTIONS

none

SEE ALSO

dpdebug, dpflashup

2.2.7 dpflashup

Update firmware on a CAC QuicKit Telephony - PCI Board

SYNOPSIS

dpflashup [**options**] **dpt_dev(s)|all**

DESCRIPTION

dpflashup manages the firmware on a CAC QuicKit Telephony - PCI board. The firmware is divided into five sections. On rev 2 boards the areas are: Host FPGA, Bridge FPGA, CPLD, MIPS processor boot code and MIPS processor application. Rev 0 boards have an Expansion FPGA area instead of Bridge FPGA.

Each of these devices has its own data file. The two FPGAs are always updated simultaneously, but the other devices can be updated independently. If only one FPGA is specified the current revision of the other will be reloaded by default.

This command may also be used to display the current version information and determine the availability of updates without changing the configuration (-S option).

Released firmware files follow the following naming convention:

dpe1<fpga><major>-<minor>-<update>.<extension>

where <fpga> is one letter that specifies which FPGA the file is for with the following convention:

Letter	FPGA	Extension
c	CPLD	xsvf
h	host FPGA	mcs
e	expansion FPGA	mcs
b	bridge FPGA	mcs
m	MIPS loader	s3
a	MIPS application	bin

<major> , <minor> and <update> are release version numbers and can be one or more digits. The driver and application library also have corresponding release version numbers (not stored as part of the file name). The <major> and <minor> version numbers are required to match for all flash files, driver and application library. By default dpflashup will pick the flash file with the largest <update> number.

Experimental firmware files (which are not normally distributed) follow the following naming convention:

dpe1<fpga><series letter><version number>.<extension

If none of the options that affect directory search paths (`-d`, `-p` or `-x`) are specified then flash files are searched for in the following directories (in order):

```
$(CAC)/dpt/flash/
$(CAC)/dptsrc/flash/
```

where `$(CAC)` is the value of the `CAC` environment variable. If the `CAC` environment variable is not set then `/usr/cac` is used instead of `$(CAC)`.

If the `-d` option is specified then just the directory specified following the `-d` is searched. The `-p` option specifies a directory to use instead of the current value of the `CAC` environment variable.

If the `-i` option is specified the board(s) will not be initialized after flash updates. Normally the board(s) are automatically initialized after any updates except in cases where a power cycle is required to complete an update (e.g. FPGA updates on DPT4 boards).

When the `-x` option is used the subdirectory “devel” under each of the paths that would have been searched without the `-x` option is searched first for files with the experimental series specified by the `-x` option. If no file is found with the experimental series then the path without the “devel” is searched for major/minor version named files. Thus if the options “`-p /tmp/sam -x`” are specified the directories searched for experimental versions would be:

```
/tmp/sam/dpt/flash/devel
/tmp/sam/dptsrc/flash/devel
/tmp/sam/dpt/flash
tmp/sam/dptsrc
```

and then if no experimental file was found

```
/tmp/sam/dpt/flash
tmp/sam/dptsrc
```

would be searched for standard major/minor version numbered files.

OPTIONS

- C** For technical support use only.
 - d** *dir* Search *dir* for flash files.
 - e** For technical support use only.
 - E** For technical support use only.
 - f** Force update even if files are not new. Reloads all files when *-o* or *-l* options are not used.
 - i** do not initialize the board after flash updates
 - l** *type file* load *file* for specified flash *type* (implies *'-o'*):
 - c* CPLD
 - h* Host FPGA
 - e* Expansion FPGA
 - b* Bridge FPGA
 - m* MIPS Loader
 - a* MIPS Application
 - n** allow match to occur with files with different major or minor version numbers.
 - o** *c/f/m* Only update the specified device:
 - c* CPLD
 - f* FPGAs
 - m* MIPS
- Note that multiple values CANNOT be combined. If more than one argument is given to *-o* all but the first is ignored. If more than one *-o* option is given all but the last is ignored.
- This option may be effectively combined with the *-f* option to force updating only a single device.
- p** *dir* Specify path to use instead of \$(CAC)
 - s** Show current flash state before updating and updates being performed
 - S** Show current flash state and updates that would be performed if *-S* not specified. No changes are made to the configuration.
 - t** trace search and selection of flash files
 - T** For technical support use only.
 - v** *major**minor* Override default major and minor version.
 - W** For technical support use only.
 - x** *series* Use flash files from devel subdirectory with series letter

2.2.8 dpinfo

Displays information about one or more QuicKit Telephony PCI boards.

SYNOPSIS

dpinfo [options] [dpt_dev(s) | serial_number]

DESCRIPTION

The following is an example listing from dpinfo:

```

Software release:      1.5.5
Driver version:       1.5.4 built on Jan 11 2008 11:12:27
Library version       1.5.5 built on Jan 22 2008 10:41:54
Compatibility versions:
  DPT4 FPGA config:   1.4.5      Embedded code:  1.4.10
  DPT5/6 FPGA config: 1.5.10     Embedded code:  1.4.10

*** Board dpt0 ***
Board type:           DPT4
PCI location (bus:dev.fn): 03:0d.0
Board EEROM Settings:
  system clock:       30880 KHz
  MUX clock:          30000 KHz
  smPCI clock:        30000 KHz
  PCB revision:       2
  Assembly options:   Flash:F3, PCI66MHz:disabled, H100RefMod:yes
  Serial number:      50001406
  Serial date:        05/03/2005
  Burn-in hours:     40
  Options:            No RAMboot, No TxHeader, Expansion
  Connectors:         RJ45, 120 ohm, A=RxTx B=RxTx C=RxTx D=RxTx
  PLD version:        released version 1.4.0
  Host FPGA vers:     released version 1.4.5
  Exp FPGA vers:      released version 1.4.1
  MIPS Loader vers:   released version 1.4.0
  MIPS Appl. vers:    released version 1.4.10

```

The first six lines report various version numbers for the software; the version number for software release, the device driver and the API library used to build dpinfo as well as the date and time that the device driver and API were built. This section also includes the version numbers for the FPGA and MIPS application that were included in the same software release version. This information is given just once even if multiple boards are listed.

Following the software information are sections of hardware information for each board being reported. The information reported for each board includes the board type and its PCI slot location, followed by information stored in the board's EEROM.

The next three lines give the various clock rates which have been configured. Clock rates are set by loading information from clock synthesizer data files with the **dpclock** program. For DPT5 and DPT6 boards, the measured clock frequencies are also displayed.

The PCB revision gives the hardware revision number. The assembly options specify various component types and modifications that may have been made to the board. The current assembly options include the type of flash memory used, a modification to disable the PCI slot from running at 66MHz and a modification to the reference clock supplied to the H.100 interface. Additional assembly options may be added from time to time.

The serial number is also displayed on a sticker on the board. The serial date is the date the board was last serialized. The burn-in hours record how many hours the board was burned in and tested before shipping.

The options and connectors lines indicate various options that are currently selected. Options and connector information can be changed by the **dpserial** program. Some of the information must correspond to physical options installed on the board. In general, RAMboot is the only option that can be changed without modifying components or jumper settings on the board. See the DPT Hardware Reference for details.

The version lines indicate versions of PLD and FPGA configurations and MIPS software currently installed on the board as reported by information stored in the EEPROM on the board. For DPT5 and DPT6 boards, the current version of the main FPGA is also reported, as read from a register on the board. Finally, the version of the Comet framer chips is reported.

If the **-m** option was used the output would include a table following the board name giving address ranges for each directly addressable memory region on the board. The physical column shows the addresses as they are seen on the PCI bus. The host column, the address space as physical addresses as presented to the host. The board column, the addresses as presented to the MIPS processor. The length column shows the length of each region in bytes. The base column gives the virtual address of the region as it is currently mapped in the address space of the application.

OPTIONS

- i** identify board(s) by blinking LEDs
- m** display memory region information for each board
- s** select boards to include by serial number instead of device name
- v** verbose info (includes report of comet versions)
- x** Inhibit listing of module information.

SEE ALSO

dpfind

2.2.9 dpinit

Perform initialization operations on the board.

SYNOPSIS

dpinit [options] dpt_dev(s) | all

DESCRIPTION

The initialization procedure must be performed after the board is first powered up and at other times when required, such as after certain diagnostic programs are run, to return the board to a normal operating modes. The initialization process includes the following operations:

- FPGA's for any modules on the expansion bus are loaded.
- Registers are set to expected values.
- The embedded processor is reset and started.

OPTIONS

- b** turns on batch mode. dpinit will wait until the embedded processor has completed its initialization before initializing the next board or terminating dpinit.
- B** turns off batch mode.
- f dir** specifies the directory to use instead of \$(CAC) to locate the configuration file for loading the expansion FPGA.
- h** help message
- i** inhibit starting of the embedded processor
- q** quiet mode
- r** inhibit loading the module FPGA's
- t** trace values written to registers.
- v** verbose mode

2.2.10 dpled

Flash LEDs on a CAC QuicKit Telephony PCI Board

SYNOPSIS

dpled dpt_dev

DESCRIPTION

dpled flashes the internal LEDs on a CAC QuicKit Telephony PCI board. These are the LEDs mounted on the top of the board and are not visible when installed in the system case.

dpled does not halt the embedded processor. If it is running an application or the normal channelization program which causes the LEDs to blink, then the LEDs will display the combined blink rate of both **dpled** and the embedded processor program.

OPTIONS

none

2.2.11 dprun

Start or halt the processor on a CAC QuicKit Telephony PCI Board

SYNOPSIS

dprun [options] dpt_dev | all

DESCRIPTION

dprun starts or halts the processor on a CAC QuicKit Telephony PCI board. This command is normally unnecessary as by default the processor is started by the dpinit program which must be run when the board is first powered on.

With no options the command will start a halted board or restart a running board. With the **-h** option the command will halt the board

OPTIONS

-h halt the processor on a board.

2.2.12 dpserial

Display and optionally update serialization info for a CAC QuicKit Telephony PCI Board

SYNOPSIS

dpserial [options] **dpt_dev**

DESCRIPTION

dpserial updates or displays the serialization data for a CAC QuicKit Telephony PCI Board. This data includes the serial number and date, burn hours, and various configuration options. If **dpserial** is run with no options then it prompts for each of the configuration settings. The **-s** options displays without changing any options.

This command should be run anytime the connector jumpers are changed for boards with BNC and Triaxial connectors. This is necessary for the library and embedded processor to be able to properly map connectors to framers.

OPTIONS

-a	n	set only Connector A direction.
-b	n	set only Connector B direction.
-c	n	set only Connector C direction.
-c	n	set only Connector D direction.
		Connector (A,B,C,D) direction:
	0	Receive
	1	Transmit
-s		Show eeprom contents and exit
-v		Verbose. Print lots of debugging information.

SEE ALSO

dpclock, dpflashup, dptp12config

2.2.13 dps2pci

Translate a serial number for an installed board into its device name or lists a table of all serial number / device name pairs.

SYNOPSIS

dps2pci [serial_number]

DESCRIPTION

If no serial number is provided on the run string than a table of all serial numbers and corresponding device names is listed. If a serial number is specified the device name for a board with that serial number is listed other wise it indicates the board was not found. Device names can change based on position in the backplane a board is installed in. This program gives a device name independent way to name a board.

OPTIONS

none

SEE ALSO

2.2.14 dptp12config

Program host FPGA on a CAC QuicKit Telephony PCI Board

SYNOPSIS

dptp12config *bit_file* *dpt_dev*

DESCRIPTION

dptp12config programs the host FPGA on a CAC QuicKit Telephony PCI Board over the PCI inter face. It does not save the configuration in flash or update version information in the serial EEPROM. This command is intended for internal use only and should only be used under the direction of CAC technical support.

OPTIONS

-d	<i>path</i>	set path for configuration files.
-f	<i>file name</i>	host fpga configuration file to load
-h		display usage summary
-q		quiet operation

SEE ALSO

dpflashup, dpserial

3 DPT Diagnostic Programs

The diagnostic programs are provided to verify that a CAC QuicKit Telephony PCI Board is functioning properly. The different diagnostic programs test different aspects of a board. Different options may need to be selected for a given test program in order to test all of the functionality covered by that program.

These programs are installed in the directory \$CAC/dpt/diag – by default /usr/cac/dpt/diag.

3.1 DPT Diagnostic Programs Overview

Diagnostic programs either test individual functionality on the board or test information transfer to and from the board. A brief summary of the diagnostic programs is shown in the table, below. A complete and comprehensive description of all the diagnostic programs follows.

dpchantest	test channelization on a board
dppram	test dual-port RAM
dpdebug	an interactive, low-level debugging tool
dpdiag	run a suite of diagnostic tests on one or more boards
dppmemtest	test memory on a board.
dppiomem	test SRAM on a board
dppmaxfer	test DMA transfers from a board to the host's memory.
dppmoddma	test DMA transfer between SRAM on a board and memory on a SMPCI plug in module
dp54xdiag	tests a DM5420 module on the board

3.2 DPT Diagnostic Programs Description

3.2.1 dpburn

Runs a suit of diagnostic programs for burn-in testing.

SYNOPSIS

dpburn [*options*] [*dpt_dev(s)*]

DESCRIPTION

The dpburn program is used to burn in boards before they are shipped. It sequentially runs the diagnostic programs **dppiomem**, **dpdpram** and **dpchantest** repeatedly. It logs any errors detected and updates the burn hours kept in the EEROM.

Note: this program is currently only supported on Solaris and Linux platforms.

OPTIONS

-b		run in background and suppress screen messages
-B	<i>hours</i>	sets frequency of update of EEROM burn hours (defaults to 1)
-e		do not update burn hours
-h		display the usage summary (help message)
-i	<i>cycles</i>	number of cycles of test to run (default is 1024)
-p	<i>passes</i>	number of
		passes (default is unlimited)
-v		verbose output
-X		cross couple framers

SEE ALSO

dpburntime

3.2.2 dpburntime

Program for updating burn hours on a CAC quicKit Telephony PCI board.

SYNOPSIS

dpburntime

DESCRIPTION

Identifies the board and modules supported, if any, accesses the eeprom, identifies the number of hours for burn time, and updates the information for the board.

Note: this program is currently only supported on Solaris and Linux platforms.

OPTIONS

none

SEE ALSO

dpburn

3.2.3 dpchantest

test channelization on a CAC QuicKit Telephony PCI Board

SYNOPSIS

dpchantest [**framer_mode**] [**options**] [--] **slotlist device(s)**

DESCRIPTION

dpchantest tests channelization functionality on a CAC QuicKit Telephony PCI board. A transmit data pattern is generated by the board and is looped back, either internally or externally, to the host. The host monitors the data pattern and reports any errors.

The device(s) may be specified with sender-receiver names, with a single name using the same device for sender and receiver or just a sender or just a receiver. The name can be a board name such as dpt0 or a specific framer name such as dpt1c1. The specification dpt1c2-dpt0c1 says to send from framer 2 on dpt1 to framer 1 on dpt0. -dpt0 says to receive on all framers on dpt0. dpt1c1- says to send on framer 1 on board 1. Multiple sender-receiver pairs can be specified.

The slot list is of slot ranges or a bit field representing the slots to record. A bit field is a single hexadecimal number with the least significant bit indicating timeslot 0 and the most significant bit indicating timeslot 31. A slot range is either a single decimal number or a number dash number. The default is all slots.

When the loopback is post-framer (i.e. -s is not given) timeslot 0 should not be included in slotlist. If CAS mode is enabled (-x) then timeslot 16 should also be excluded.

Note: when run on newer, faster systems the program fails to properly synchronize the receivers with the transmitters. This can be mitigated using the **-H** or **-Z** options (see below).

FRAMER MODES

e1 E1	transmit e1 data stream
t1 T1	transmit t1 data stream
j1 J1	transmit Japanese version of t1 data stream

OPTIONS

- A** allocate unaligned buffers (malloc instead of valloc for development)
- b** transfer random numbers of bytes in each I/O
- B** transfer random numbers of blocks (256 bytes) in each I/O
- C** framer IDs are Comet IDs. The default is framer IDs are connector IDs.
- d** Enable digital loopback. This will cause any transmitted data to be looped (post-framer) back to the receiver.

- D** enable DRAM loopback (processor local). This will cause any transmitted data to be looped by the processor putting output packets directly into the receive queue in DRAM.

- f** enable fast-clock logic (E1)
- h** Enable HDB3 line decoding. Without this switch AMI is assumed.
- H** suppress header tx/rx
- l** Enable line loopback. This will not affect the received data stream but will cause all incoming data to be looped (pre-framer) back to the transmitter.

- L** lbo specify line buildout
- n** non blocking I/O
- o** test odd sized reads before main loop (developer testing)
- p** Enable payload loopback - will not affect the received data stream but causes incoming data to be looped (post-framer) back to the transmitter.

- R** report mode for burn
- s** Enable serial loopback. This will cause any transmitted data to be looped (pre-framer) back to the receiver.

- S** enable SDRAM loopback (processor local). This will cause any transmitted data to be looped by the processor putting output packets directly into the receive queue in SDRAM.

- t** mm:ss run test for mm minutes and ss seconds.
- T** replace upper byte of each test data word with the transmitter's framer number.

- u** Record an unframed data stream. When using this option all timeslots should be captured (by specifying ffffffff for the slotlist).
- v** verbose mode
- x** Enable CAS multi-frame. This will case the framer to sync to and verify CAS framing in timeslot 16.
- X** cross couple framers (a <-> c, b <-> d)
- Z** add a delay between starting each channel.
- 4** Enable CRC4 multi-frame. This will case the framer to sync to and verify CRC4 framing and error detection data in timeslot 0
- end of options. Only needed if next items starts with a dash " - "

Line Build Out Options:

Standard	TR62411	Mode
75ohm		E1 75 Ohm
120ohm		E1 120 Ohm (default)
l0	lt0	T1 Long Haul 0 dB (default)
l7.5	N/A	T1 Long Haul 7.5 dB
l15	N/A	T1 Long Haul 15 dB
l22.5	N/A	T1 Long Haul 22.5 dB
s110	st110	T1 Short Haul 0-110 ft
s220	st220	T1 Short Haul 110-220 ft
s330	st330	T1 Short Haul 220-330 ft
s440	st440	T1 Short Haul 330-440 ft
s550	st550	T1 Short Haul 440-550 ft
s660	st660	T1 Short Haul 550-660 ft

Line build options are given following a –L option. The minimum unique part of the option may be specified.

SEE ALSO

3.2.4 dpdebug

interactive debugger for CAC QuicKit Telephony - PCI Boards

SYNOPSIS

dpdebug [*options*] [*dpt_dev*]

DESCRIPTION

dpdebug is an interactive debugger for CAC QuicKit Telephony - PCI boards. It is intended for internal use by CAC but is included in this release for its potential utility in debugging customer problems in the field. This command is intended to **only** be used under the direction of CAC technical support.

For a summary of commands and their options, enter the "help" or "?" command at the prompt.

To exit, enter "quit" or "q".

OPTIONS

-c *command* specify a command to be run, non-interactively

Commands specified with the **-c** option should be surrounded by quotes so that multi-token commands are seen by the shell as a single argument to **dpdebug** program. Multiple command may be specified using multiple **-c** options and they will be executed in the order given. For example:

```
dpdebug -c "rl 60" -c "rl 4c" dpt0
```

3.2.5 dpdiag

Run a suite of diagnostic tests on one or more boards.

SYNOPSIS

dpdiag [**options**] [**dptdev(s)**]

DESCRIPTION

The dpdiag program is used to perform a sequence of tests on DPT boards. The following diagnostic tests are run:

- Global memory test using the dppiomem program
- Dual-port memory test using the dpdpram program
- E1 Channelization and framer test using the dpchantest program
- T1 Channelization and framer test using the dpchantest program

The program cycles through the tests on each board being tested. The boards to be tested may be specified by name or the program can scan for and test all boards found in the system. The tests are run continuously until interrupted (using control-C) or a number of cycles may be specified. Progress and status messages are displayed in the command window or console. These messages may be logged in a file if desired. Errors are also logged in a separate file (unless disabled). Other behavior options are also available, see below.

OPTIONS

- a** scan for and test all DPT boards found in the system
- c** *count* specify number of cycles to run (default is to run continuously)
- e** framer tests are configured for external loop-back (default is to use internal, digital loop-back)
- h** display the usage summary (help message)
- l** enable progress and status message log
- L** *filename* specify the name for the log file (default is dpdiag_date.log)
- m** disable logging of error messages (default is error log enabled)
- M** *filename* specify the name for the error log (default is dpdiag_date.err)
- q** quick test: one cycle (unless -c is used) with partial memory tests and short, internal loop-back framer tests
- t** [*min:*]*sec* specify the run time for the framer tests (default is 2:30)
- v** verbose mode
- dptdev(s)** specify one or more boards to test if not using -a

3.2.6 dpdpram

test dual port RAM on a CAC QuicKit Telephony PCI Board.

SYNOPSIS

dpdpram [options] **dpt_dev**

DESCRIPTION

dpdpram tests the channelization dual port memory on a CAC QuicKit Telephony PCI board.

OPTIONS

-A		do all tests
-b		Use burst mode.
-c	<i>n</i>	Continuous Mode
	1	Write Only
	2	Read Only
	3	Read/Write
-r	<i>n</i>	specify number of test iterations (default is 10).
-R		report mode used for burn
-s	<i>addr</i>	specify start address (in hex, default is 0).
-l	<i>bytes</i>	specify number of bytes to test (in hex, default is to end of DPRAM).

CAVEATS

Do not use this command when channelization is active. It will disrupt the channelization process and indicate false errors. Use `dprun -h` to halt channelization. Requires re-initialization of the board to resume normal board operations.

SEE ALSO

`dppiomem`, `dptdmram`

BUGS

Should check that channelization is stopped before running.

3.2.7 dpmemtest

Test memory on DPT4 board.

SYNOPSIS

dpmemtest [*options*] **dpt_dev**

DESCRIPTION

dpmemtest all memory resources on DPT 4 boards.

OPTIONS

-b		Use burst mode.
-i	<i>n</i>	Number of iterations to run (specify 0 to run continuously)
-s	<i>addr</i>	Specify start address (in hex, default is 0).
-t	<i>typen</i>	Specify type of memory to test. ALL = all available memory (default) GMEM = global memory DPRAM = Dual Port memory TDM = TDM map memory
-l	<i>bytes</i>	Specify number of bytes to test..
-v		verbose mode

NOTES

Running this command will halt the MIPS processor. Before any commands that interact with the processor are executed **dprun** should be executed.

3.2.8 dppiomem

Test SRAM on a CAC QuicKit Telephony PCI Board

SYNOPSIS

dppiomem [*options*] **dpt_dev**

DESCRIPTION

dppiomem tests the SDRAM which serves as the main memory for the embedded processor on a CAC QuicKit Telephony PCI board.

OPTIONS

-A Test all transfer routines
-b Use burst mode.
-c *mode* Continuous Mode
 mode = 1 Write Only
 mode = 2 Read Only
 mode == 3 Read/Write
-r *n* Do *n* iterations (default is 10).
-s *n* Specify start address (in hex, default is 0).
-l *n* Specify number of bytes (in hex, default is to end of DPRAM).
-o Test other transfer routines (byte and halfword). **dpdpram, dptdm ram**

NOTES

Running this command will halt the MIPS processor. Before any commands that interact with the processor are executed **dprun** should be executed.

3.2.9 dpdmaxfer

Test DMA transfers from a CAC QuicKit Telephony PCI Board to the host's memory.

SYNOPSIS

dpdmaxfer [options] dpt_dev

DESCRIPTION

dpdmaxfer tests 8, 16 and 32 bit DMA transfers from SDRAM memory on a CAC QuicKit Telephony PCI Board to the host's memory. In batch mode both 8 and 32 bit transfers are tested with various starting offsets. In non batch mode only 32 bit transfers are performed. If the size option is set, transfers of varying lengths are performed starting at size and incrementing by the increment amount. If the size option is not set DMA transfers are for **32768** bytes.

OPTIONS

-a	<i>address</i>	Sets the starting address in SDRAM.
-b		batch mode
-c	<i>iterations</i>	sets the number of iterations to run
-d	<i>millsecs</i>	specify delay in milliseconds between iterations
-i	<i>increment</i>	sets the increment size for non batch
-q		quiet mode – suppress details after first iteration
-S		stop on error
-s	<i>size</i>	size of transfers in bytes

3.2.10 dpmoddma

Test DMA transfer between SRAM on a CAC QuicKit Telephony PCI Board and memory on a SMPCI plug in module.

SYNOPSIS

dpmoddma [options] dpt_dev

DESCRIPTION

The dpmoddma program tests DMA transfer between SRAM on a CAC QuicKit Telephony PCI Board and memory on a SMPCI plug in module. A program is downloaded to the module which actually requests the DMA transfers. Currently only the DM5420 module type is supported. Transfers can be between the baseboard SRAM and either the module's local or global memory. In interactive mode the starting address in module memory, destination in SRAM and the length of transfers is prompted for by the program. In non-interactive mode the starting address, destination address and length are uploaded from the module test program.

OPTIONS

-l	DMA to module local memory
-i	interactive mode
-g	DMA to module global memory
-q	quit after starting module program
-s	DMA size
-v	verbose

SEE ALSO

3.2.11 dp54xdiag

The dp54xdiag program tests a DM5420 module on CAC QuicKit Telephony PCI Board.

SYNOPSIS

dp54xdiag [options] dpt_dev

DESCRIPTION

OPTIONS

-C	<i>cycles</i>	sets number of cycles of test to run
-e		sets e1 mode (default is t1)
-E		use external framer loop-back
-f		run framer test
-L	<i>mode</i>	sets TDM local loop-back mode 1 – FRAMER -> TDM -> FRAMER 2 – DSP -> TDM -> DSP
-l		use local clock for TDM
-m		use H.100 master mode
-n		set number of iterations
-s		use H.100 slave mode
-t		use t1 mode
-v		verbose mode

SEE ALSO

4 DPT Demonstration Programs

The demonstration programs provide examples of how to program host applications for the CAC QuicKit Telephony PCI Board using the supplied API libraries.

These programs are installed in the directory \$CAC/dpt/demo – by default /usr/cac/dpt/demo. For Unix installations, the demo programs are not built or installed by default. See the DPT4 installation instructions for details on how to configure the build to include the demo programs.

4.1 DPT Demonstration Programs Overview

dp54xled	demonstrates several operations with DM5420 smPCI modules.
dpchantest_mt	Example of multi-threaded channel application
dph100test	host program for verifying the H.100 interface
dprec	record a stream from a board
dpsend	transmit a stream from a board
dpsignaling	demonstrates line status signaling capabilities
dpt1tdmdemo	demonstrates using the TDM bus to pass the data streams between the framers and a DM5420 smPCI module.

4.1.1 dp54xled

SYNOPSIS

DESCRIPTION

The dp54xled program demonstrates how to download code to a DM5420 SMPCI module, access variables in the DSP's memory, respond to interrupts from the module, generate interrupts to the module and control the LED.

OPTIONS

-d	set loop delay
-h	inhibit running
-q	quiet mode
-w	wait for external interrupts

4.2 DPT Demonstration Programs Description

4.2.1 dpchantest_mt

test channelization on a CAC QuicKit Telephony PCI Board using one thread per slot.

SYNOPSIS

```
dpchantest_mt dpt_dev framer
```

DESCRIPTION

dpchantest_mt tests channelization functionality on a CAC QuicKit Telephony PCI Board. A transmit data pattern is generated by the board and is looped back (preframer) to the host. The host monitors the data pattern and reports any errors.

This program differs from **dpchantest** in that it always analyzes all time-slots as a set of single-slot channels. This is done by creating 32 threads, each of which opens a single slot. The primary purpose of this program is to test system load while transferring channelized data.

The `dpt_dev` parameter is a board name such as `dpt0`.

The `framer` may be specified as a number (0-3) or a letter (a-d or A-D).

OPTIONS

-t mm:ss specifies length of time in minutes (mm) and seconds (ss) to run the test.

SEE ALSO

dpchantest

4.2.2 dph100test

host program for verifying the H.100 interface.

SYNOPSIS

```
dph100test [-psv] dpt_dev
```

DESCRIPTION

dph100test configures the H.100 interface and performs a number of different test to verify the operation of the interface. A loop back adapter is required on the external H.100 connector.

This program is only valid on CAC QuicKit Telephony PCI Boards with the expansion interface option.

OPTIONS

-p	pause between tests
-s	set H.100 timing slave mode
-v	set verbose mode

SEE ALSO

4.2.3 dprec

record a stream from a CAC QuicKit Telephony PCI Board

SYNOPSIS

dprec dpt_dev [framer_mode] framer slotlist output_file

DESCRIPTION

dprec records data from a CAC QuicKit Telephony PCI Board and saves that data to a specified file.

The framer may be specified as a number (0-3) or a letter (a-d) or (A-D).

The slotlist is a bitfield representing the slots to record. The least significant bit is timeslot 0 and the most significant bit is timeslot 31. This should be a hexadecimal value.

To pass the output to another program, make a fifo (using **mkfifo**) and specify the fifo as the output file.

OPTIONS

- d** Enable digital loopback. This will cause any transmitted data to be looped (post-framer) back to the receiver.
- s** Enable serial loopback. This will cause any transmitted data to be looped (pre-framer) back to the receiver.
- h** Enable HDB3 line decoding. Without this switch AMI is assumed.
- u** Record an unframed data stream. When using this option all timeslots should be captured (by specifying ffffffff for the slotlist).
- p** Enable payload loopback. This will not affect the received data stream but will cause all incoming data to be looped (post-framer) back to the transmitter.
- l** Enable line loopback. This will not affect the received data stream but will cause all incoming data to be looped (pre-framer) back to the transmitter.
- x** Enable CAS multi-frame. This will cause the framer to sync to and verify CAS framing in timeslot 16.
- 4** Enable CRC4 multi-frame. This will cause the framer to sync to and verify CRC4 framing and error detection data in timeslot 0.

EXAMPLE

To record an entire unframed E1 on Framer A of /dev/dpt0 to framer_a.dat:

```
dprec -u dpt0 A ffffffff framer_a.dat
```

To record slots 48 of Framer C of /dev/dpt3 using HDB3 and CRC4 to sample.dat:

```
dprec -h4 dpt3 c f0 sample.dat
```

SEE ALSO

dpchantest, dpchantest_mt

4.2.4 dpsend

transmit a stream from a CAC QuicKit Telephony PCI Board

SYNOPSIS

```
dpsend [framer_mode] [ options ] [ slotlist ] device(s)
      [output_file]
```

DESCRIPTION

dpsend transmits an e1 or t1 data stream on one or more framers for one or more CAC QuicKit Telephony PCI Boards.

The slot list is of slot ranges or a bit field representing the slots to record. A bit field is a single hexadecimal number with the least significant bit indicating timeslot 0 and the most significant bit indicating timeslot 31. A slot range is either a single decimal number or a number dash number. The default is all slots.

A device name can either refer to all four framers on a board or to a single framer. A device name like dpt2 specifies all framers while dpt2c3 specifies a single framer numbered 3.

When the loopback is post-framer (i.e. -s is not given) timeslot 0 should not be included in slotlist. If CAS mode is enabled (-x) then timeslot 16 should also be excluded.

If an output_file is specified data to transmit is read from the file. If no file is specified an internally generated data pattern is sent.

FRAMER MODE

e1 E1	transmit e1 data stream
t1 T1	transmit t1 data stream
j1 J1	transmit Japanese version of t1 data stream

OPTIONS

-a	Display with ASCII
-C	framer IDs are Comet IDs. The default is framer IDs are connector IDs.

- d** Enable digital loopback. This will cause any transmitted data to be looped (post-framer) back to the receiver.
- D** enable DRAM loopback (processor local). This will cause any transmitted data to be looped by the processor putting output packets directly into the receive queue in DRAM.
- h** Enable HDB3 line decoding. Without this switch AMI is assumed.
- l** Enable line loopback. This will not affect the received data stream but will cause all incoming data to be looped (pre-framer) back to the transmitter.
- L** lbo specify line buildout
- p** Enable payload loopback. This will not affect the received data stream but will cause all incoming data to be looped (post-framer) back to the transmitter.
- P** start paused
- r** *count* Repeat data file count number of times. If count is omitted then repeat forever.
- s** Enable serial loopback. This will cause any transmitted data to be looped (pre-framer) back to the receiver.
- S** enable SDRAM loopback (processor local). This will cause any transmitted data to be looped by the processor putting output packets directly into the receive queue in SDRAM..
- t** mm:ssrun test for mm minutes and ss seconds.
- u** Record an unframed data stream. When using this option all timeslots should be captured (by specifying ffffffff for the slotlist).
- w** secs update display every seconds.
- x** Enable CAS multi-frame. This will case the framer to sync to and verify CAS framing in timeslot 16.
- 4** Enable CRC4 multi-frame. This will case the framer to sync to and verify CRC4 framing and error detection data in timeslot 0.
- end of options. Only needed if next items starts with a dash “ - “

Line Build Out Options:

Standard	TR62411	Mode
75ohm		E1 75 Ohm
120ohm		E1 120 Ohm (default)
l0	lt0	T1 Long Haul 0 dB (default)
17.5	N/A	T1 Long Haul 7.5 dB

l15	N/A	T1 Long Haul 15 dB
l22.5	N/A	T1 Long Haul 22.5 dB
s110	st110	T1 Short Haul 0-110 ft
s220	st220	T1 Short Haul 110-220 ft
s330	st330	T1 Short Haul 220-330 ft
s440	st440	T1 Short Haul 330-440 ft
s550	st550	T1 Short Haul 440-550 ft
s660	st660	T1 Short Haul 550-660 ft

Line build options are given following a -L option. The minimum unique part of the option may be specified.

SEE ALSO

dptchantest, dpsnd, dprec, dpreceive

4.2.5 dpsignaling

demonstrates line status signaling capabilities

SYNOPSIS

dpsignaling [options] device

DESCRIPTION

The program starts two threads, one to send signals and one to receive signals. The framers are configured with digital loopback. The thread receiving signals reports each time a signal is received. The thread sending signals sends a different signal every five seconds.

OPTIONS

-e	e1 mode
-q	quiet
-t	t1 mode
-T	t1 transmit only

4.2.6 dpt1tdmdemo

demonstrates using the TDM bus to pass the data streams between the framers and a DM5420 module.

SYNOPSIS

dpt1tdmdemo [options] device

DESCRIPTION

The TDM is configured to pass the data streams from the framer to a DSP. A DSP program is downloaded and started running.

OPTIONS

-e	e1 mode
-t	t1 mode
-l	use local clock

5 DPT Examples Programs

5.1 DPT Examples Overview

To make understanding of the CAC programs easier, we have created a set of example programs. The two examples given here are:

- dpreceive, and
- dpsnd

These programs use existing data sets, or generate a data set, so that users may become more familiar with operation of the software.

5.2 DPT Examples Programs Description

5.2.1 dpreceive

dpreceive is a program to demonstrate receiving a data stream from an E1, T1, or J1 channel. It is a simplified version of dprec.

SYNOPSIS

```
dpreceive [t1|e1|j1] [options] [slot_list] device [outfile]
```

DESCRIPTION

The dpreceive program provides a simple example of opening a receive channel, waiting for the framer to be in sync, reading from the input data stream and writing to a data file.

OPTIONS

-s	Enable serial loopback E1 / T1
-h	Enable HDB3 (E1) or B8ZS (T1)
-x	Enable CAS (E1) or ESF (T1)
-4	Enable CRC4 multi-frame

SEE ALSO

dprec, dpsnd, dpsend

5.2.2 dpsnd

Example program for transmitting E1, T1, or J1 data on a CAC QuicKit Telephony board.

SYNOPSIS

```
dpsnd [t1|e1|j1] [options] [slot_list] device [infile]
```

DESCRIPTION

The dpsnd program provides a simple example of opening a transmit channel, reading an input file and transmitting the data stream.

OPTIONS

Framer Options

- s Enable serial loopback E1 / T1
- h Enable HDB3 (E1) or B8ZS (T1)
- x Enable CAS (E1) or ESF (T1)
- 4 Enable CRC4 multi-frame

SEE ALSO

dpsend, dpreceive, dprec