Mellanox Software Tools (MST) User's Manual

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About this Manual

This manual describes the tools and utilities included in the Mellanox Software Tools (MST) package for the architecture platforms x86, IA-64, Intel EM64T, and PPC with Linux as the running operating system.

This MST package includes a script for the installation of any one, two, or all three of the following tools:

- The InfiniHost Mellanox Software Tools (hMST)
- The Infiniscale III Mellanox Software Tools (is3MST)
- The InfiniScale Mellanox Software Tools (isMST)

This manual is organized in the following manner:

- Two introductory chapters, with Chapter 1 describing how to install the tool sets above, and Chapter 2 describing the available operations by the unified MST Driver (for all three tool sets).
- Part I follows, comprised of chapters 2-6, where the hMST tools are described.
- Part II follows, comprised of chapters 7-11, where the is3MST tools are described.
- Part III follows, comprised of chapters 12-15, where the isMST tools are described.
- Part IV follows, containing the User's Manual for MTUSB-1, the USB to I^2C Adapter.
- An Appendix where a special initialization file used by one of the is3MST tools is described.

Intended Audience

This manual is intended for software developers running the Mellanox host and/or switch devices, and writing drivers and applications running above it.

The manual assumes familiarity with the InfiniBand™ architecture specification.

Related Documentation

Please refer to the following documentation as reference to Mellanox InfiniBand Host Channel Adapter and Switch devices.

- InfiniHost MT23108 Programmer's Reference Manual, *Doc. # 2111PM*
- InfiniHost MT23108 Hardware Reference Manual, *Doc. # 2112HM*
- InfiniScale MT43132 Register Specification, *Doc. # 2053RS*
- InfiniScale MT43132 Data Sheet (Hardware Reference Manual), *Doc. # 2052HM*
- InfiniScale III MT47396 Programmer's Reference Manual, *Doc. # 2235PM*
- InfiniScale III MT47396 Hardware Reference Manual, *Doc. # 2231HM*

1 Mellanox Software Tools (MST) Installation

This chapter presents the platforms and operating systems supported by this MST package. It then describes a unified script called *mst_install* which may be used to install one, two, or all three of the tool sets: hMST, is3MST, and isMST.

1.1 Supported Platforms and Operating Systems

The tools in this MST package have been qualified on the architecture platforms and operating systems listed in the following table:

Table 1 - Supported Platforms and Operating Systems

Platform	Operating System	Kernel	GCC
X86	Red Hat Linux Advanced Server 2.1	2.4.9-e.24 (UP; SMP and enterprise)	2.96-108.1
	Red Hat Linux 8.0	2.4.18-14 (UP; SMP and bigmem)	3.2-7
	Red Hat Linux 8.0	2.4.22 (UP; SMP) with gcc 3.2-7	
	Red Hat Linux 8.0	2.4.23 (UP; SMP) with gcc 3.2-7	
	Red Hat Linux 9.0	2.4.20-8 (UP; SMP; bigmem)	3.2.2 20030222 (Red Hat Linux 3.2.2-5)
	Red Hat Enterprise Linux AS 3.0	2.4.21-4.EL (UP; SMP)	3.2.3 20030502 (Red Hat Linux 3.2.3-20)
	Red Hat Enterprise Linux AS 3.0	2.4.21-4.EL big pages & kernel patch	3.2.3 20030502
	SuSe SLES 8.0	2.4.19-64G-SMP	3.2
	SuSe 9.0	2.4.21-99-smp4G	3.2.3
	SuSe 9.0	2.6.3 (UP; SMP; bigmem)	3.3.1
IA-64	Red Hat Linux Advanced Server release 2.1AS (Derry)	2.4.18-e.25smp	2.96-112.7.2
	SuSE SLES-8 (ia64)	2.4.19-SMP	3.2
	Red Hat Enterprise Linux AS 3.0	2.4.21-4.EL	3.2.3 20030502 (Red Hat Linux 3.2.3-20)
Intel EM64T	SuSE 9.0	2.4.21-156-smp	3.3.1
X86_64 (AMD64)	SuSE SLES-8 SP3 (AMD64)	2.4.21-143-smp	3.2.2
	Red Hat Enterprise Linux AS 3.0	2.4.21-4.EL	3.2.3 20030502 (Red Hat Linux 3.2.3-20)
PPC (7455, HDPU Compute Blade) [1]	Yellow Dog Linux release 3.0 (Sirius)	2.4.23-pre5	3.3

1. Supported by hMST only.

1.2 Supported I^2C Adapters

The tools in this MST package can access Mellanox devices attached to the following I^2C Adapters:

- MTUSB USB-to-I2C Adapter (Initial revision of USB-I2C adapter from Mellanox).
- MTUSB-1 USB-to-I2C Adapter (First revision of USB-I2C adapter from Mellanox).
- CALIBRE (ISA to I2C adapter card from Mellanox; requires a PC with an ISA slot).

1.3 Tools Installation

The entire MST package is provided in a single tar file which may be extracted using the following command:

tar -zxvf MST-<platform>-<version>.tgz

Once you untar, you will notice the existence of the following subdirectories:

hmst-<platform> - Installation kit for InfiniHost MT23108 and InfiniHost III-Ex MT25208 tools

ismst-<platform> - Installation kit for InfiniBridge MT21108 and InfiniScale MT43132 tools

is3mst-<platform> - Installation kit for InfiniScale III MT47396 tools

This package provides an installation script named *mst_install*. It enables the installation of one, two, or all three tools sets: hMST, isMST, and is3MST.

When you run *mst_install*, it prompts for the tool set(s) you wish to install. More than one tool set may be specified in the response line, separated by spaces. If none is specified, all three will be installed. The following is an example of an *mst_install* run:

```
# ./mst_install
`/tmp/scripts/mvision' -> `/usr/mst/bin/mvision'
create symbolic link `/usr/bin/mvision' to `/usr/mst/bin/mvision'
`/tmp/scripts/mburn' -> `/usr/mst/bin/mburn'
create symbolic link `/usr/bin/mburn' to `/usr/mst/bin/mburn'
`/tmp/scripts/mtrace' -> `/usr/mst/bin/mtrace'
create symbolic link `/usr/bin/mtrace' to `/usr/mst/bin/mtrace'
     1  hmst-i686-3.2.3-release.tgz
     2  ismst-i686-3.2.3-release.tgz
     3  is3mst-i686-3.2.3-release.tgz
Enter the numbers of the desired packages to install (Press Enter for all)>
```


Additionally, three scripts are provided which serve to unify the initiation of applications from the various tools sets. See Table 2, “Unified Initiation Scripts” for description.

Table 2 - Unified Initiation Scripts

Script	Operation
mvision	Prompts for chip type (MTxxx), then runs *infinivision*, *infinivisionEx*, *is3infinivision*, *adevmon* or *gdevmon* as applicable.

Table 2 - Unified Initiation Scripts

Script	Operation
mburn	Prompts for chip type, then prompts for user interface type (*GUI* or *command line*). Choose *command line* to run *flint* or *eburn*; otherwise the script runs *infiniburn*, *is3burn*, or *emt* as applicable
mtrace	Prompts for chip type, then runs *itrace* or *is3trace* as applicable.

1.4 I^2C Cable Connection During Device Power-On

During power-on of a device such as MTEK43132 or MTS2400, the device uses the I^2C bus to transfer its run-time program to its internal RAM. Since external signals on the I^2C bus may disturb this process, it is required to disconnect the I2C cable from the device until the power-on process is complete.

1.5 MST Driver Control Operations

1.5.1 Overview

The MST driver provides basic access to Mellanox hardware for use by Mellanox and OEM tools. It is composed of several kernel modules, a linkable access library (libmtcr.a), access utilities (mread, mwrite), and utilities for remote access. A script called *mst* is provided to the user to operate the MST driver functions.

Specifically, the *mst* script enables the user to execute the following operations:

1.5.2 Starting the MST Driver

To start the MST driver, execute the following command:

```
mst start
```

This command:

- Creates special files representing Mellanox devices in the directory /dev/mst.
- Loads appropriate kernel modules.
- Saves PCI configuration headers in the directory /usr/mst/etc/pci.

After successful completion of this command, the set of MST drivers is ready to work.

1.5.3 Stopping the MST Driver

To stop the MST driver, execute the following command:

```
mst stop
```

This command:

- Stops the Mellanox service
- Removes all special files/directories
- Unloads kernel modules

1.5.4 Restarting the MST Driver

To restart the MST drivers, execute the following command:

```
mst restart
```

This command effectively functions as does executing `mst stop` followed by `mst start`.

1.5.5 Displaying the MST Driver Status

To display the status of the MST driver, execute the following command:

```
mst status
```

This command displays a list of the loaded MST kernel modules and the local and remote devices recognized by the host. For example:

```
MST modules:
------------
    MST PCI module loaded
    MST PCI configuration module loaded
    MST Calibre (I2C) module is not loaded
MST devices:
------------
/dev/mst/mtusb                - MTUSB USB to I2C adapter as I2C master
/dev/mst/mt23108_pciconf0     - PCI configuration cycles access.
                                bus:dev.fn=01:01.0 addr.reg=88 data.reg=92
                                Chip revision is: 00
/dev/mst/mt23108_pci_cr0      - PCI direct access.
                                bus:dev.fn=02:00.0 bar=0xf7e00000size=0x100000
                                Chip revision is: 00
/dev/mst/mt23108_pci_ddr0     - PCI direct access.
                                bus:dev.fn=02:00.0 bar=0xe8000000 size=0x8000000
/dev/mst/mt23108_pci_uar0     - PCI direct access.
                                bus:dev.fn=02:00.0 bar=0xf7000000 size=0x800000
/dev/mst/vtop                 - Virtual to physical addresses tranlation driver
```

1.5.6 Starting an MST Server

To start an MST server, execute the following command:

```
mst server start [port]
```

where:

port – IP port where the MST server listens. The default is 23108.

This command starts an MST server to enable an incoming connection.:

1.5.7 Stopping an MST Server

To stop an MST server, execute the following command:

```
mst server stop
```

where:

This command stops an MST server.

1.5.8 Connecting to a Remote Server

To connect to a remote server, execute the following command:

```
mst remote add hostname[:port]
```

where:

hostname – An IP address or a host name, optionally followed by port number. (The default port is 23108.)

This command establishes a connection with the specified host on the specified port. This adds to the local devices list the devices on the remote peer.

1.5.9 Disconnecting from Remote Servers

To remove all remote devices on a remote host, execute the following command:

```
mst remote del hostname[:port]
```

where:

hostname – An IP address or a host name, optionally followed by port number. This must be specified exactly as it is in the `mst remote add` command described above.

This command removes from the local devices list all the devices on the specified host.

1.5.10 Saving PCI Configuration Headers

To save PCI configuration headers, execute the following command:

```
mst save
```

This command saves PCI configuration headers in the directory: /usr/mst/etc/pci. This command is invoked automatically when the "mst run" command is executed.

1.5.11 Loading PCI Configuration Headers

To load PCI configuration headers, execute the following command:

```
mst load
```

This command loads PCI configuration headers from the directory: /usr/mst/etc/pci.

1.5.12 Resetting a Mellanox PCI Device

To reset a Mellanox device attached to the PCI bus, execute the following command:

```
mst reset <device_name>
```

This command resets the device <device_name> and then carries out the command "mst load". To get a list of currently available Mellanox devices, type "ls /dev/mst" or "mst status". Devices connected to the PCI bus will have the string "pci" as a part of their name.

Part I: InfiniHost Software Tools and Utilities

The InfiniHost MT23108 software tool set consists of the following:

2 infiniburn Tool

2.1 Supported Platforms

The InfiniBurn tool runs on the platforms listed in "Supported Platforms and Operating Systems" on page 13, except for those that do not support X-Window graphics.

2.2 Overview

InfiniHost functionality is dependent on configuration information and firmware that is loaded from the attached NV Memory at boot. NV Memory on a Mellanox board is mainly Flash memory (though EEPROM memory can be present on InfiniHost evaluation boards used primarily by developers).

Upon boot, InfiniHost:

1. Loads initial configuration values from NV Memory (Flash/EEPROM) to the InfiniHost configuration registers.
2. Reads firmware residing on NV Memory (Flash/EEPROM).
3. Copies the firmware to local DDR memory.
4. Executes the firmware from this DDR memory.

Mellanox supplies this default configuration and firmware, which can be customized for a specific board configuration. After this configuration update, the modified configuration and firmware must be burned to NV Memory.

To facilitate the handling of the configuration settings and firmware for the InfiniHost device, Mellanox provides the InfiniHost InfiniBurn tool. This tool burns firmware and its default boot-time configuration to the NV Memory residing on the different types of Mellanox boards. The InfiniBurn tool enables you to:

- Change default FW configuration by:
  - Loading a "Board Definition" file in which FW parameters are preassigned prior to burning, with data specific to the board used. See information on page 27.

    Note: Each Mellanox board has a "Board Definition" (.brd) file. The user must load a brd file in order to enable further action (write or burn FW).
  - Change parameters value directly in Infiniburn's GUI.
- Save to file all the firmware parameters you have changed.
- Save to file the entire firmware image.

You can use InfiniBurn for burning the firmware via the following interfaces:

- PCI/PCIX direct access
- PCI/PCIX via configuration cycles
- I2C – CALIBRE ISA I2C Card
- I2C USB

  Note: Burning via the I2C interfaces is significantly slower than burning via the other interfaces.

The InfiniBurn tool is backwards compatible and can read earlier versions of the firmware. However, if you try to run a firmware version released after the infiniburn version you have, it is possible that you will get errors. In this case,

please get a new version of infiniburn.

After reading configuration, the firmware version currently on your system can been seen in the FW tab of InfiniBurn (page 55). It is a combination of the values specified in three fields: Major Rev ID. Minor rev ID.Subminor Rev ID).

This chapter is organized in the following sections:

- Starting the InfiniBurn Tool (page 24)
- Reading the Firmware (page 25)
- Specifying or Creating a "Board Definition" file (page 27)
- Modifying Parameters (page 33)
- Post-modification Operations, including:
  - Saving the Firmware Parameters to File (page 57)
  - Saving the Image to File (page 57)
  - Burning the Firmware Image to NV Memory (Flash/EEPROM) (page 59)

2.3 Operations

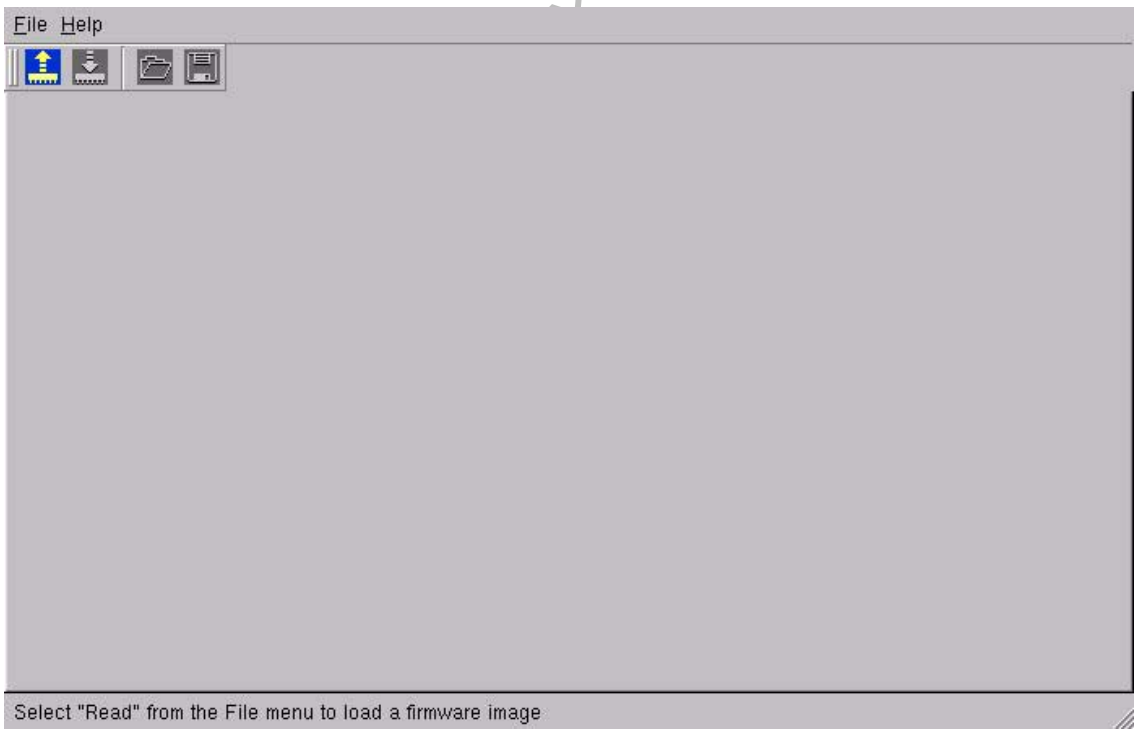
The operations of InfiniBurn are described in the following sections.

2.3.1 Starting the InfiniBurn Tool

The MST driver must be started prior to running InfiniBurn tool. **To start InfiniBurn:**

- Start the MST driver (mst start or mst restart).
- Enter `infiniburn` at the command line.

This displays the following window, which enables you to carry out the operations for reading, configuring, saving, and burning the configuration and firmware.



NOTE: this window is displayed only initially, before you have read in an image.

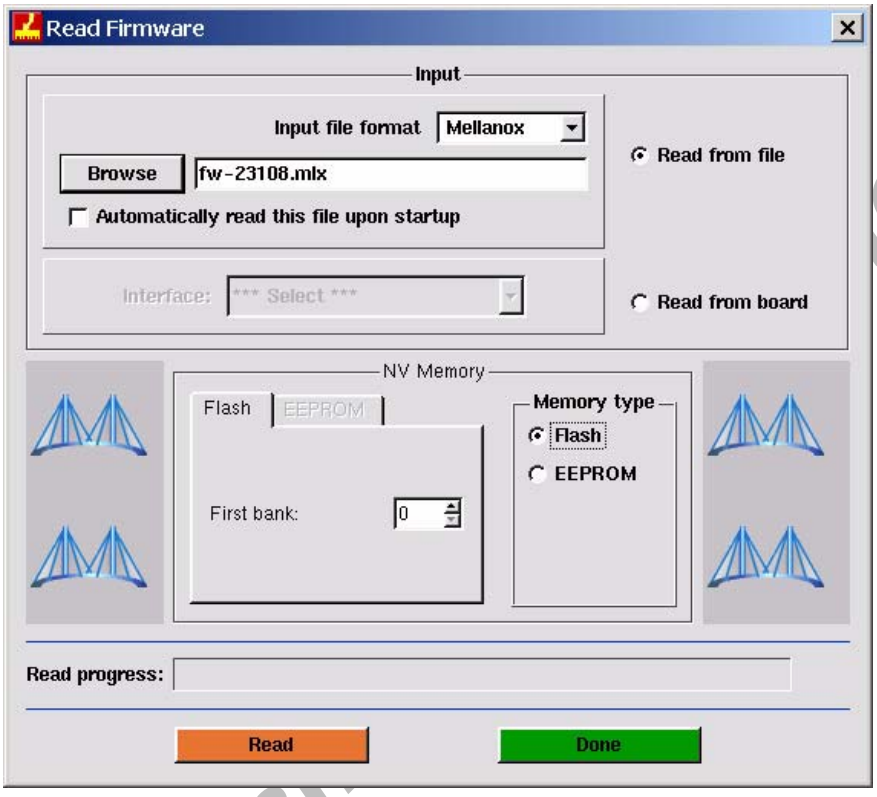
2.3.2 Reading the Firmware

After starting the InfiniBurn tool, you can read:

- A new firmware image in a file supplied by Mellanox.
- A firmware image that you have prepared previously and saved as a file in Mellanox format or in binary format.
- A firmware image currently residing on the device.

To read the Mellanox-supplied image of the current firmware:

1. From the menu bar of the main window, select **File | Read**. This displays the following dialog box:



:

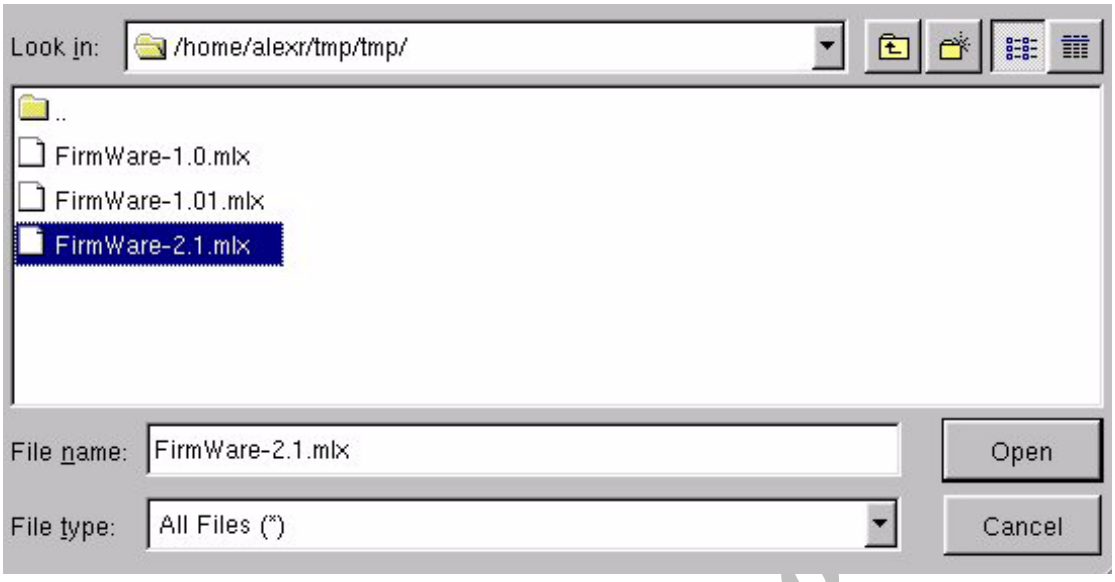
2. Select **Read from file**.
3. Pick **Browse** and browse to the Mellanox-supplied firmware image, which includes firmware executables, the static configuration of selected registers, and input parameters for the tool.
4. Click **Read.**

   Note: You can use the InfiniBurn tool even if the InfiniHost device is not connected to a board; however, in such cases you can neither read an image from the device nor burn an image to the device.

To set this as the default the next time InfiniBurn is launched, select **Automatically read this file upon startup.**

To read a parameters file that was specified and saved previously:

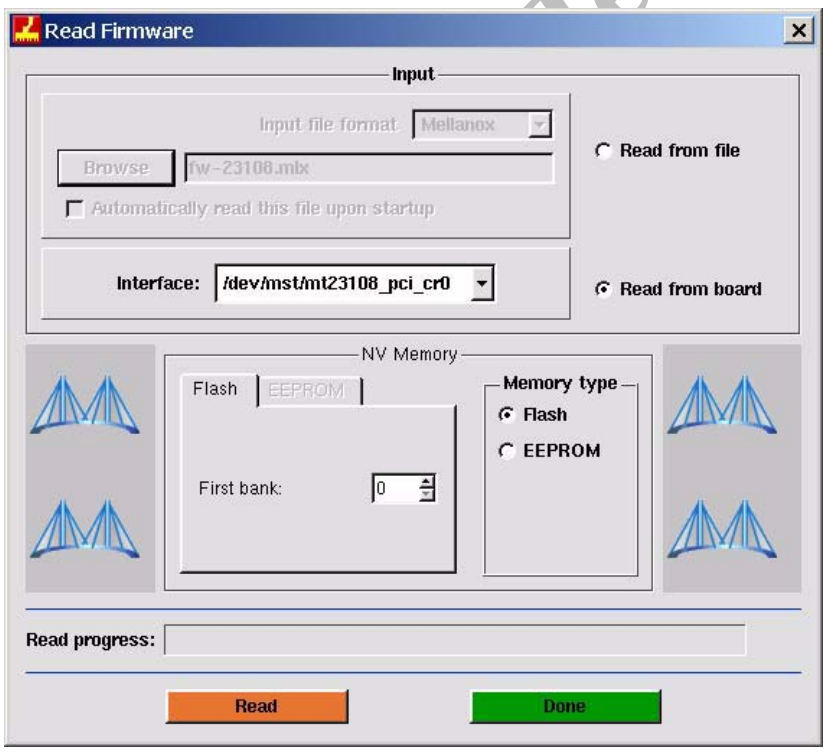
1. From the menu bar of the main window, select **File | Load**. This displays the following screen:



2. Select the file containing the saved parameters.

To read the current Firmware image from NV Memory:

1. From the menu bar of the main window, select **File | Read**. This displays the following screen:



2. Select **Read from board**.

3. From the **Interface** select list, select the interface through which the image is accessed. The interfaces available are determined dynamically, according to the board and its strapping options. The options available by default are:
   - mt23108_pci_cr0 – This interface provides direct access.
   - mt23108_pciconf0 – This interface enables access via configuration cycles, and it can be used to access the image when there are difficulties either with the Flash memory or the firmware. Access via this interface is slower than direct access.
4. In the Memory type box, select Flash as the type of NV Memory.
5. Specify the first bank.
6. Click **Read**.

2.3.3 "Board Definition" File

After Infiniburn reads the FW file, the user must load a board definition file. Mellanox's board files are a part of a FW release.
The user can also create a *"Board Definition"* file, where it is possible to preassign some of infiniburn's required parameters with data specific to the board used. This file can be created using a text editor; its format is that of a Perl script with some additional functions. When infiniburn is invoked, it is possible to load this file to set some of the FirmWare burning parameters.

Once all changes and settings have been programmed to the GUI of infiniburn, it is now possible either to burn the FirmWare (FW) or to write it into a file (for later use with Flint).

2.3.3.1 Naming Convention for the *Board Definition* file

The name of the *Board Definition file* is arbitrary, however, it should have a ".brd" extension.

2.3.3.2 Creating the *Board Definition* file

Currently, it is not possible to create this file automatically; it needs to be manually typed into a text editor and saved with the ".brd" extension as mentioned above. The syntax is that of Perl with some additional functions. However, the Perl commands **"use"** and **"require"** should be avoided. (Otherwise, infiniburn will load files using your local perl library search path.)

Not all parameters are settable via the *Board Definition file*. Furthermore, each FirmWare has its own list of settable parameters. The list for InfiniHost FW can be found in the appendix of the FW Release Notes available to the user.

The user can also extract the list of settable parameters on her/his own. For this purpose, it will be necessary to run infiniburn and check the parameter tabs in the GUI. A parameter can be set in the *Board Definition file* if it has a "refname". The "refname" is a preassigned, unique reference name given to a specific parameter of a specific FW (that cannot be altered by the user).

To find whether a parameter has a "refname" or not, the user can point at the parameter tab in the GUI of infiniburn and check the tooltip that will pop-up: if the parameter has a "refname", it will appear on the last line of this tooltip; otherwise, only the current value of the parameter will appear.

2.3.3.3 infiniburn Functions Related To *Board Definition*

As mentioned above, the Perl language may be utilized for the creation of the *Board Definition file*. Additionally, infiniburn provides a few functions for use in the *Board Definition file*.

Furthermore, infiniburn provides the user with the capability of creating an additional function; infiniburn will call this function the moment it is instructed to either burn the FW or write to a file. The execution of this function may abort the burn/write process. (See below.)

Available Functions:

infiniburn provides 3 functions for use in the *Board Definition file*. These functions are *fset, fget,* and *pmessage*. Following is a description of each function.

fset

Parameters: *REFNAME NEW_VALUE*

Return: *None*

Action: *Assigns NEW_VALUE to parameter referenced as REFNAME*

Example:

```
fset('adapter_vendor_id', 0x25);
```

Action: *Assigns 0x25 to the parameter referenced as 'adapter_vendor_id'*

fget

Parameters: *REFNAME*

Return: *PARAMETER VALUE if parameter referenced as REFNAME is found; UNDEF otherwise*

Action: *Looks for parameter referenced as REFNAME: if found, the function returns its value; otherwise, it returns UNDEF*

Examples:

1.
```
my $VendorId = fget('adapter_vendor_id');
```
Action: *gets value of parameter referenced as 'adapter_vendor_id' and assigns it to $VendorId variable.*

2.
```
if (defined(fget('adapter_vendor_id')) {
   $VendorId = fget('adapter_vendor_id');
} else {
   print "adapter_vendor_id not defined";
   $VendorId = 0;
}
```
Action: *Checks whether the parameter referenced as 'adapter_vendor_id' is defined: if so, the function gets the value and assigns it to $VendorId variable; otherwise, it assigns 0 to $VendorId, and prints the message "adapter_vendor_id not defined".*

pmessage

Parameters: *MESSAGE_TXT [FATAL_FLAG]*

Return: *If FATAL_FLAG is present and is Not Zero, the function returns 0.*
If FATAL_FLAG is missing or if Zero, the function will return 0 if user clicks the "Cancel" button, 1 if user clicks "OK" (See next.)

Action: *Displays MESSAGE_TEXT as a pop-up window. The message is "fatal" if FATAL_FLAG is present and Not Zero; it is "non-fatal" otherwise.*
If the message is fatal, the button ("OK") will be displayed under the message. In this case pmessage returns 0.
If message is non-fatal, two buttons, "OK" and "Cancel", will be displayed. In this case the return code of pmessage depends on the user's action: pmessage returns 0 if "Cancel" is clicked and 1 if "OK".

Examples:

1.
```
if ($VendorId == 0x25) {
   pmessage("Very bad parameters combination", 1);
   exit;
}
```
Action: *If variable $VendorId is 0x25, Displays the message and exits.*

2.
```
if ($VendorId == 0x25) {
   exit if !pmessage("Suspicious parameters combination\nAre you sure?");
}
```
Action: *If variable $VendorId is 0x25 displays the message; it will exit if user clicks the "Cancel" button.*

User Defined Function:

The function ***plast*** enables the user to create a function which infiniburn will (always) call right before the FW burning or writing (to file) stage. Note that the user may choose not to define this function; by default, it returns 1 when called by infiniburn.

plast

Parameters: *None*

Return: *The user may program the return code of plast to be 0 or 1. If 1 is returned, infiniburn continues; otherwise, the FW burning process is aborted.*

Action: *This function is somewhat of a "last chance" to change parameters option, before going ahead with the FW burning/writing process. The function is called by infiniburn ONLY ONCE, when the user presses the "Burn" button or the "Write" button.*
If plast returns return 0, the process will be aborted silently (i.e., the user is responsible for exit message); otherwise, infiniburn will proceed with the burning/writing process.

Note: *The user may choose Not to define plast; by default, it returns 1 when called by plast.*

Examples:

1.
```
sub plast
{
 return 0 if $VendorId == 0x25;
 return 1;
}
```
Action: *If $VendorId equals 0x25 the burn/write process will be silently ABORTED; Otherwise, infiniburn will proceed to burn the FW or write the parameter settings to a file.*
Note: *This abort process is not a user-friendly behavior; if $VendorId does equal 0x25, the "Burn" button will no longer work. Therefore, it is recommended to print out to stdout the cause of the abort.*

2.
```
sub plast
{
print "Hi, I'm in PLAST function\n";
my $a = fget('adapter_rev_id');
if ($a == 0xa0) {
  pmessage("Adapter Revision ID is 0xA0. GOOD.");
  return 1;
  } elsif ($a == 0xa8) {
    return pmessage("Adapter Revision ID is 0xA8. BAD.", 1);
```

```
    } else {
      return pmessage("Adapter Revision ID is $a. Suspicious. Continue?");
    }
  }
```

Action: *When "Burn" button is clicked, "Hi, I'm in PLAST function" will be printed to stdout.*
Then, if parameter referenced as 'adapter_rev_id' equals 0xa0, a pop-up window will display the message: "Adapter Revision ID is 0xA0. GOOD." The burning/writing process will continue regardless of user action.
If parameter referenced as 'adapter_rev_id' equals 0xa8, a pop-up window will display the message: "Adapter Revision ID is 0xA8. BAD." The burning/writing process will be aborted right after the user clicks "OK".
If parameter referenced as 'adapter_rev_id' has any other value, a pop-up window will display the message "Adapter Revision ID is ... Suspicious. Continue?", followed by "OK" and "Cancel" buttons. The burning/writing process will be aborted if user clicks "Cancel"; it will continue if user clicks "OK".

2.3.3.4 infiniburn's GUI Changes

A new button labeled "**B**" will appear on the buttons bar of infiniburn screen. If this button is clicked, a regular "file selection box" will pop-up. The user will select the .brd file prepared earlier, and infiniburn will load it. Those parameters which got set or modified in this process will be red-highlighted in the GUI. After this loading process, it is possible to either burn the FW or write to a binary file for later burning using the Flint tool.

2.3.3.5 Examples of "Board Definition" Files

Two "Board Definition" files are provided as examples in the following: one for *Cougar-Cub* board (MTLP23108 PCI-X Host Channel Adapter), and one for the *Jaguar* board (MTEK23108-C02-OBN PCI-X Host Channel Adapter).

Board Definition File (.brd) for Cougar-Cub (MTLP23108 PCI-X HCA).

```
# -*- perl -*-

my $supported_board_format_rev = 0x1;
my $check_board_format_rev = fget('_board_format_rev');
if ($check_board_format_rev != $supported_board_format_rev) {
  pmessage("ERROR: FW / board file format mismatch. Unable to load the board file.",1);
return;
}

#my $rc = pmessage("Hello world!", 1);
#print "RC = $rc\n";

#ADAPTER_TAB
fset('adapter_ref_clock_khz', 62500);
fset('vpd_enable', 1);

#SPD_TAB
fset('SPD0_addr', 0x56);
fset('SPD0_offset', 0x400);
fset('SPD0_width',1);

#PLL_TAB - (See "Clocks and PLLs" chapter of InfiniHost MT23108 Hardware Reference Manual, and "Setting the PLL Parameters" on page 46 of this manual)
fset('pllc_od',1);
fset('pllc_r',6);
fset('pllc_f',38);
fset('plld_od',1);
fset('plld_r',5);
fset('plld_f',35);
fset('pllr_ldiv',2);
```

Board Definition File (.brd) for Jaguar (MTEK23108-C02-OBN PCI-X HCA). # -*- perl -*-

```
my $supported_board_format_rev = 0x1;
my $check_board_format_rev = fget('_board_format_rev');
if ($check_board_format_rev != $supported_board_format_rev) {
  pmessage("ERROR: FW / board file format mismatch. Unable to load the board file.",1);
  return;
}

#my $rc = pmessage("Hello world!", 1);
#print "RC = $rc\n";

#ADAPTER_TAB
fset('adapter_ref_clock_khz', 66000);
fset('vpd_enable', 0);

# SPD_TAB
fset('SPD0_addr', 0x50);
fset('SPD0_offset', 0x0);
fset('SPD0_width',0);

#PLL_TAB - (See "Clocks and PLLs" chapter of InfiniHost MT23108 Hardware Reference Manual, and “Setting the PLL Parameters” on page 46 of this manual)
fset('pllc_od',1);
fset('pllc_r',6);
fset('pllc_f',36);
fset('plld_od',1);
fset('plld_r',6);
fset('plld_f',30);
fset('pllr_ldiv',1);
```

2.3.4 Modifying Firmware Parameters

The InfiniBurn tool features the following tabs that enable you to set the parameters for InfiniHost firmware:

- **Adapter** – sets the parameters of the Adapter (board) where InfiniHost resides (page 34).
- **HCA** – specifies how InfiniHost operates as an HCA (page 37).
- **IB** – sets the IB parameters (page 40)
- **PCI/PCIX** – sets how InfiniHost functions with the PCI/PCIX interface (page 44).
- **PLL** – sets system clock parameters (page 46).
- **DDR** – defines to the InfiniHost device the DDR memory attached to the board (page 48).
- **SPD** – specifies SPD addresses and (optionally) sets SPD parameters on the Flash memory (page 50).
- **NTU** – sets parameters of an NTU device that InfiniHost incorporates (page 54).
- **FW** – displays the firmware version and specifies the firmware's use of DDR memory (page 55).

  Note:
  Some InfiniBurn parameters are connected to other InfiniBurn parameters and their values are calculated by a formula linking them. For example: on the HCA tab, the parameter "HCA subsystem vendor ID" = "HCA vendor id"; and "TPT map"=4 when "Log2 of system page" = 12 – otherwise "TPT map" = 12.

  InfiniBurn enables you to override such calculated values by ***de***selecting the Auto check box located next to the parameter on the screen and manually specifying the desired value.

  To restore the automatic calculation of the parameter's value and the value itself, re-select the Auto check box.

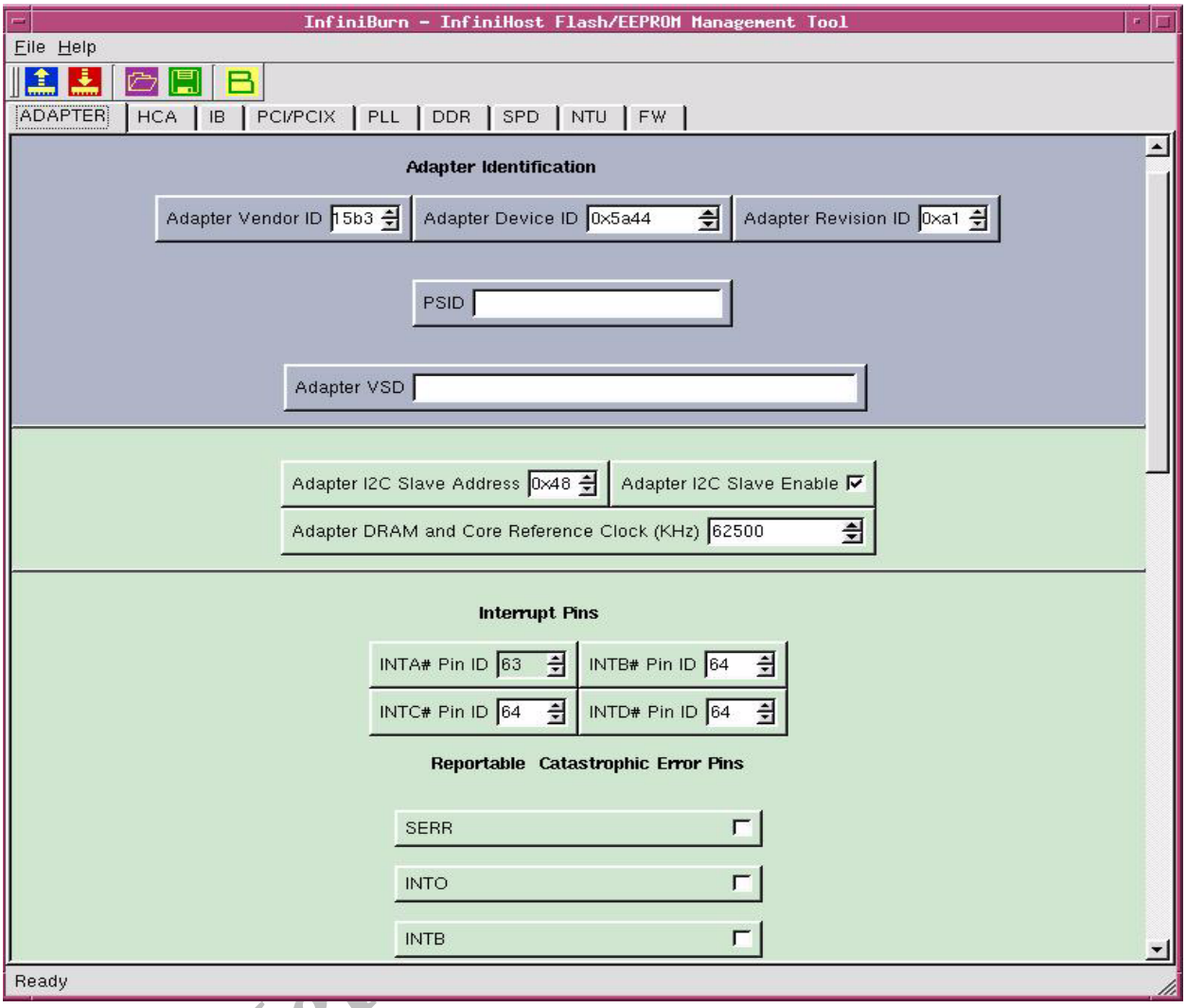
  The following are the parameters whose calculated values you can overwrite:

  HCA tab: – HCA Subsystem VendorID, TPT map

  IB tab – NodeGUID[31:0], SystemImageGUID[31:0], Port*x* GUID[31:0]

2.3.5 Setting the Adapter Parameters

The following Adapter tab enables you to set the parameters of the Adapter (board) where the InfiniHost device resides.



This tab enables you to specify the following fields:

Adapter Vendor ID – Adapter Vendor ID reported to the driver querying QUERY_ADAPTER.

Adapter Device ID – Adapter Device ID reported to the driver querying QUERY_ADAPTER.

Adapter Revision ID – Adapter Revision ID reported to the driver querying QUERY_ADAPTER.

VSD – Specifies data that will be written to the VSD (Vendor Specific Data) section in the firmware image.

PSID – Specifies data that will be written to the PSID (Parameter Set ID) section in the firmware image.

Adapter I2C Slave Address – Specifies the I^2C slave address on the adapter.

I2C Slave Enable – When selected, enables the I^2C slave on the adapter.

Adapter DRAM and Core Reference Clock (KHz) – Adapter Reference clock (KHz). The default value for this parameter is determined by the Board type selected in the Adapter tab. Deselecting the Auto check box disables this default and enables you to set the parameter value.

Interrupt Pins

INTA# Pin ID – The number of the GPIO pin connected to INTA# on the adapter.

INTB# Pin ID – The number of the GPIO pin connected to INTB# on the adapter.

INTC# Pin ID – The number of the GPIO pin connected to INTC# on the adapter.

INTD# Pin ID – The number of the GPIO pin connected to INTD# on the adapter.

Reportable Catastrophic Error Pins:

SERR – Enables/disables the pulling of the SERR interrupt pin upon catastrophic error.

INTO – Enables/disables the pulling of the INTO interrupt pin upon catastrophic error.

INTB – Enables/disables the pulling of the INTB interrupt pin upon catastrophic error.

Unreportable Catastrophic Error Pins:

SERR – Enables/disables the pulling of the SERR interrupt pin upon unreportable catastrophic error.

INTO – Enables/disables the pulling of the INTO interrupt pin upon unreportable catastrophic error.

INTB – Enables/disables the pulling of the INTB interrupt pin upon unreportable catastrophic error.

Per Port Parameters

Half/Full Swing – Ports are now configured to support full swing by default. Note that for Jaguar boards rev1.1 there is a compliancy problem related to this feature. It is recommended to set it to "half swing".

Tx Pre Emphasis – Controls enabling / disabling pre-emphasis amplifier. Disabled by default.

Enable Equalization – Controls enabling / disabling the ports' equalization. Disabled by default.

Interrupt Coalescing Delay – Minimum delay between two consecutive interrupts generated by the HCA (in clock units).

Expansion ROM – Selecting the Expansion ROM Enable check box enables you to burn expansion ROM. Expansion ROM provides you with a mechanism by which a driver image resides on the card and is read at boot-time. (Details of Expansion ROM can be found in Section 6.3 ("PCI Expansion ROMs") of the *PCI Local Bus Specification Revision 2.3*

VPD Enable – When selected, enables support for Vital Product Data (VPR).

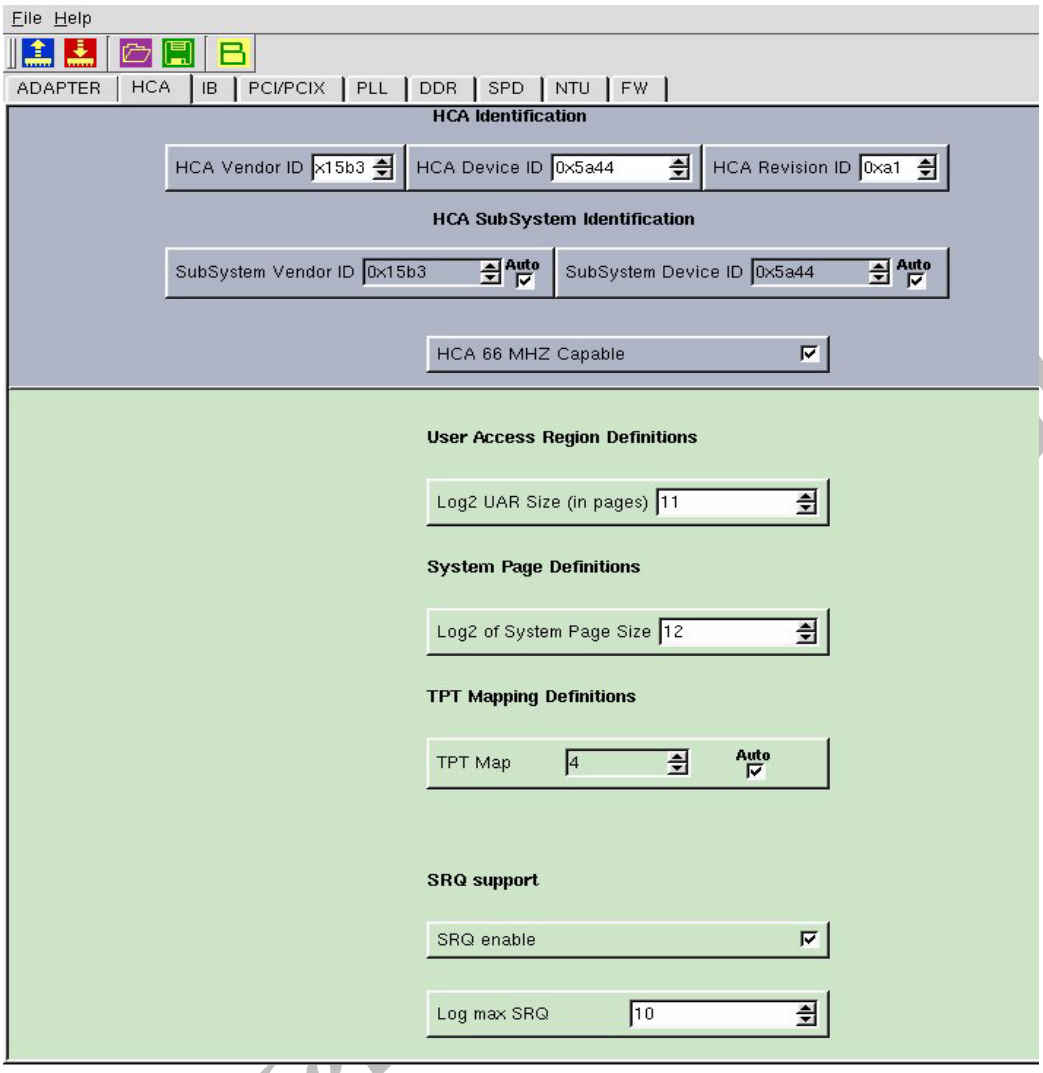
VPD EEPROM Size – Specifies the amount of EEPROM used for VPD.

VPD EEPROM Addr – Specifies the VPD I2C address.

VDP EEPROM Offset – Specifies the offset on the EEPROM from which firmware starts to read the VDP (the address should be word aligned).

2.3.6 Setting the HCA Parameters

The following HCA tab enables you to specify how InfiniHost operates as an HCA and how it reports itself to system sweep.



This screen enables you to specify the following fields:

HCA Vendor ID – Mellanox HCA Vendor ID included in device headers and reported to the system sweep process. Vendors using InfiniHost silicon on their own boards may modify this parameter and specify their ID provided by IEEE.

HCA Subsystem VendorID – Mellanox subsystem Vendor ID included in device headers and reported to the system sweep process. Vendors using InfiniHost silicon on their own boards may modify this parameter.

De-selecting the Auto check box enables you to override the automatic calculation of the value of this field and to manually set the value.

HCA Device ID – Mellanox InfiniHost Device ID included in the device headers and reported to the system sweep process. Vendors using InfiniHost silicon on their own boards may modify this parameter.

HCA Subsystem ID – Mellanox subsystem HCA ID included in device headers and reported to the system sweep process.

De-selecting the Auto check box enables you to override the automatic calculation of the value of this field and to manually set the value.

HCA Revision ID – Mellanox InfiniHost Revision ID. Vendors using InfiniHost silicon on their own boards may modify this parameter.

HCA 66MHZ Capable – When selected, reports to system sweep process that the Mellanox HCA handles a frequency of 66MHZ.

Log2 UAR Size (in pages) – Specifies Log2 of the Maximum Number of UARs (see the *InfiniHost Programmer's Reference*) to be used to access the device.

Log2 of System Page Size – Log2 of the minimum page size supported in the system. This parameter is used by InfiniHost to segment PCI/PCIX bursts.

TPT Mapping Definitions - Determines the indexing method of the TPT translation cache entries. When accessing the translation cache, you need to select the index and tag bits from the vector defined by virtual address[63:0], Lkey[31:0]. This register determines which bits of the vector go into the tag and which into the index.

The values available in the select box specify the following:

Table 3 - TPT Mapping Definition

Value	Indexing Method
0	index={Lkey[7:0]}; tag={VA[51:0],Lkey[31:8]}
1	index={VA[0],Lkey[6:0]}; tag={VA[51:1],Lkey[31:7]}
2	index={VA[1:0],Lkey[5:0]}; tag={VA[51:2],Lkey[31:6]
3	index={VA[2:0],Lkey[4:0]}; tag={VA[51:3],Lkey[31:5]
4	index={VA[3:0],Lkey[3:0]}; tag={VA[51:4],Lkey[31:4]
5	index={VA[4:0],Lkey[2:0]}; tag={VA[51:5],Lkey[31:3]
6	index={VA[5:0],Lkey[1:0]}; tag={VA[51:6],Lkey[31:2]
7	index={VA[6:0],Lkey[0]}; tag={VA[51:7],Lkey[31:1]
8	index={VA[7:0]}; tag={VA[51:8],Lkey[31:0]
9	index={VA[4],Lkey[6:0]}; tag={VA[51:5],VA[3:0],Lkey[31:7]

Table 3 - TPT Mapping Definition (Continued)

Value	Indexing Method
10 (a)	index={VA[5:4],Lkey[5:0]}; tag={VA[51:6],VA[3:0],Lkey[31:6]
11 (b)	index={VA[6:4],Lkey[4:0]}; tag={VA[51:7],VA[3:0],Lkey[31:5]
12 (c)	index={VA[7:4],Lkey[3:0]}; tag={VA[51:8],VA[3:0],Lkey[31:4]
13 (d)	index={VA[8:4],Lkey[2:0]}; tag={VA[51:9],VA[3:0],Lkey[31:3]
14 (e)	index={VA[9:4],Lkey[1:0]}; tag={VA[51:10],VA[3:0],Lkey[31:2]
15 (f)	index={VA[10:4], Lkey[0]}; tag={VA[51:11], VA[3:0],Lkey[31:1]

De-selecting the Auto check box enables you to override the automatic calculation of the value of this field and to manually set the value.

SRQ Support

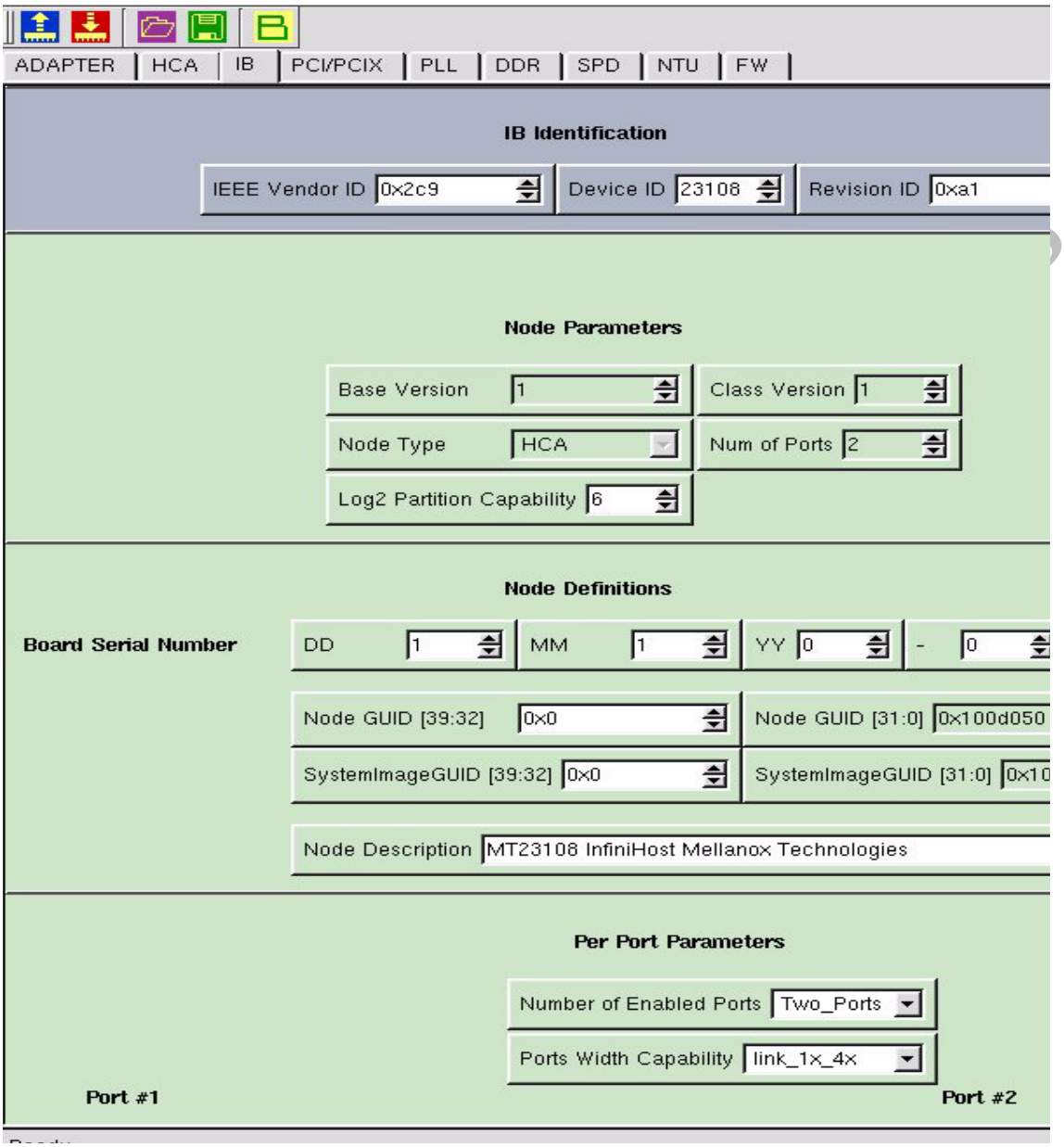
SRQ enable – When selected, enables support for Shared RQs. (Selected by default; enabled with 1024 SRQs.)

Log max SRQ – Log2 of the maximum number of SRQs.

2.3.7 Setting the IB Parameters

The following IB tab enables you to:

- Specify how the InfiniHost HCA identifies itself as an IB node to the Subnet Manager (SM).
- Define the HCA's IB connect capabilities.



This tab enables you to specify the following fields:

IEEE Vendor ID – Mellanox IB Vendor ID. This parameter is part of the Node Information that may be queried by the Subnet Manager (SM).

Device ID – Mellanox IB Device ID. This parameter is part of the Node Information that may be queried by the Subnet Manager (SM).

Revision ID – Mellanox IB Revision ID. The parameter is part of the Node Information that may be queried by the Subnet Manager (SM**).**

Base Version – Supported MAD Base Version. This is a read-only parameter and is part of the Node Information that may be queried by the Subnet Manager (SM).

Node Type – Type defined by IB. This is a read-only parameter and is part of the Node Information that may be queried by the Subnet Manager (SM). (Future revisions will support InfiniHost as a TCA as well, and this parameter will then be read-write).

Log2 Partition Capability – Size of Partition Table that is supported by each port. The maximum number of entries per port in InfiniHost is 64.

Class Version – The supported Subnet Management Class version. This is part of the Node information that may be queried by the Subnet Manager.

Num of ports – The number of ports, determined by the enabling of ports. The parameter is part of the Node Information that may be queried by the Subnet Manager (SM).

Node Definitions – The Node Definitions section of this tab contains the following fields enabling you to specify the definition for this InfiniHost node:

Board Serial Number – This serial number is applicable only for Mellanox boards. The number is the Mellanox Unique board serial number specified on the S/N sticker on the board. This parameter dynamically sets the Node GUID accordingly. The sticker's serial number has the following form:

MT*xxxxxRDDMMYY-num*

where:

xxxxx – The digits of the board ID.

R – The revision ID, denoted by a capital letter.

DD – Date (day of month)

MM – Month

YY –Year

num – Three-digit numeral.

The Board Serial Number section has the following box where you specify these components of the serial number:

DD, **MM**, **YY, dash (-)** ***numeral*** – The date, month, year and numeral listed on the serial number (S/N) sticker attached to the board. For example: for a board with the serial number S/N MT50320C090702-003, specify the following:

DD = 09
MM= 07
YY= 02
-003

NodeGUID – Mellanox IB HCA Node GUID. The parameter is part of the Node Information that may be queried by the Subnet Manager (SM). Vendors using InfiniHost silicon on their own boards may modify this parameter while maintaining the format described next. The format for the GUID is:

CCCC CCEE EEEE EEEE

where:

CCCCCC – The 24-bit field of the company ID (0x002c9 for Mellanox), which is specified in the upper left corner in the IEEE Vendor ID box.

EEEEEEEEEE – The 40-bit field of the extension, which should be unique per company ID. These bits are specified in the following boxes on the tab:

Node GUID[31:0] – The lowest 32 bits of the GUID.

Node GUID [39:32] – The next highest 8 bits of the GUID. (Recall that the highest bits of the GUID are specified in the IEEE Vendor ID box.)

For information about burning the GUID settings to the board, see “To burn the Firmware image to NV Memory (Flash):” on page 59.

> Note: An Auto check box is located next to both the NodeGUID[31:0] and SystemImageGUID[31:0] fields (above and below, respectively). De-selecting this box enables you to override the automatic calculation of the value of this field and to manually set the value.

SystemImageGUID[39:32]
SystemImageGUID[31:0] – Upper and lower 32 bits of SystemImageGUID of NodeInfo. Provides a means for system software to indicate the availability of multiple paths to the same destination via multiple nodes. If you do not want an indication of the node association, set this to zero.

NodeDescription – InfiniHost Node description, which is part of the NodeDescription that may be queried by the Subnet Manager (SM).

The Per Port Parameters section of the tab displays the following parameters for each port:

Number of Enabled Ports – Number of InfiniHost ports enabled.

Port *x* Enabled/Disabled – Enables or disables one of the InfiniHost Ports. The Node information given by the Device (queried by an SM) will reflect the port’s state.

PortGUID – The Port GUID value for each port. The Port GUID is the first entry in the GUID table that each port holds, and may be queried by a Subnet Manager.

> Note: An Auto check box is located next to the fields for the lower 32 bits of the GUID for each port. De-selecting this box enables you to override the automatic calculation of the value of this field and to manually set the value.

Port width cap – PortWidth supported, as defined by the IB specification. Ports may be opened as supporting either 1x, 4x or both.

Tx Polarity – When set, inverts serial input data on Lane X of this port. This is equivalent to flipping the differential input of the SERDES. Each bit relates to Lane *X*, where *X* = 0,1,2,3.

Rx Polarity – When set, inverts serial input data on Lane X of this port. This is equivalent to flipping the differential input of the SERDES. Each bit relates to Lane *X*, where *X* = 0,1,2,3.

TX Lane Reverse – When set, the serial output data on lane X will be reversed on this port.

RX Lane Reverse – When set, the serial input data on lane X will be reversed on this port.

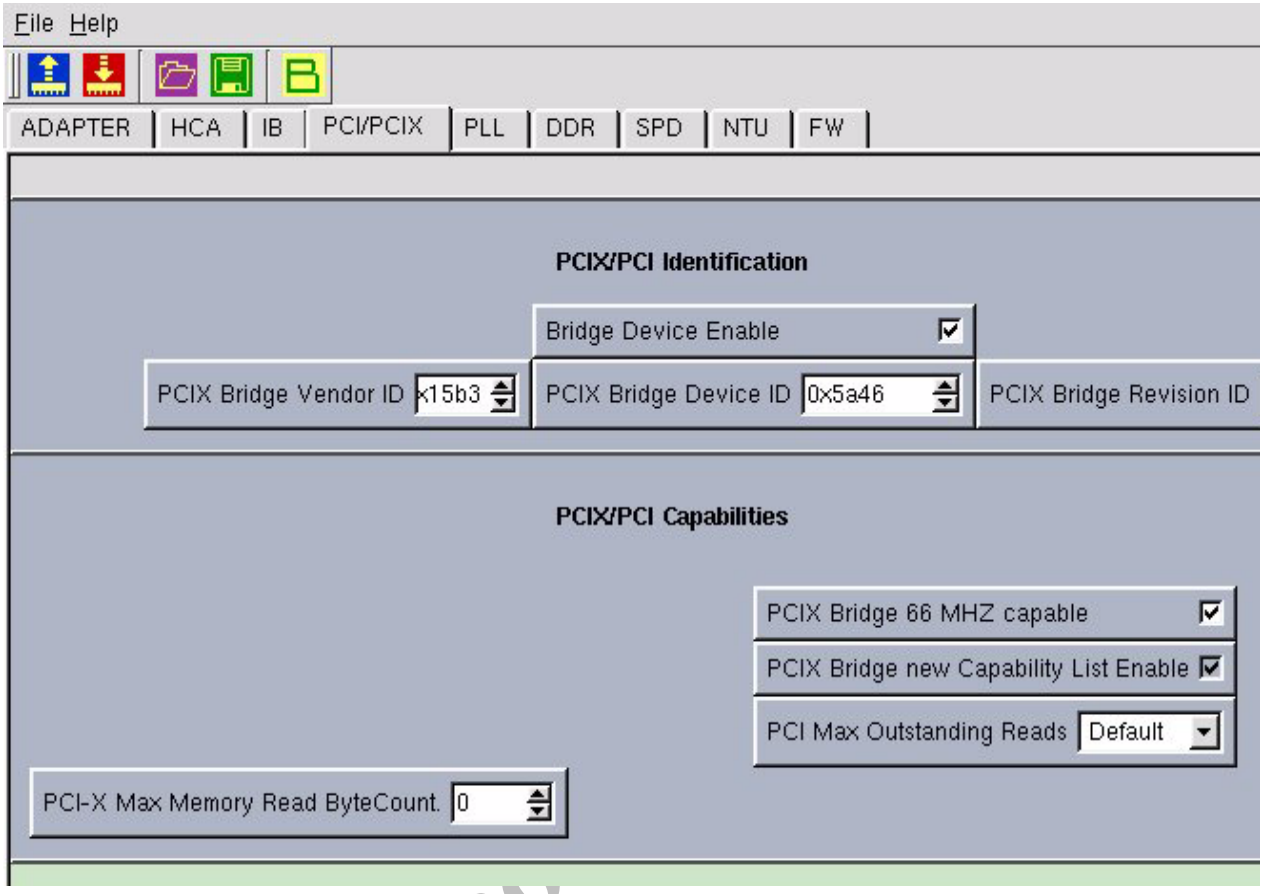
Phy LED GPIO – GPIO number connected to the LED indicating the physical state of the port.

Log LED GPIO – GPIO number connected to the LED indicating the logical state of the port.

Note: if SelfRefresh mode is enabled, GPIO 13 and GPIO 8 cannot be used for the Phy or Log LED entries.

2.3.8 Setting the PCI/PCIX Parameters

The following PCI/PCIX tab enables you to specify how InfiniHost functions with the PCI/PCIX interface and how it reports itself to system sweep.



This tab enables you to specify the following fields:

- The default value of the PCI max Memory read bytecount field has been changed to 0 (reporting 512 byte page size, as per the PCIX specification). A value (4) has been added for backwards compatibility (selecting 4 reports a page size of 4K, and this field is read-only; this previously was default behavior).

PCIX Bridge VendorID – Mellanox Bridge PCIX Vendor ID included in device bridge headers and reported to the system sweep process. Vendors using InfiniHost silicon on their own boards may modify this parameter.

PCIX Bridge Device ID – Mellanox Bridge PCIX Device ID to be presented in the device bridge headers. This parameter may be modified upon a vendor using InfiniHost Silicon on its own board.

PCIX Bridge Revision ID – Mellanox Bridge PCIX Revision ID reported to the system sweep process.

PCIX Bridge 66 MHZ Capable – When selected, reports to system sweep process that the Mellanox HCA handles a frequency of 66MHZ.

PCIX Bridge new capability list enable – Displays whether the new capability list is enabled.

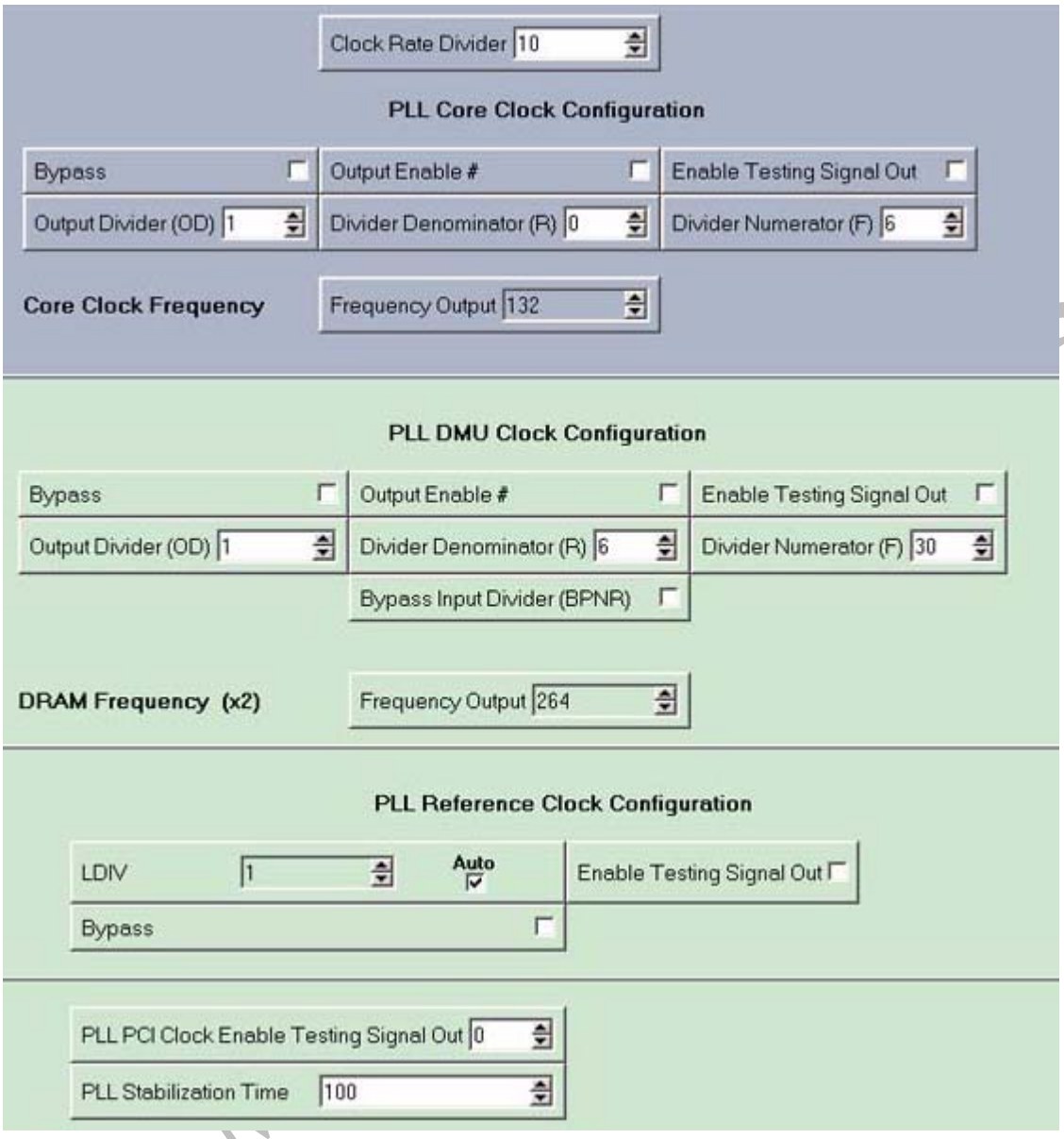
PCIX max outstanding reads on PCI Bridge – Sets the maximum number of read requests that can be outstanding on the PCI/PCIX bridge. It has been observed that most systems work optimally with 2 outstanding reads for PCI and 2 for PCIX. For the ServerWorks PCI chipset (HE/LE), it has been observed that the max outstanding reads for PCI is 1. Default settings will be these optimal values. However, any value may be forcibly set with the InfiniBurn tool by selecting any value other than Default.

Bridge Device Enable – Enables/disables the on-chip PCI bridge. To disable the PCI bridge, do the following:

1. In the HCA tab, modify the LOC2 UAR size parameter so that the size of UAR memory will equal that of the DDR memory. For example, for 256M DDR, set the value to 16 since UAR size is in units of pages, page=4K, 2^16*4K=256M).
2. In the PCI tab, deselect the Bridge Device Enable check box.
3. After burning FW with these options, you must execute a full reboot of the PC.

2.3.9 Setting the PLL Parameters

The following PLL tab enables you to specify the system clock parameters.



This tab enables you to specify the following parameters:

Clock Rate Divider – When EEPROM/Flash is present, this field sets the serial clock rate for reading the remaining part of a PLL configuration record.

The **PLL Core Clock Configuration** section of this tab contains the following fields:

Bypass – When this button is selected, the DDR memory controller clock is bypassed. This is used only in special debug modes.

Output Enable # – When selected, enables core clock output.

Enable Testing Signal Out – When selected, enables testing of the signal output, in order to sample core clock signal on the board through a dedicated pin. The sampled signal is half the output frequency.

Output Divider (OD) – Divider used to calculate board core clock. The default value for this parameter is determined by the Board type selected in the Adapter tab. The value for Cougar and Jaguar boards is 1.

Divider Denominator (R) – Specifies the divider denominator used to calculate the board core clock. The default value for this parameter is determined by the Board type selected in the Adapter tab. The value for Cougar and Jaguar boards is 6.

Divider Numerator (F) – Specifies the divider numerator used to calculate the board core clock. The default value for this parameter is determined by the Board type selected in the Adapter tab. Deselecting the Auto check box disables this default and enables you to set the parameter value. The value for Cougar and Jaguar boards is 36.

Core Clock Frequency Output – Core clock that is used in InfiniHost. The default value for this parameter is determined by the Board type selected in the Adapter tab. The value for Cougar boards is 157; for Jaguar boards, 156.

The **PLL DMU Clock Configuration** section of this tab contains the following fields and buttons:

Bypass – When this button is selected, the DMU clock is bypassed. This is used only in special debug modes.

Output enable – When selected, enables DRAM clock output.

Enable Testing Signal Out – When selected, enables testing of the signal output, in order to sample DMU clock signal on the board through a dedicated pin. The sampled signal is half the output frequency

Output Divider (OD) – Divider used for the calculation of the DMU clock.

Divider Denominator (R) – Divider denominator used for the calculation of the DMU clock.

Divider Numerator (F) – Divider numerator used for the calculation of the DMU clock.

DRAM Clock Frequency Output – The frequency (MHz) of on-board DIMMs. The initial value is 0xffffffff.

The **PLL Reference Clock Configuration** section of this tab contains the following fields and buttons:

LDIV – Sets the ratio between the frequency of the pins of an external reference clock and the SERDES differential clock. The default value for this parameter is determined by the Board type selected in the Adapter tab. Deselecting the Auto check box disables this default and enables you to set the parameter value.

Bypass – When this button is selected, the PLL reference clock is bypassed. This is used only in special debug modes.

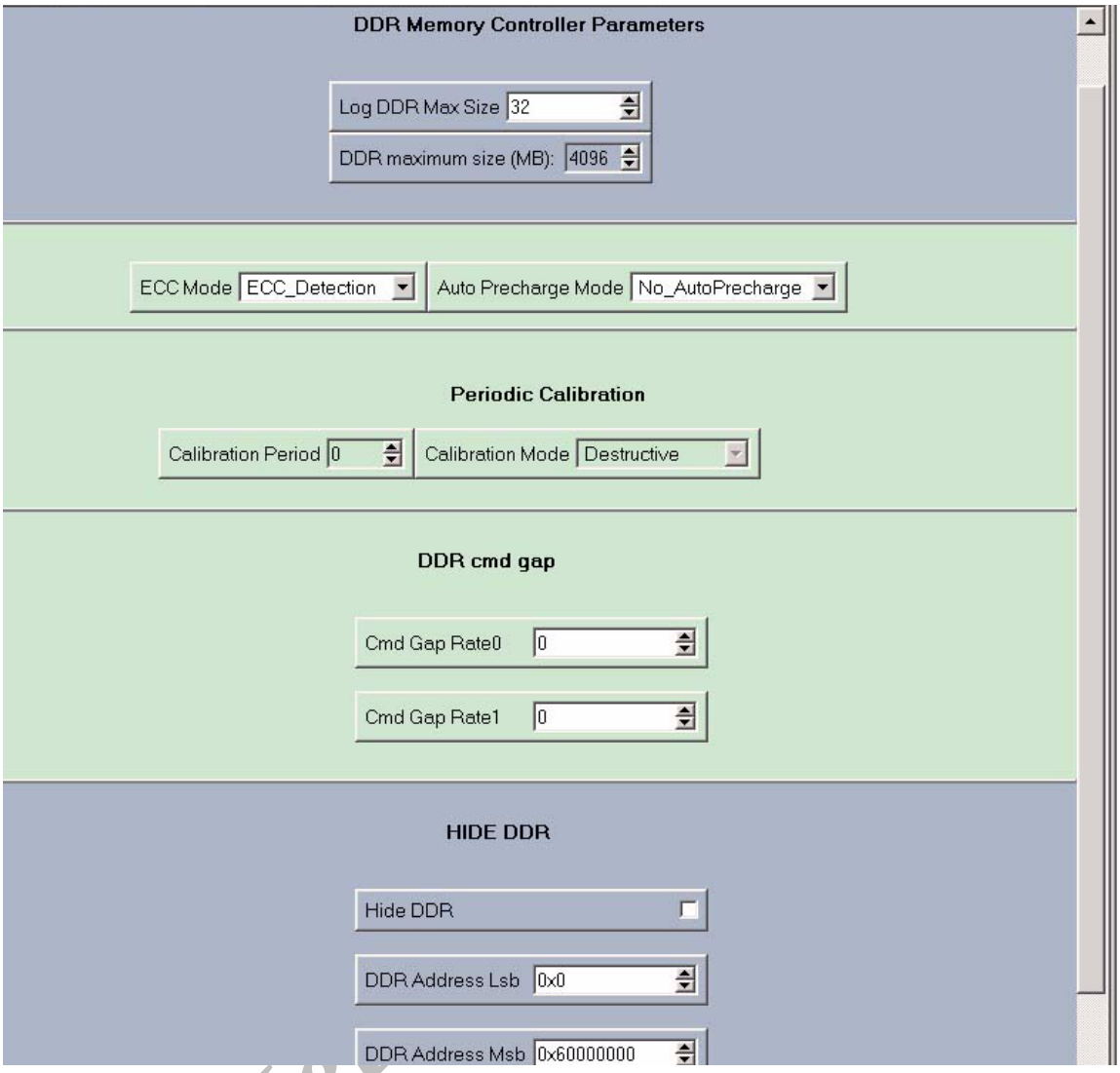
Enable testing signal out – When selected, enables testing of the signal output, in order to sample the PLL reference clock signal on the board through a dedicated pin.

PLL PCI/PCIX Clock Enable Testing Signal Out – When selected, enables testing of the signal output, in order to sample the PLL PCI/PCIX clock signal on the board through a dedicated pin.

PLL Stabilization Time – Specifies the time, in units of external clocks, multiplied by 1024. This is required for stabilizing internal PLLs.

2.3.10 Setting the DDR Parameters

The following DDR tab enables you to define to the InfiniHost device the DDR memory attached to the board.



This tab enables you to specify the following fields:

Log DDR Max Size – Log2 of then maximum size of the DDR.

Note: This parameter enables you to restrict the user to use less memory than the actual size of the DDR.

DDR maximum size (MB) – Translation of DDR maximum size to MB. This field is read-only and is determined by the value specified in the Log DDR Max Size field.

ECC Mode: None/Parity/ECC Correction/ECC Detection – Determines the type of the EEC mode on the board's attached DIMMs.

Auto Precharge Mode – Determines the auto precharge mode.

Calibration Period: in seconds – Periodic calibration time intervals. The value 0 disables it.

Calibration Mode: Destructive/NonDestructive – If periodic calibration is enabled, this is the DIMMs' calibration operating mode.

DDR cmd gap

Cmd Gap Rate0 – Minimum gap (in clocks) between execution of two requests (RD or WR) from the PCI port. This value affects performance.

Cmd Gap Rate1 – Minimum gap (in clocks) between execution of two requests (RD or WR) from the HCA port. This value affects performance.

HIDE DDR – When selected, the InfiniHost DDR is hidden from the system BIOS, and read/write operations must be done through the command interface.

DDR Address Lsb
DDR Address Msb – Least/most significant bits of the specified DDR address space.

Exit SR WAITING PERIOD[DCLK] – Specifies how many dram clocks InfiniHost waits before exiting after Self-Refresh has been activated.

2.3.11 Setting the SPD Parameters

The following SPD (Serial Presence Detect) tab enables you to specify SPD addresses and (optionally) SPD parameters on the Flash memory.

For each DIMM slot address (the Slot # fields at the top of the screen), the following values are available:

0x0 - 0xff: – Valid addresses that will cause reading from the SPD EEPROM via I2C.

Note: In the screen shown below, each slot specifies an address in this range, and the values shown are Mellanox default values.

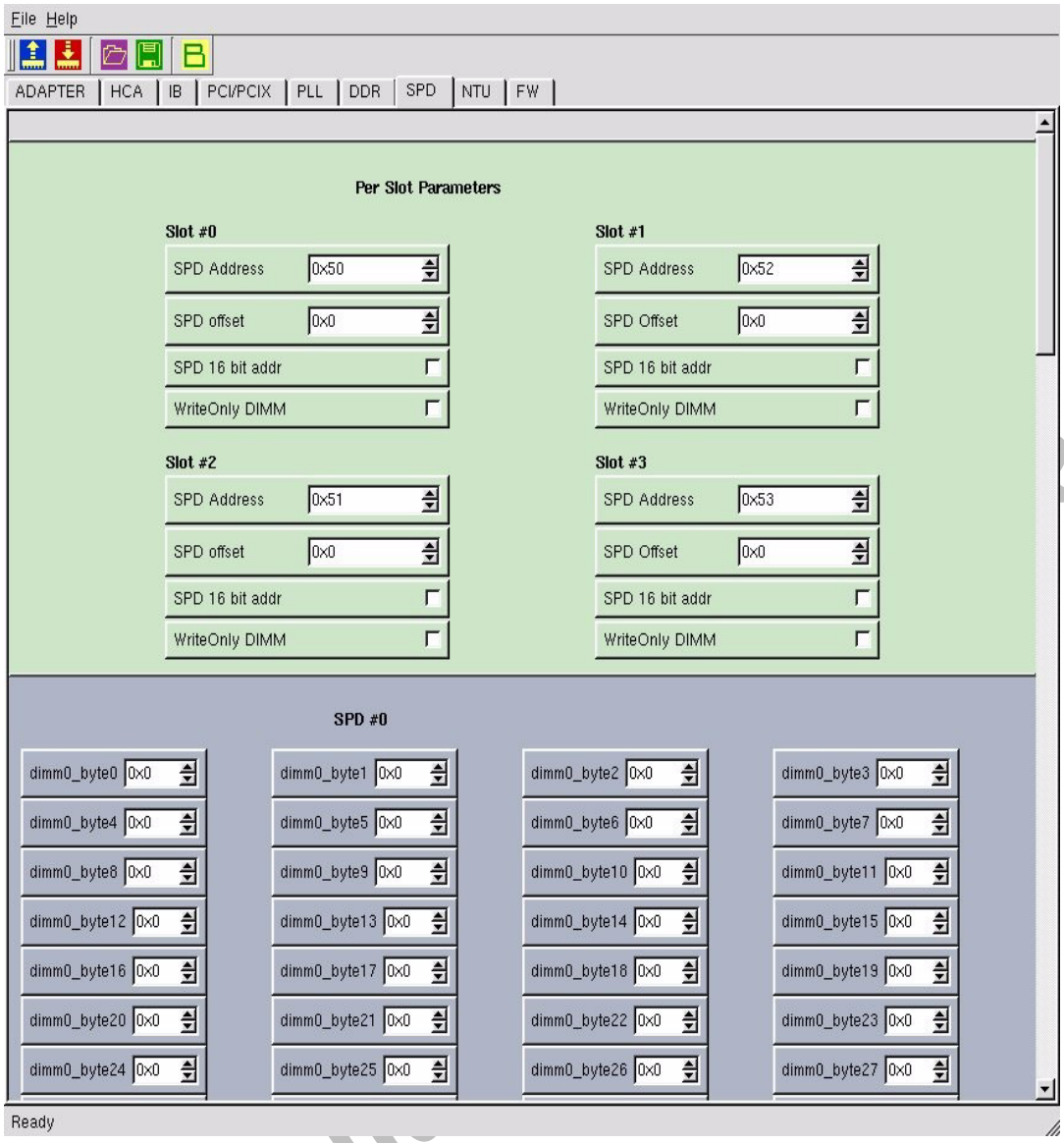
0x100 – Indicates that the DIMM is not present, and therefore no SPD read will be performed.

0x101 – DIMM values will be read from the values manually specified in this tab (64 bytes per DIMM slot).

SPD Offset – Specifies the offset on the EEPROM from which firmware starts to read the SPD.

SPD 16 bit addr – If set, the address of the EEPROM of the SPD is 16 bits.

Write Only DIMM – If set, the DIMM is write only.



The following table summarizes the byte assignments defined in this tab. For detail about these individual bytes, see the JEDC Standard no. 21-C specification available from www.jedec.org.

Table 4 - SPD Table

Byte Number	Function Described
0	Number of Serial PD Bytes written during module production
1	Total number of Bytes in Serial PD device
2	Fundamental Memory Type (FPM, EDO, SDRAM ...)
3	Number of Row Addresses on this assembly
4	Number of Column Addresses on this assembly
5	Number of Physical Banks on DIMM

Table 4 - SPD Table (Continued)

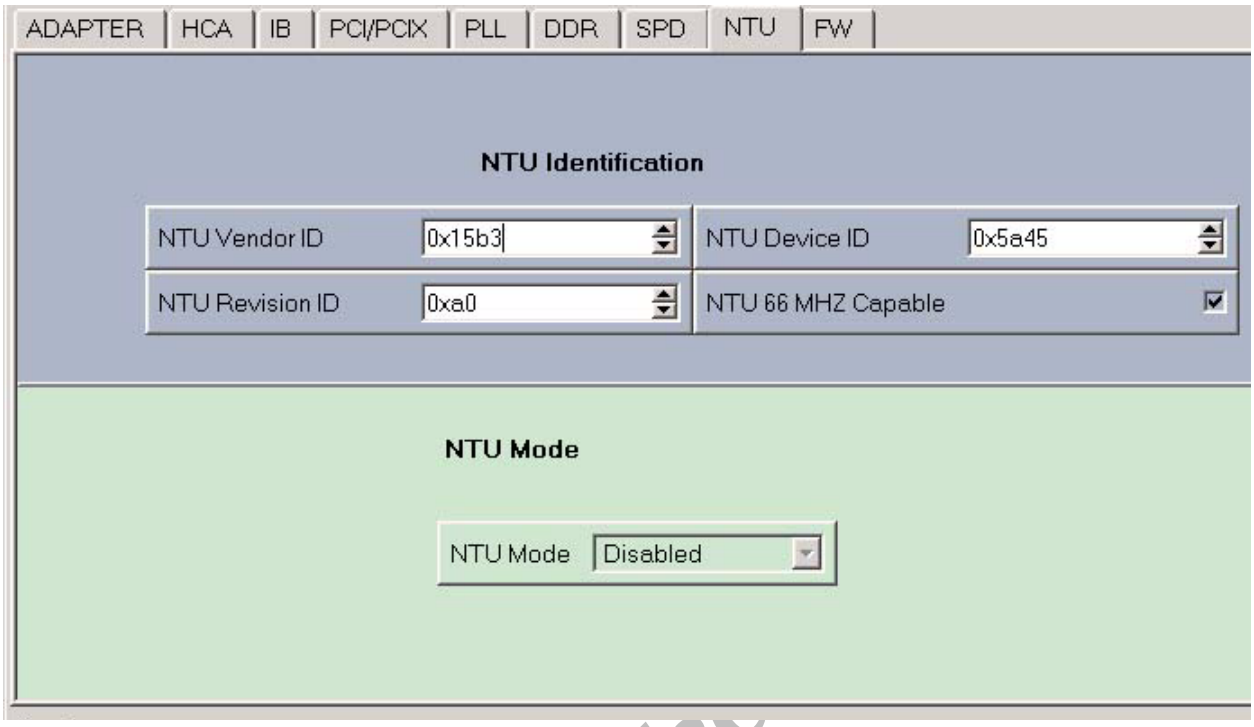
Byte Number	Function Described
6-7	Data WIdth of this assembly
8	Voltage Interface Level of this assembly
9	SDRAM Device Cycle time at Maximum Supported CAS Latency (CL), CL=X
10	SDRAM Device Access from Clock
11	DIMM configuration type (Non-parity, Parity or ECC
12	Refresh Rate/Type
13	Primary SDRAM Width
14	Error Checking SDRAM Width
15	SDRAM Device Attributes: Minimum Clock Delay, Back-to-back Random Column Access
16	SDRAM Device Attributes: Burst Lengths Supported
17	SDRAM Device Attributes: Number of Banks on SDRAM Device
18	SDRAM Device Attributes: CAS Latency
19	SDRAM Device Attributes: Chip Select Latency
20	SDRAM Device Attributes: Write Latency
21	SDRAM Module Attributes:
22	SDRAM Device Attributes: General
23	SDRAM Device Minimum Clock Cycle at CLX-0.5
24	SDRAM Device Maximum Data Access Time (t_{AC}) from clock at CLX-0.5
25	SDRAM Device Minimum CLock Cycle at CLX-1
26	SDRAM Device Maximum Data Access Time (t_{AC}) from Clock at CLX-1
27	SDRAM Device Minimum row Precharge Time (t_{RP})
28	SDRAM Device Minimum Row Active to Row Active delay (t_{RRD})
29	SDRAM Device Minimum RAS to CAS delay (t_{RCD})
30	SDRAM Device Minimum Active to Precharge Time (t_{RAS})
31	Module Bank Density
32	Address and Command Input Setup Time Before Clock
33	Address and Command Input Hold Time After Clock
34	SDRAM Device Data/Data Mask Input Setup Time Before Data Strobe
35	SDRAM Device Data/Data Mask Input Hold Time After Data Strobe
36-40	Reserved for VCSDRAM
41	SDRAM Device Minimum Active to Active/Auto-Refresh (tRC)
42	SDRAM Device Minimum Auto-Refresh to Active/Auto-Refresh (tRFC)
43	SDRAM Device Maximum device cycle time (tCKmax)

Table 4 - SPD Table (Continued)

Byte Number	Function Described
44	SDRAM Device Maximum skew between DQS and DQ signals (tDQSQ)
45	SDRAM Device Maximum Read DataHold Skew Factor (tDQSQ)
46-61	Superset information (may be used in future)
62	SPD Revision
63	Checksum for Bytes 0-62

2.3.12 Setting the NTU Parameters

The following NTU tab enables you to set parameters of an NTU device that InfiniHost incorporates.



This tab enables you to specify the following fields:

NTU Vendor ID - Mellanox Vendor ID to be included in the NTU device headers and reported to the system sweep process. Vendors using InfiniHost silicon on their own boards may modify this parameter.

NTU Device ID – Mellanox Device ID to be included in the NTU device headers and reported to the system sweep process. Vendors using InfiniHost silicon on their own boards may modify this parameter.

NTU Revision ID – Mellanox Revision ID to be included in the NTU device headers and reported to the system sweep process. Vendors using InfiniHost silicon on their own boards may modify this parameter.

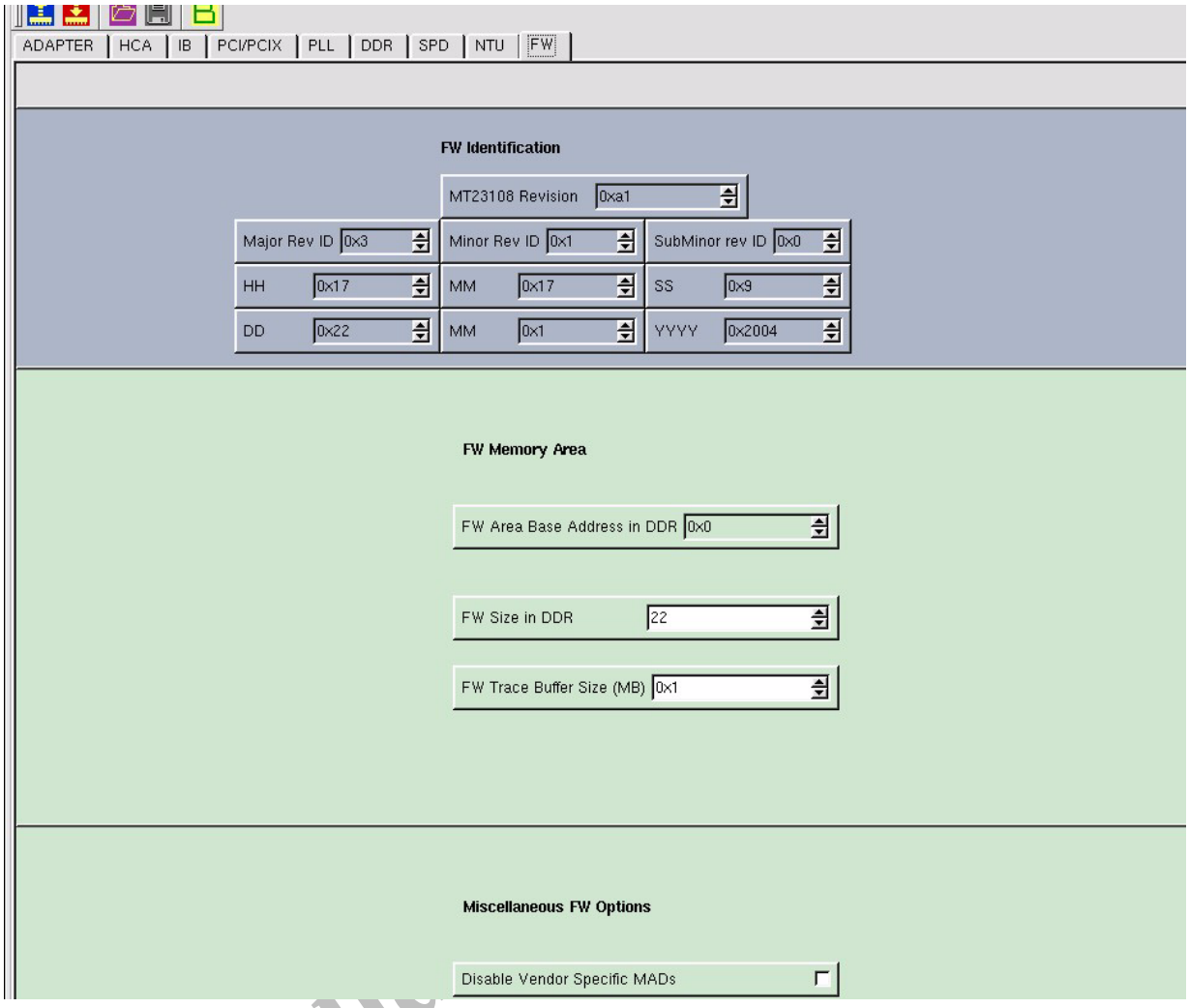
NTU 66 MHZ Capable – When this button is selected, Mellanox NTU support of 66MHz is reported to the system sweep process.

NTU Mode: NTU Disabled/Remote Memory/Transparent P2P – Mode of NTU for using InfiniHost as a PCI/PCIX to IB device for Remote memory access, P2P functionality (primary or transparent).

Note: Not supported in current version.

2.3.13 Setting the FW Parameters

The following FW tab displays the firmware version and specifies the firmware's use of DDR memory.



This tab contains the following fields:

MT23108 Revision – The version of the InfiniHost device this firmware runs on.

RevisionID – Firmware revision ID. This is a read-only parameter specifying the current firmware version.

HH, MM, SS, DD, MM, YYY – Read-only fields displaying the time/date when the firmware was built.

FW Area Base Address in DDR – Base address of the firmware residing in the DDR.

FW Area Length in DDR – Log2 of DDR memory allocated for InfiniHost firmware. A minimum of 4M bytes is required. This area should not be accessed by any external device.

FW Trace Buffer Size (MB) – Trace buffer size for all iRISCs. The trace buffer is divided into six parts - one for each iRISC. The trace buffer resides in DDR memory, and its allocation is in addition to the Firmware required length.

Disable Vendor Specific – Enables/disables vendor-specific MAD support.

2.4 Post-Modification Operations

After you have finished modifying/specifying the firmware parameters, you can carry out one of the following operations for handling the firmware:

- Save to file all the firmware parameters (not only those that have been modified) (page 57).
- Save to file the entire firmware image (page 57).
- Burn to NV Memory the entire image (page 59).

These operations are described in the following sections.

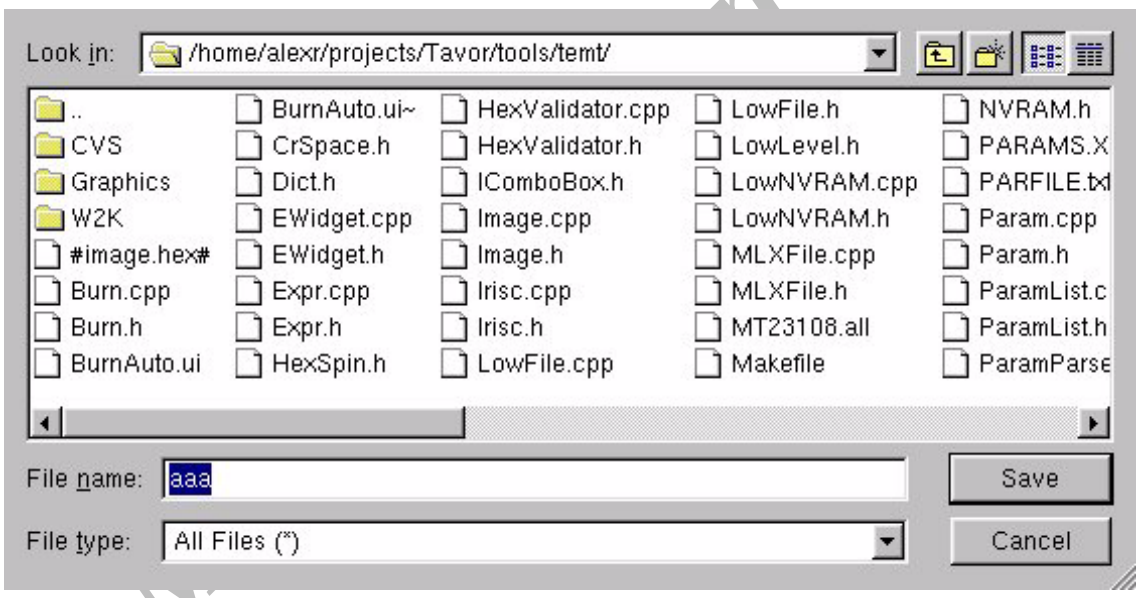
Note: The above operations are enabled only after loading a board definition file.

2.4.1 Saving Firmware Parameters to File

If you want to be able to use the firmware parameters later, and not burn them to the firmware image now, you can save them to a file. You can later load this file to reconfigure the firmware parameters. You may want to do this after installing a new firmware release with a different image; you can use this file with the saved parameters to modify the new image so it includes your parameter specifications.

To save the Firmware parameters to file:

1. From the InfiniBurn tool menu bar, select **File | Save**. This displays the following dialog box:



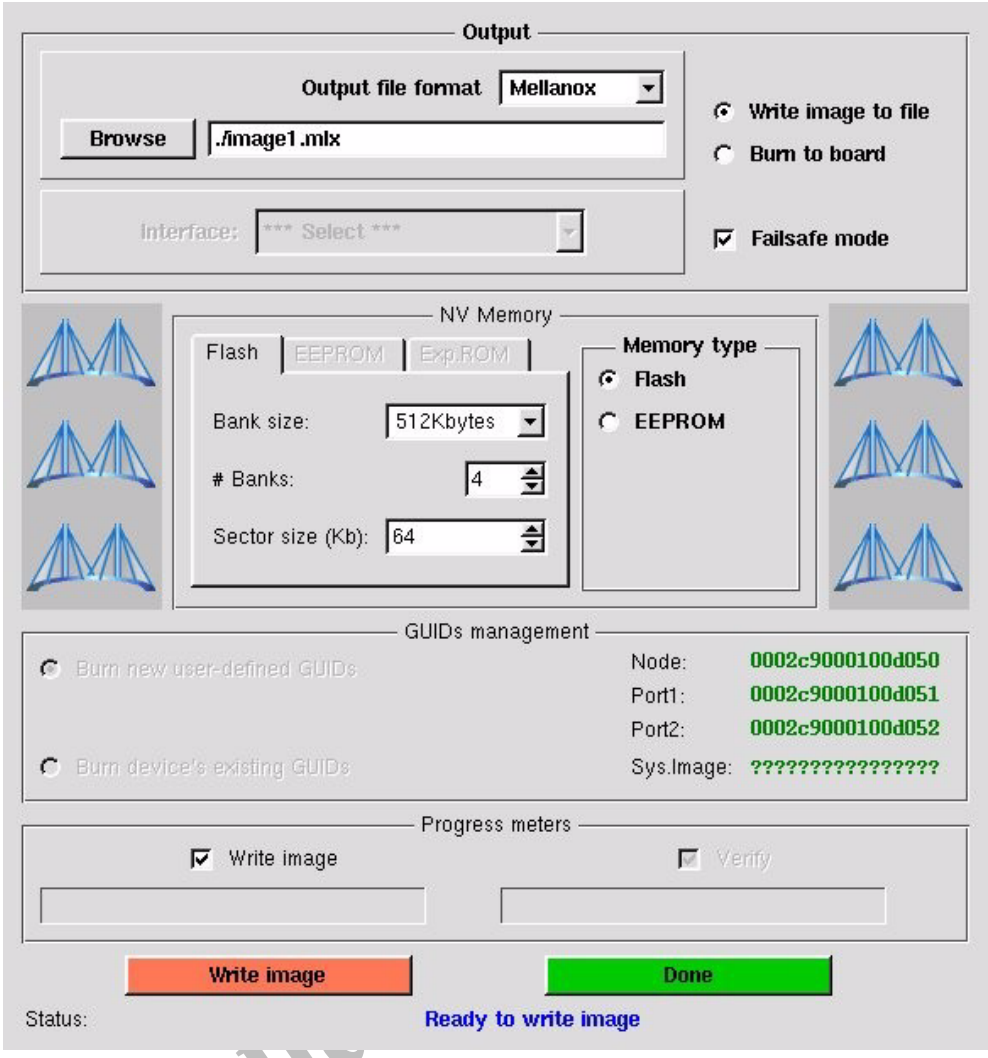
2. Browse to the location where you want the file to reside and type in the filename.
3. Click **Save**.

2.4.2 Saving the Entire Image to File

You can save one basic firmware image file, which includes all your parameter modifications. This image can later be burnt to NV Memory via the InfiniBurn tool or via command line interface.

To save the Firmware image to file:

1. From the InfiniBurn tool menu bar, select **File | Burn/Write**. This displays the following dialog box:



2. Select **Write Image to File**.
3. Select the **Output file format**; The currently supported formats are:
   - Mellanox-proprietary. This format enables you to re-read the file later.
   - RAW binary. Use this format if you plan to use FLINT.
   - Intel Hex
   - Addr/data pairs.

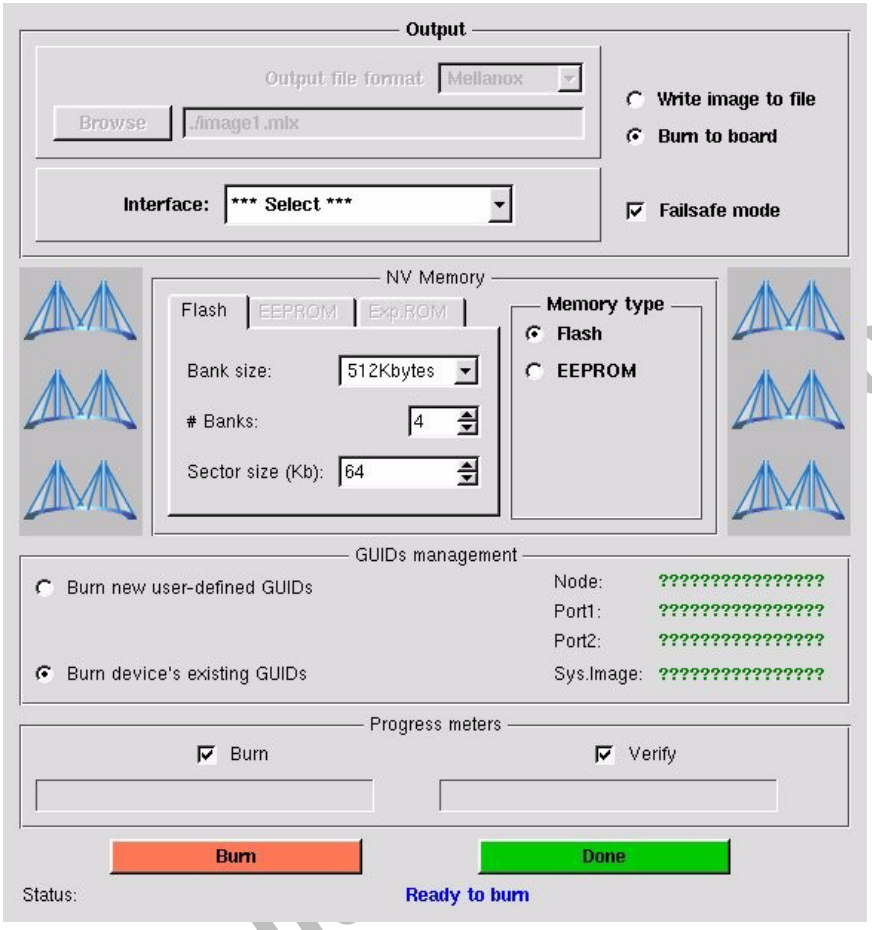
   The output file format is affected by whether or not the **Failsafe mode** check box is selected. Selecting Failsafe mode saves the full failsafe-enabled image, which contains two identical images and some additional data. In Failsafe burning, the two images are programmed in sequence, and the second image is programmed only after the CRC for the first image has been checked. (For complete technical detail about the Failsafe mechanism, see the application note *Programming Flash on InfiniHost*.)
4. Click **Browse** and select an existing file or specify a new file where the image will be saved.
5. Click **Burn**.

2.4.3 Burning the Firmware Image to NV Memory

To complete the configuration of your system and bring InfiniHost to its operational functionality, you can use InfiniBurn to burn the entire firmware image to the NV Memory (Flash) on your board.

To burn the Firmware image to NV Memory (Flash):

1. From the InfiniBurn tool menu bar, select **File | Burn/Write**. This displays the following:



Note: This figure displays the screen of the current release of InfiniBurn. The GUIDs management fields of previous InfiniBurn releases differ from those shown here, as follows:

- The field "Burn new user-defined GUIDs" previously was "Get GUID from previous screen (IB tab)".
- The field "Burn device's existing GUIDs" previously was "Read existing GUIDs from the device".

2. Select **Burn to board**.
3. Select **Failsafe mode** to burn the image using a redundancy mechanism to guarantee the success of writing operations (even in the event of mid-process failure).
4. From the Interface select box, choose the interface through which the firmware is burnt. The options displayed are determined dynamically, according to the board and the jumpers on the board. The list of options may include the following:
   - /dev/mst/mt23198_pci_cr0 – Sets the utility to use PCI memory cycles to directly access the InfiniHost device. In most cases, this is the fastest method for burning the firmware.
   - /dev/mst/mt23108_pciconf0 – Sets the utility to use PCI configuration cycles, rather than using PCI memory, to access the InfiniHost device.

- /dev/mst/calibre – Sets the Calibre board as an I^2C master to access the InfiniHost device, which burns to Flash memory.
- /dev/mst/mt21108_pci_i2cm0 – Sets the system to use the InfiniBridge device as an I^2C master to access the InfiniHost device, which in turn burns to Flash memory.

5. In the Memory Type box, either select Flash or (if you have selected Expansion ROM on the Adapter tab) select the Use Expansion ROM check box in the Exp ROM tab.
6. If Flash, specify the following in the Flash tab:
   - Bank size – of each Flash bank.
   - Number of banks
   - Sector size (kb)
   - Number of EEPROMs
7. If Exp ROM, specify the following in the Exp ROM tab (in addition to the Flash settings, described above):
   - The external file that contains the content for the expansion ROM.
8. In the GUIDs Management box, you can select how InfiniBurn manages GUIDs.
   - To keep the existing GUIDs on the device, select the **Burn device's exisitng GUIDs** check box. InfiniBurn will read the existing GUIDs, and burn them to board again.
     Note: It is possible that GUIDs burned to a board with previous versions of InfiniBurn cannot be burned to board again with this option; attempting to do so may generate an error. If you receive this error, specify the GUID settings in the IB tab and retry this operation. (For more detail about the GUID settings in the IB tab, see "Setting the IB Parameters" on page 40.)
   - To burn to the board GUIDs that have been defined (in the IB tab) but not previously burned to the device, select the **Burn new user-defined GUIDs** check box. (For more detail about the GUID settings in the IB tab, see "Setting the IB Parameters" on page 40.)
9. Optionally, to specify that after the burning is complete, the InfiniBurn tool checks that the image actually matches the one burnt to the board, select the **Verify** check box.
10. Click **Burn**.

3 infinivision Tool

3.1 Supported Platforms

See "Supported Platforms and Operating Systems' (page 13).

3.2 Overview

Mellanox supplies the infinivision tool with the InfiniHost MT23108 device. infinivision provides compact and convenient viewing of the modules, registers and sub-fields accessible from the CR bus. infinivision can be used to directly edit CR values described in the *InfiniHost Programmer's Reference Manual (PRM*), such as host command interface registers.

3.3 Installation and Setup

The InifiniVision tool is part of the InfiniHost Tool Kit package, whose requirements and installation procedure are described in "Mellanox Software Tools (MST) Installation' (page 13).

3.4 Operation

The operations of the infinivision tool are described in the following sections:

- Start the infinivision tool (page 61).
- Select the device interface for accessing the registers of the InfiniHost device (page 62).
- Specify the notation (decimal or hex) infinivision displays (page 63).
- Select a register (page 63).
- Modify register values (page 63).
- Save CR space and other values to an external file (page 64.)
- Monitor fields in the Watch window (page 64)

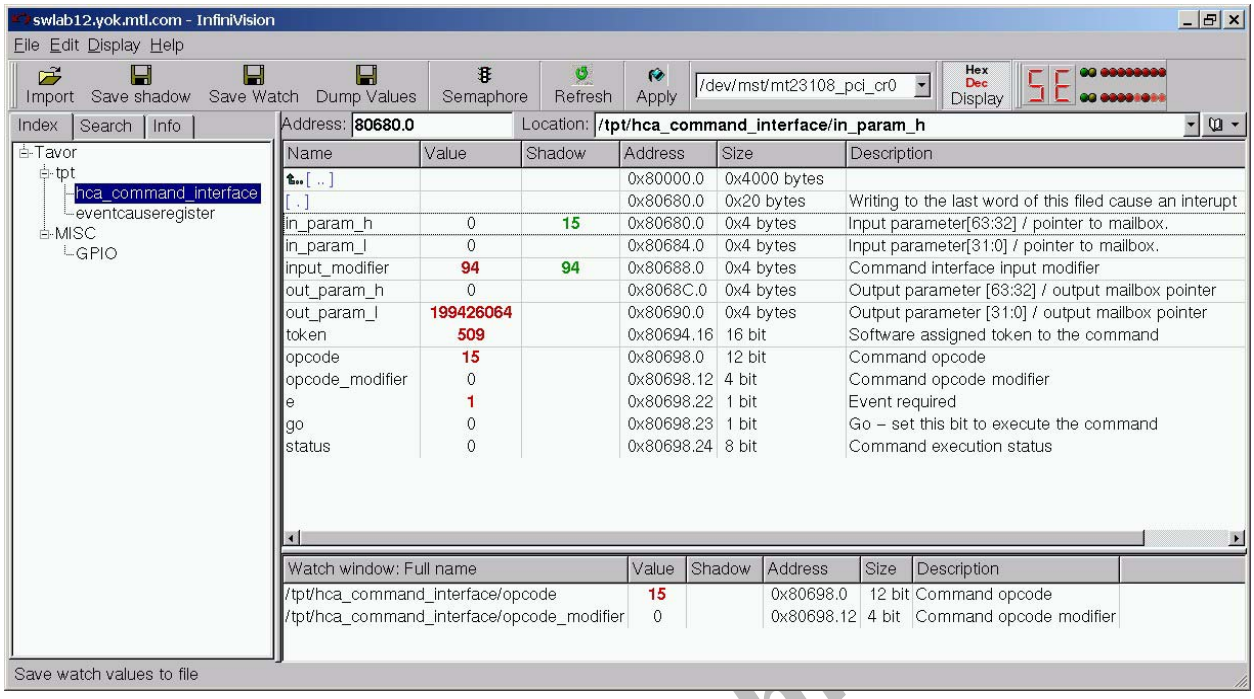
3.4.1 Start the infinivision Tool

The MST driver must be started prior to running infinivision tool. **To start infinivision:**

- Start the MST driver (mst start or mst restart).
- Enter `infinivision` at the command line.

This command displays the following window.

Figure 1: HCA Command Interface



3.4.2 Select the Device Interface to Access the InfiniHost Device

After infinivision has been started, you can select the interface used to access the registers of the InfiniHost device.

To select the device interface to access the device registers:

- From the select box (at the top and center of the window), select the device interface used to access the device registers.

The interfaces available in the select list are determined dynamically by the MST driver. The following interfaces may be available:

- **mtusb –** enables access via the I2C interface.
- **mtusb-1** - an improved version of mtusb.
- **mt23108_pci_cr0** – enables access via the PCI interface
- **mt23108_pciconf0** – enables access via the PCI interface in the case where the on-board EEPROM has intentionally been disabled (EEPROM_disable jumper is set). This is typically done if the firmware image has been serverly corrupted and normal boot is not possible. Before selecting this interface, you need to do the following:

  1. Shut down and disconnect the system.
  2. Remove the Mellanox board.
  3. Connect the GP5 jumper.
  4. Reconnect the board and reboot.

3.4.3 Specify the Notation Displayed

You can set the infinivision graphical interface to display values (in the "Value" and "Shadow" columns) in either decimal or hexadecimal notation, as follows:

To select the notation displayed.

- Click the **Hex Dec Display** button at the top of the window to toggle between decimal and hexadecimal notation for the values listed in the Value and Show columns.

3.4.4 Select a Register

The infinivision tool automatically reads the registers and the fields of the InfiniHost device through the device interface selected. (The procedure to select the device interface is described above, in "Select the Device Interface to Access the InfiniHost Device" on page 62. These registers and their associated fields are displayed in the infinivision navigation pane (on the left side of the screen).

To choose the register and fields you want to read or modify, expand the tree of the navigation pane and select the specific register to display.

To facilitate navigation among the different registers and fields, the infinivision utility includes a bookmark mechanism. Bookmark a particular register and return to the display for this bookmarked register at a later time, as follows:

To create and use bookmarks.

1. While the register to be bookmarked is selected, click the bookmark (book) icon located to the right of the Location list box.
2. Return to a bookmarked register by selecting a bookmark from the drop-down list opened by the arrow next to the bookmark icon.

3.4.5 Modify Register Values

The procedures to set and modify register values involve the "Shadow" mechanism – a buffer storing specified values until they are applied via the Apply button. The main screen of the infinivision interface contains a column labeled "Shadow," where the specified values are displayed in green before they are applied (written) to the register, after which they are displayed in black.

The infinivision utility enables you to view and modify the values assigned to registers and subfields of the InfiniHost device. You can:

- Load the default value of a particular register field to the Shadow column.
- Load the default values for all fields of a register to the Shadow column.
- Load the values from a previously saved file to the Shadow column.
- Modify register values, using the values in the Shadow column.
- Dump all CR space registers to a file.
- Save all Shadow values to a file.

To load to the Shadow column the default value of a particular register field:

1. Place the cursor in the field (the row) whose default value is to be loaded.
2. Right-click and select **Load Default value to Shadow**.
   This writes the value to the Shadow column, where it is displayed in green.

To load to the Shadow column the default values of all the fields of a register:

1. Place the cursor in a field of the register whose default values are to be loaded.
2. Right-click and select **Load ALL default values to Shadow**.
   This writes the values to the Shadow column, where they are is displayed in green.

To load values from a previously saved file to the Shadow column:

1. Place the cursor in a field of the register whose default values are to be loaded.
2. Select File | Import Shadow from the menu bar. This displays the Import Shadow from select box, enabling you to browse to the file (*.temt) you want to import.
3. This writes the values to the Shadow column, where they are is displayed in green.

To modify the values contained in a register.

- Click the Apply button located at the top of the screen.
  This applies the value displayed in the Shadow column to the Value column and writes it to the hardware register. This changes the Shadow column entry to black.

To dump the entire register space to a file.

1. Select the interface for accessing the device registers (as explained above, in “To select the device interface to access the device registers:” on page 62.
2. Select **File | Dump All Values to File** ... This displays the **Select target file for CR** space dialog box.
3. Browse to or type in a file name.
4. Click the Save button.

To save all Shadow values to a file.

1. Select the interface for accessing the device registers (as explained above, in “To select the device interface to access the device registers:” on page 62.
2. Select **File | Save Shadow**... This displays the **Export Shadow by Address** dialog box.
3. Browse to or type in a file name.
4. Click the Save button.

3.4.6 Monitor Fields in the Watch Window

The Watch window of at the bottom of the infinivision screen enables you to monitor fields of different nodes simultaneously. infinivision additionally enables you to set the Watch window automatically to update its display five times a second, and to save the values of the watch window to file.

To display the Watch window:

- Select **Display | Watch** from the menu bar.

To set the Watch window to update its display automatically:

- Select **Display | Watch timer updates** from the menu bar.

To save the watch window values to file:

- Select **File | Save Watch Values to File...** from the menu bar. This displays a dialog box where you specify/browse to the file where the watch values are saved.

To save the watch window Field names to file:

Select **File | Save Watch Configuration to File...** from the menu bar. This displays a dialog box where you specify the name of watch configuration file.

To restore the watch window Fields from file:

Select **File | Restore Watch Configuration from File...** from the menu bar. This displays a dialog box where you specify the name of watch configuration file whose fields you want to monitor.

4 itrace Utility

4.1 Supported Platforms

See "Supported Platforms and Operating Systems' (page 13).

4.2 Overview

The iTrace utility prints trace messages generated by iRISC processors of the InfiniHost device. These trace messages inform developers of software drivers about internal status, events, critical errors, etc., for each iRISC. Trace messages generated by iRISCs are stored in packed format in the trace buffer (usually allocated in DDR).

The iTrace utility both extracts and displays these messages.

iTrace is a command line application, controlled by command line parameters. It prints trace messages in text format to the console.

4.3 Installation and Setup

The iTrace utility is part of the MST toolkit, whose requirements and installation procedure are described in "Mellanox Software Tools (MST) Installation' (page 13).

4.4 Operation

You can run the iTrace utility only after the debug firmware had been loaded and the SYS_ENABLE command had been executed.

> Note: You can execute the "System Enable" command manually, as you may want to do if you want to run iTrace without the driver.
>
> 1. Write 0x00800001 to CR-Space register 0x80698
> This can be done with mwrite, as in the following example:
> **/usr/mst/bin/mwrite /dev/mst/mt23108_pci_cr0 0x80698 0x00800001**
>
> 2. Read the value from same address (0x80698). If you get 1, the SYS.ENA is OK
> This may be done by mread, for example:
> **/usr/mst/bin/mread /dev/mst/mt23108_pci_cr0 0x80698**

The MST driver must be started prior to running iTrace tool. **To start iTrace:**

- Start the MST driver (mst start or mst restart).
- Enter the following command:

```
iTrace [options...] IRISC_NAME
```

where:

IRISC_NAME – is the iRISC whose traces are to be printed. This can be specified once anywhere in the command line as a special option without the leading hyphen. For example:

```
itrace ntu -w
itrace -w ntu
```

iTrace recognizes the following iRISC names:

- exus
- exur
- tcu
- tpt
- qpc
- ntu

[options] can specify any of the following:

-h, --help – Displays help about iTrace usage.

-m, --mask=*TRACE_MASK* – Sets the Trace Mask.

To enable generating trace messages for iRISC, the trace_mask register must be set according to the specifications in the “Driver Debug Hooks” chapter in the *InfiniHost Programmer’s Reference Manual (PRM)*. Setting / clearing bits of the trace_mask register enables/disables generating specific types of trace messages. The `TRACE_MASK` parameter must be a hexadecimal or decimal number and its value will be written into the trace_mask register. Changing trace_mask will not change or remove messages previously stored in the trace buffer, so disabled types of messages still can be displayed by iTrace if they were previously generated.

Example: `itrace exur –m 0xFF0`

```
itrace -m=0xfffffffff tcu
```

This generates output regarding the Sequence numbers, timestamps, and records of operations, such as the following:

```
IRISC Trace Viewer (Mellanox MT23108/InfiniHost, V3.10, Jan 16 2003 15:53:03)
FW Version: 1.0000.18 15/04/2003 10:20:59

(00000001 25b9a565) INFO: receive_ipc from irisc 4 opcode=0x01 #Data-dwords=7
(00000002 25b9a7df) INFO: IPCdata[00]=0x00000000
(00000003 25b9a859) INFO: IPCdata[01]=0x00000000
(00000004 25b9a8d2) INFO: IPCdata[02]=0x00000010
(00000005 25b9a94b) INFO: IPCdata[03]=0x00000000
(00000006 25b9aa0c) INFO: IPCdata[04]=0x00000000
(00000007 25b9aad7) INFO: IPCdata[05]=0x00200f90
(00000008 25b9aba2) INFO: IPCdata[06]=0x00800023
(00000009 25b9b47b) CMD_IF: cmdif_initiator: got command OpCode=0x23 Event? 0. will use
ptr 0x0x11e374 for HCR:
(0000000a 25b9b66a) DEBUG: ...[000]:00000000
(0000000b 25b9b6ec) DEBUG: ...[004]:00000000
(0000000c 25b9b766) DEBUG: ...[008]:00000010
(0000000d 25b9b7df) DEBUG: ...[00c]:00000000
(0000000e 25b9b890) DEBUG: ...[010]:00000000
(0000000f 25b9b95a) DEBUG: ...[014]:00200f90
(00000010 25b9ba25) DEBUG: ...[018]:00800023
(00000011 25b9cc53) CMD_IF: cmdif_committer: CMDIF_DO_CMDPROLOG
(00000012 25b9cedc) CMD_IF: CMD_IF: conf_special_qp:               conf_qp_num=0x10,
```

```
special_qp_num=0x000000
(00000013 25b9dee8) MAD: init_traps for port 1
(00000014 25b9e342) MAD: init_traps for port 2
.
.
.
```

-w, --wait – Runs iTrace in wait mode. iTrace will exit only if you press <Ctrl-C>. This is not the default behavior of iTrace. Without the –w option, iTrace will exit if there have been no new traces in the last 0.5 seconds.

-d, --d=*DEVICE* – Specifies the name of the MST device driver for accessing the cr-space. The default value is: /dev/mst/mt23108_pci_cr0. This option is useful for accessing trace buffers through I2C devices.

To run iTrace via the I2C interface, use this option to specify the following:

--d=*device*, where the *device* is an I2C device (such as InfiniBridge, or Caliber).

--noddr – Sets iTrace not to directly access DDR for reading the trace buffer but to use the NSI Gateway instead. By default, iTrace access DDR directly. If cr-space device specified in the –d parameter is one of the I2C devices, –noddr is switched on.

--no-propel – Sets iTrace not to animate the propeller in wait mode (-w option). By default, animation is enabled.

-v, **--version** – Prints version and exits

-c, **--color** – Enables color in trace output.

-D, **--dump** – Dumps the trace buffer and exits. This option is useful for debugging iTrace – it dumps the contents of the trace buffer in row format.

Note: Typing `--help` at the command line displays manual pages describing the syntax of the iTrace utility.

5 FLINT Utility

5.1 Overview

The FLINT (Flash interface) utility enables you to burn from command line the Flash memory from a binary image (which may be prepared previously with the InfiniBurn tool). The FLINT utility also enables you to execute various operations on Flash memory from the command line. You can read/write specific words from/to Flash memory or change the GUIDs of a binary image previously prepared (with the InfiniBurn utility).

Note:

The FLINT utility does not keep the existing GUID (as does the InfiniBurn tool), which you need to specify. See below, in "Burning the Entire Flash from a Raw Binary Image" on page 73, for the syntax for specifying the GUID.

Burning with the FLINT utility is not Failsafe.

The FLINT utility is supplied with its source code, which can serve as a reference for customer modifications.

5.2 Installation and Setup

The FLINT utility is part of the MST toolkit, whose requirements and installation procedure are described in Mellanox Software Tools (MST) Installation (page 13). The MST installation copies the FLINT tool to /usr/mellanox/bin.

5.3 Usage

```
flint [switches...] <command> [parameters...]
```

5.3.1 Switch Description

-bsn <BSN> - Mellanox Board Serial Number (BSN). Valid BSN format is:
MTxxxxx[-]R[xx]ddmmyy-nnn[-cc]
Commands affected: burn

-d[evice] <device> - Device flash is connected to.
Commands affected: all

-guid <GUID> - Base value for up to 4 GUIDs which are automatically assigned the following values:
guid -> node GUID
guid+1 -> port1
guid+2 -> port2
guid+3 -> system image GUID.
Commands affected: burn

-guids <GUIDs...> - 4 GUIDs must be specified here. These GUIDs will be assigned to: node, port1, port2 and system image GUID respectively.
Commands affected: burn

-h[elp] - Prints this message and exits

-i[mage] <image> - Binary image file.
Commands affected: burn, verify

-nofs - Burn image not in failsafe manner.

-s[ilent] - Do not print burn progress flyer.
Commands affected: burn

-y[es] - Non-interactive mode. Assume the answer "yes" to all questions.
Commands affected: all

-vsd <vendor-specific-data> -A VSD string, composed of up to 208 characters, will be written to the VSD section in the flash. If not specified, the current VSD will be preserved.

-psid <Parameter-Set-ID> - The PSID string, composed of up to 16 characters, indicates the FW parameter which was used for the image generation. If not specified, current PSID will be preserved.

5.4 Operation

The FLINT utility enables you to do the following operations:

- Burn entire flash from raw binary image (page 73).
- Read one dword from flash (page 74).
- Write one dword to flash (page 74).
- Write one dword to flash without sector erase (page 74).
- Erase a sector (page 75).
- Verify entire flash (page 75).
- Query miscellaneous FW and flash parameters (page 75).

The MST driver must be started prior to running flint tool. **To start flint:**

- Start the MST driver (mst start or mst restart).
- Enter the following command:

```
flint -d <device> <command> [parameters...]
```

The following sections provide the command line syntax for each of the FLINT utility operations, together with an example of its use.

5.5 Burning the Entire Flash from a Raw Binary Image

The FLINT utility enables you to burn the Flash from a binary image.

Note: You can prepare this binary image with the InfiniBurn utility, by doing the following in the Output window:

- Select Write image to file.
- Select RAW binary in the Output file format field.
- Click the Write image to file button.

To burn the entire Flash from a raw binary image, use the following command line:

```
flint -d <device> b file [GUID...]
```

where:

device – Device on which the flash is burned.

file – Name of the image file.

GUID (optional) – One or four GUIDs.

If 4 GUIDS are present here, they will be assigned as node, port1, port2 and system image GUIDs, respectively.
If only one GUID is present here, it will be assigned as node GUID. Its values +1, +2 and +3 will be assigned as port1, port2 and system image GUID, respectively.
If nothing is present here - no GUIDs will be changed.

Note: The GUID may be defined as 16-digit hexadecimal numbers with any delimiter between them. If less than 16 digits are provided, leading zeros will be inserted.

Examples:

```
flint -d /dev/mst/mt23108_pci_cr0 b image1.bin 12345678deadbeef
```

This burns flash from the "image1.bin" file, and assigns Node UID to 12345678deadbeef, port1 GUID to 12345678deadbef0, port2 GUID to 12345678deadbef1 and system image GUID to 12345678deadbef12

```
flint -d /dev/mst/mt23108_pci_cr0 b image1.bin 12:34:56:78:de:ad:be:ef
12,34,56,78,de,ad,be,e0 34.56.78.de.ad.be.e2 '56 78 de ad be e5'
```

This burns flash from the "image1.bin" file and assigns Node GUID to 12345678deadbeef, port1 GUID to 12345678deadbee0, port2 GUID to 00345678deadbee2 and system image GUID to 00005678deadbe5

```
flint -d /dev/mst/mt23108_pci_cr0 b image1.bin
```

This burns flash from the "image1.bin" file and does not change GUIDs – i.e., assigns them as they are presented in the image.

5.6 Reading a Word from Flash

To read one dword from Flash memory, use the following command line:

```
flint -d <device> rw addr
```

where:

device – the device the dword is read from.

addr – the address of the word to read.

Example:

```
flint -d /dev/mst/mt23108_pci_cr0 rw 0x20
```

5.7 Writing a dword to Flash

To write one dword to Flash memory, use the following command line:

```
flint -d <device> ww addr data
```

where:

device – the device the dword is written to.

addr – the address of the word to write.

data – the value of the word.

Example:

```
flint -d /dev/mst/mt23108_pci_conf01 ww 0x10008 0x5a445a44
```

5.8 Writing a dword to Flash Without Sector Erase

To write one dword to Flash memory without sector erase , use the following command line:

```
flint -d <device> wwne addr data
```

where:

device – the device the dword is written to.

addr – the address of the word to write.

data – the value of the word.

Example:

```
flint -d /dev/mst/mt23108_pci_cr0 wwne 0x10008 0x5a445a44
```

Note that a result may be dependent on the Flash type. Usually, bitwise and between the specified word and the previous Flash contents will be written to the specified address.

5.9 Erasing a Sector

To erase a sector that contains a specified address, use the following command line:

```
flint -d <device> e addr
```

where:

device – the device the sector is erased from.

addr – the address of a word in the sector that you want to erase.

Example:

```
flint -d /dev/mst/mtusb e 0x1000
```

5.10 Verifying the Entire Flash

To verify the entire Flash, use the following command line:

```
flint -d <device> v
```

where:

device – the device the sector is erased from.

Example:

```
flint -d /dev/mst/mtusb v
```

5.11 Query FW and flash parameters

To query miscellaneous FW and flash parameters, use the following command line:

```
flint -d <device> q
```

where:

device – Device on which the query is run.

Example:

```
flint -d /dev/mst/mt23108_pci_cr0 query
```

6 mstdump Utility

6.1 Overview

The mstdump utility dumps device internal configuration data. The data can be used by mellanox engineers for hardware troubleshooting.

6.2 Installation and Setup

mstdump is part of the MST toolkit, whose requirements and installation procedure are described in Tools Installation (page 14). The installation copies the mstdump utility to /usr/bin.

6.3 Operation

The MST driver must be started prior to running mstdump tool. **To start mstdump:**

- Start the MST driver (mst start or mst restart).
- Enter am mstdump command that complies with the following command syntax:

  mstdump <device file> > <dump file>

Example:

```
[root@swlab20 root]#    mstdump /dev/mst/mt23108_pci_cr0 > mt23108.dmp
```

This dumps the internal configuration data of the device mt23108_pci_cr0 into the file mt23108.dmp.

Part II: InfiniScale III Software Tools and Utilities

The InfiniScale III MT47396 software tool set consists of the following:

7 is3burn EEPROM Management Tool

7.1 Overview

The is3burn tool enables you either to burn a firmware image to the EEPROM residing on your InfiniScale III board or to save an EEPROM image to file for future use.

Prior to running this tool, the MST Driver must be started (mst start or mst restart).

7.2 Syntax

```
is3burn {OPTIONS}
```

The following *OPTIONS* may be specified in an arbitrary order. All options may be used in abbreviated form, but the abbreviation must be unique.

-silent – Print errors only.

-help – Print help message and exit.

-nowarn – Suppress some warnings.

-simulate – Simulate a burn process, but do not actually burn, even when the -burn option is specified.

-noverify – Do not verify EEPROM after burning.

-nofs – Do not create a FailSafe image. If this option is not specified, a FailSafe image is created by default.

-version – Print is3burn version number and exit.

-noread – Do not read image from board in order to obtain GUIDs. By default, the image is read.

-fw <*FW image filename*> – Specify the Mellanox-supplied FW image file.

-conf <*input config file filename*> – Specify user-configureable (.INI) file (See Note 2 below). See Appendix on page 129 for description of initialization file.

-wrconf <*output config file filename*> – Write user-configureable (.INI) file with updated values.

-burn <*device*> – Burn to specified device. The device list can be obtained by running the `MST status` command.

-image <*input EEPROM image filename*> – Specify an input EEPROM image.

-wrimage <*output EEPROM image filename*> – Write an EEPROM image to the specified file.

-reindeer – The target board is MTS2400 (Reindeer).

-format <output EEPROM image format> – Output image format. May be BINARY, DWORDS, or IMAGE. The default is IMAGE.

-*GROUP.PARAM* <*Value*> – Set the value of the specified parameter. Available parameters are determined by the firmware and can be seen in the configuration file generated by the -wrconf command. (See notes below).

Notes:

1. Some parameters of the *-GROUP.PARAM* option will not take effect unless the -noread option is specified. These parameters are *Special.sysimage_GUID, Special.node_descr,* and *Special.Node_GUID*.
2. Command line has higher priority than the initialization file supplied in -conf option. Values given to parameters in command line will override those defined in initialization file.

One of the input files, <*FW image*> or <*input EEPROM image*>, must be specified (but not both of them). According to the type of input file specified, the tool works in one of two modes:

1. <*FW image*> file is specified.
   The is3burn tool reads and parses this image. There are definitions of firmware parameters as well as firmware code itself inside the firmware image. When the firmware image is read and parsed successfully, is3burn may read miscellaneous firmware parameters from the configuration file or command line (miscellaneous options in the form *-GROUP.PARAM <Value>*). The tool modifies firmware accordingly and may burn the resulting firmware image to device (-burn option) or simply dump it to file (-wrimage option). The configuration file (-wrconf option) may also be written.

   Examples:

   ```
   is3burn -fw is3fw.afw -burn /dev/mst/mtusb-1
   ```

   Burns firmware from the is3fw.afw file to a target InfiniScale III device attached to the /dev/mst/mtusb-1 device. Does not modify parameters.

   ```
   is3burn -fw is3fw.afw -wrimage is3fw.img
   ```

   Writes EEPROMs image to file is3fw.img. This file may be used later for burning.

   ```
   is3burn -fw is3fw.afw -wrconf my_conf.ini
   ```

   Reads firmware from the is3fw.afw file and writes parameter initialization information to the my_conf.ini file. The file may be edited by user and used later in is3burn. The initialization file format is described in “.INI File Format” on page 129 in the Appendix.

   ```
   is3burn -fw is3fw.afw -conf my_conf.ini -burn /dev/mst/mtusb-1
   ```

   Reads firmware from the is3fw.afw file, reads user-specific parameter initialization from the file my_conf.ini, and burns the resulting image to a target InfiniScale III device attached to the /dev/mst/mtusb-1 device

   ```
   is3burn -fw is3fw.afw -PLL.PLLStabilizationTime 150 -wrimage is3fw.img
   ```

   Reads firmware from the is3fw.afw file, changes the PLLStabilizationTime value to 150, and writes the EEPROM image to the file is3fw.img.

   ```
   is3burn -fw is3fw.afw -conf my_conf.ini
   -PLL.PLLStabilizationTime 150 -burn /dev/mst/mtusb-1
   ```

   Reads firmware from the is3fw.afw file, reads user-specific parameter initialization from the my_conf.ini file, changes the PLLStabilizationTime value to 150, and burns the resulting image to a target InfiniScale III device attached to the /dev/mst/mtusb-1 device.

2. <input EEPROM image filename> is specified.

   The is3burn tool knows nothing about the details of the firmware image. The only action it takes is to burn the image to the device. The only options that can be used with the -image option are: -silent, -burn, -simulate, -verify.

   Example:

```
is3burn -image is3fw.img -burn /dev/mst/mtusb-1
```

Reads an already compiled image from is3fw.img and burns it to a target InfiniScale III device attached to the /dev/mst/mtusb-1 device.

7.3 The Initialization File

The is3burn tool uses an initialization file. This file can be written automatically (see the -wrconf option), which writes the default parameter values to file, and it can also be modified and read by the is3burn tool (see the -conf option).

It is possible to read in multiple initialization files; thus you can maintain different logical parameter sets.

Note: Each parameter value can be modified also in the -GROUP.PARAMETER command line option.

The structure of the initialization file is described in the Appendix of this document.

8 is3infinivision

8.1 Overview

Mellanox supplies the is3infinivision tool with the InfiniScale III device. is3infinivision provides compact and convenient viewing of the modules, registers and sub-fields accessible from the CR bus. is3infinivision can be used to directly edit CR values described in the *InfiniScale III MT47396 Programmer's Reference Manual (PRM*), such as host command interface registers.

8.2 Operations

The operations of the is3infinivision tool are described in the following sections:

- Start the is3infinivision tool (page 85).
- Select the device interface for accessing the registers of the InfiniScale III device (page 86).
- Specify the notation (decimal or hex) is3infinivision displays (page 86).
- Select a register (page 87).
- Modify register values (page 87).
- Save CR space and other values to an external file (page 88.)
- Monitor fields in the Watch window (page 88)

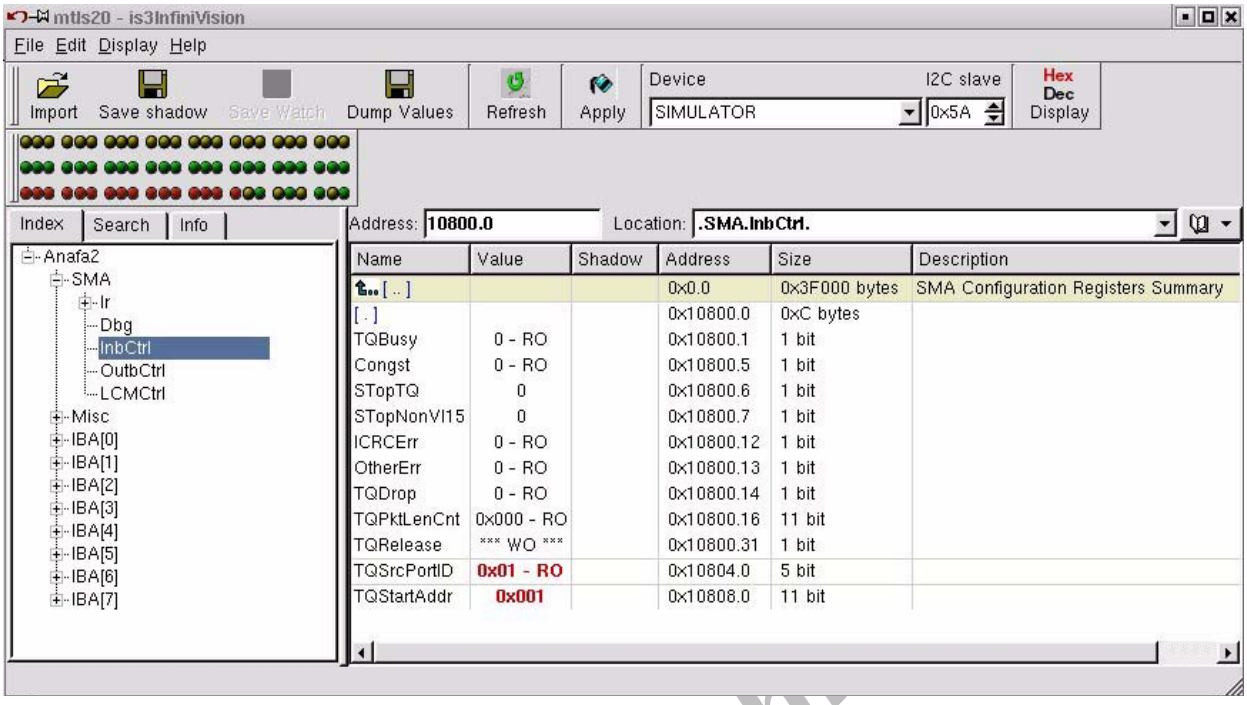
8.2.1 Start the is3infinivision Tool

The MST driver must be started prior to running is3infinivision tool. **To start is3infinivision:**

- Start the MST driver (mst start or mst restart).
- Enter `is3infinivision` at the command line.

This command displays the following window.

Figure 2: HCA Command Interface



8.2.2 Select the Device Interface to Access the InfiniScale III Device

After is3infinivision has been started, you can select the interface used to access the registers of the InfiniScale III device.

To select the device interface to access the device registers:

- From the Device select box (at the top and center of the window), select the device interface used to access the device registers.

The interfaces available in the select list are determined dynamically by the MST driver. The following interfaces may be available:

- **mtusb –** enables access via the I2C interface.
- **mtusb-1** - an improved version of mtusb
- **mt47396_ppc0** – enables access via the PPC interface

8.2.3 Specify the Data Notation Displayed

You can set the is3infinivision graphical interface to display values (in the “Value” and “Shadow” columns) in either decimal or hexadecimal notation, as follows:

To select the data notation displayed.

- Click the **Hex Dec Display** button at the top right of the window to toggle between decimal and hexadecimal notation for the values listed in the Value and Shadow columns.

8.2.4 Select a Register

The is3infinivision tool automatically reads the registers of the InfiniScale III device through the device interface selected. (The procedure to select the device interface is described above, in "Select the Device Interface to Access the InfiniScale III Device" on page 86. These registers are displayed in the is3infinivision navigation pane on the left side of the screen).

To choose the register or register fields you want to read or modify, expand the tree of the navigation pane and select the specific registers to display.

To facilitate navigation among the different registers and fields, the is3infinivision utility includes a bookmark mechanism. Bookmark a particular register and return to the display for this bookmarked register at a later time, as follows:

To create and use bookmarks.

1. While the register/field to be bookmarked is selected, click the bookmark (book) icon located to the right of the Location list box.
2. Return to a bookmarked register by selecting a bookmark from the drop-down list opened by the arrow next to the bookmark icon.

8.2.5 Modify Register Values

The procedures to set and modify register values involve the "Shadow" mechanism – a buffer storing specified values that can be applied via the Apply button. The main screen of the is3infinivision tool contains a column labeled "Shadow," where the specified values are displayed in green before they are applied (written) to the register, after which they are displayed in black.

The is3infinivision tool enables you to view and modify the values assigned to registers and subfields of the InfiniScale III device. You can:

- Load the default value of a particular register field to the Shadow column.
- Load the default values for all fields of a register to the Shadow column.
- Load the values from a previously saved file to the Shadow column.
- Modify register values, using the values in the Shadow column.
- Dump all CR space registers to a file.
- Save all Shadow values to a file.

To load to the Shadow column the default value of a particular register field: 1.

1. Place the cursor in the field (the row) whose default value is to be loaded.
2. Right-click and select **Load Default value to Shadow**.
   This writes the value to the Shadow column, where it is displayed in green.

To load to the Shadow column the default values of all the fields of a register:

1. Place the cursor in a field of the register whose default values are to be loaded.
2. Right-click and select **Load ALL default values to Shadow**.
   This writes the values to the Shadow column, where they are is displayed in green.

To load values from a previously saved file to the Shadow column:

1. Place the cursor in a field of the register whose default values are to be loaded.

2. Select **File | Import Shadow** from the menu bar. This displays the Import Shadow from select box, enabling you to browse to the file (*.temt) you want to import.
3. This writes the values to the Shadow column, where they are is displayed in green.

To modify the values contained in a register:

- Click the Apply button located at the top of the screen.
  This applies the value displayed in the Shadow column to the Value column and writes it to the hardware register. This changes the Shadow column entry to black.

To dump the entire register space to a file:

1. Select the interface for accessing the device registers (as explained above, in “To select the device interface to access the device registers:” on page 86.)
2. Select **File | Dump All Values to File** ... This displays the **Select target file for CR space** dialog box.
3. Browse to or type in a file name.
4. Click the Save button.

To save all Shadow values to a file.

1. Select the interface for accessing the device registers (as explained above, in “To select the device interface to access the device registers:” on page 86.
2. Select **File | Save Shadow**... This displays the **Export Shadow by Address** dialog box.
3. Browse to or type in a file name.
4. Click the Save button.

8.2.6 Monitor Fields in the Watch Window

The Watch window at the bottom of the is3infinivision screen enables you to monitor fields of different nodes simultaneously. is3infinivision additionally enables you to set the Watch window automatically to update its display five times a second, and to save the values of the watch window to file.

To display the Watch window:

- Select **Display | Watch** from the menu bar.

To set the Watch window to update its display automatically:

- Select **Display | Watch timer updates** from the menu bar.

To save the watch window values to file:

- Select **File | Save Watch Values to File...** from the menu bar. This displays a dialog box where you specify/browse to the file where the watch values are saved.

To save the watch window Field names to file:

Select **File | Save Watch Configuration to File...** from the menu bar. This displays a dialog box where you specify the name of watch configuration file.

To restore the watch window Fields from file:

Select **File | Restore Watch Configuration from File...** from the menu bar. This displays a dialog box where you specify the name of watch configuration file whose fields you want to monitor.

9 is3itrace Utility

9.1 Overview

The is3itrace utility prints trace messages generated by iRISC processor of the InfiniScale III device. These trace messages inform developers of software drivers about internal status, events, critical errors, etc. Trace messages generated by the iRISC are stored in packed format in the firmware trace buffer.

The is3itrace utility both extracts and displays these messages.

is3itrace is a command line application, controlled by command line parameters. It prints trace messages in text format to the console.

9.2 Operation

The MST driver must be started prior to running is3itrace tool. **To start is3itrace:**

- Start the MST driver (mst start or mst restart).
- Run is3itrace with the following command line syntax:

  `is3itrace [`*`options`*`...]`

where [*options*] can specify any of the following:

-b, **--behavior**=*BEHAVIOR* – Sets the behavior of is3itrace when the trace buffer is full (0=none, 1=discard new, 2=wait).

-d, --d=*DEVICE* – Specifies the name of the MST device driver for accessing the cr-space. Currently, there is no default device.

This option is useful for accessing trace buffers through I2C devices.

To run is3itrace via the I2C interface, use this option to specify the following:

--d=*device*, where the *device* is an I2C device (such as InfiniBridge, or Caliber). (You can additionally use the --i2c option, described below).

-D, **--dump** – Dumps the trace buffer and exits. This option is useful for debugging is3itrace – it dumps the contents of the trace buffer in row format.

-e, --error=*ERRORL* – Sets the maximum level of the error messages generated by the firmware.

-f, --**hashfile**=***HASHFILE*** – itrace format strings file (default: ir-objs/hashfile)

-h, --help – Displays help about is3itrace usage.

--i2c=***I2C_SLAVE*** – Sets i2c_slave address. InfiniScale III default: 0x51

-m, --mask=*TRACE_MASK* – Sets the Trace Mask.

Setting /clearing bits of the trace_mask register enables/disables generating specific types of trace messages. The `TRACE_MASK` parameter must be a hexadecimal or decimal number and its value will be written into the

trace_mask register. Changing trace_mask will not change or remove messages previously stored in the trace buffer, so disabled types of messages still can be displayed by is3itrace if they were previously generated.

Example: `is3itrace –m 0xFF0`

`is3itrace -m=0xffffffff`

This generates output regarding the Sequence numbers, timestamps, and records of operations, such as the following:

```
IRISC Trace Viewer (Mellanox MT47396/InfiniScale III, V3.0, Oct 13 2003 12:29:22)
FW Version: 0.0000.0 00/00/00 0:0:0

1  1454a050:  uitrace.c:86      :Initial itrace message 1 2 3
2  1454a0e4:  boot2.c:546     :Welcome to boot2
3  145da209:  load_sections.c:409     :Starting load section code
4  145e1b20:  load_sections.c:531     :Special Structures section
5  145e1c39:  load_sections.c:271     :Struct ID 1 - System Image GUID
6  145e1e17:  load_sections.c:280     :Struct ID 2 - Node Description
7  145e26d5:  load_sections.c:289     :Struct ID 3 - Board ID
8  145e27dc:  load_sections.c:271     :Struct ID 1 - System Image GUID
9  145e29c9:  load_sections.c:389     :Unknown special structure type 0
10  145e3ee6:  load_sections.c:449     :Address-Data pairs section
11  145e66d4:  load_sections.c:465     :Block Initialization section.
                                        Addr = 0x3f804, Size = 32 bytes  , 8 dwords
12  145f45cc:  load_sections.c:497     :Read-Modify-Write section
13  14678e26:  load_sections.c:465     :Block Initialization section. Addr = 0x20000,
                                        Size = 73444 bytes  , 18361 dwords
14  157e75ed:  load_sections.c:525     :Jump-Address section.
                                        Jump Address = 0x20000020
15  157e857a:  load_sections.c:538     :Section Loader reached Last Data Record
.
.
```

-n, **--start**=START_NO or **--start**=now. Sets first message number to display.

--no-propel – Eliminates the activity display (propeller) in wait mode (-w option). By default, animation is enabled.

-t, --trace=*TRACEL* – Sets the maximum level of the trace messages to be generated by the firmware.

-v, **--version** – Prints version and exits.

-w, --wait – Runs is3itrace in wait mode. is3itrace will exit only if you press <Ctrl-C>. This is not the default behavior of is3itrace. Without the –w option, is3itrace will exit if there have been no new traces in the last 0.5 seconds.

10 i2c Utility

10.1 Overview

The i2c utility provides low level access to the I2C bus on MTEK43132-M16-5 (Gnu) and MTEK43132-M96-2P (Gazelle) switch platforms, enabling you to read or write data.

10.2 Installation and Setup

The i2c utility is part of the MST toolkit, whose requirements and installation procedure are described in Tools Installation (page 14).

10.3 Operation

The MST driver must be started prior to running i2c tool. **To start i2c:**

- Start the MST driver (mst start or mst restart).
- Run i2c with the following command line syntax:

  `i2c [OPTIONS] <device> <cmd> <i2c_addr> <addr> [<data>]`

where `[OPTIONS]` can be the following:

`-h` – Prints this message.

`-a` <***addr_width***> – Sets address width (in bytes) to the specified value. May be 0, 1, 2 or 4. Default is 1.

`-d` <***data_width***> – Sets data width (in bytes) to the specified value. May be 1, 2 or 4. Default is 1.

`-x <data_len>` – Presents each byte of data as two hexadecimal digits (such as 013C20343B). Note that this option is mutually exclusive with the "-d" option.

The remaining parameters are:

<***device***> – Valid MST device.

<*cmd*> – Command. May be "r[ead]" or "w[rite]".

<*i2c_addr*> – I2C slave address.

<***addr***> – Address (of length *addr_width*) inside I2C target device to read/write operation.

<***data***> – Data (bytes of length *data_width*) to write to target device.

Note that <*addr*> value is ignored if <*addr_witdh*> == 0

All parameters are interpreted as hexadecimal values. The application return code is zero only when read/write was successfully completed.

Examples:

1. Read two bytes from address 0 of target I2C device at address 0x50:

```
> i2c -a 1 -d 2 /dev/mst/calibre r 0x50 0x00
0000
```

2. Write two bytes to the address above then read them:

```
> i2c -a 1 -d 2 /dev/mst/calibre w 0x50 0x00 0x1234
> i2c -a 1 -d 2 /dev/mst/calibre r 0x50 0x00
3412
```

3. Read (as separate) 16 bytes in hexadecimal format starting from address 0 of the target device above:

```
> i2c -a 1 -x 16 /dev/mst/calibre r 0x50 0x00
12340000000000000000000000000000
```

11 isw Utility

11.1 Overview

The isw utility provides access, via the I2C MST device, to one of the boards/chips on the MTEK43132-M96-2P/ MTEK43132-M16-S (Gazelle/Gnu) switch platforms. You use this utility to connect to a device on a Leaf or Spine board of the switch platform, after which you can run the other tools affecting devices, such as:

- adevmon: Device Monitoring Utility (page 115)
- EMT Tool (page 99)
- eburn Utility (page 117)

11.2 Installation and Setup

The isw utility is part of the MST toolkit, whose requirements and installation procedure are described in Tools Installation (page 14).

11.3 Operation

The MST driver must be started prior to running isw tool. **To start isw:**

- Start the MST driver (mst start or mst restart).
- Run isw with the following command line syntax:

  `isw` [*OPTIONS*] <*DEVICE*> <*TARGET*>

where [OPTIONS] are:

`-gazelle` – Board type is MTEK43132-M96-2P (Gazelle). This is the default.

`-ch` – Uses chassis access I2C bridges (MTEK43132-M96-2P; Gazelle only).

`-gnu` – Board type is MTEK43132-M16-S (Gnu).

`-leaf` – Board type is standalone MTEK43132-MSX12-4x (LEAF).

`-spine` – Board type is standalone MTEK43132-SP8 (SPINE).

`-h` – Prints this message.

`DEVICE` – A valid MST device.

- ***TARGET*** – For the MTEK43132-M96-2P (Gazelle) board, this should be in the format <*BRD*><*CHIP*>|`CH`, where:

  <*BRD*> is a board ID, such as L1-L12 or S1-S6 or PS (Power supply)
  <*CHIP*> is a chip ID, such as A1-A7 (InfiniScale 1-7)
  CH represents Chassis).
  Note that if BRD is PS, no CHP is required.

For an MTEK43132-M16-S (GNU) board, TARGET is simply the CHIP definition (A1-A7).

Examples:

```
isw /dev/mst/calibre          L1A3
isw /dev/mst/calibre          L2A7
isw /dev/mst/calibre          S3A2
isw /dev/mst/mtusb            L4CH
isw /dev/mst/mtusb            mtusbPS
isw -gnu /dev/mst/mtusb       A4
```

Part III: InfiniScale Mellanox Software Tools (isMST) and Utilities

The InfiniScale MT43132 software tool set (isMST) contains the following:

- "EMT Tool' (page 99)
- "adevmon: Device Monitoring Utility' (page 115)
- "eburn Utility' (page 117)
- "gz_burn Utility' (page 119)

In addition to the tools listed above, isMST also includes the following two tools which have been presented in Part II of this book as part of the is3MST tool set:

- "i2c Utility' (page 93)
- "isw Utility' (page 95)

12 EMT Tool

12.1 Overview

This chapter describes the Mellanox EEPROM Management Tool (EMT). EMT enables you to burn Firmware and its default boot-time configuration to the EEPROMs residing on boards hosting Mellanox InfiniScale and InfiniBridge devices. EMT also enables you to prepare an image that you can save and later burn to the EEPROM via the command line.

You can use EMT for burning Firmware via the following interfaces:

- **PCI**
- **I^2C** – CALIBRE ISA I^2C Card
- **USB I^2C**

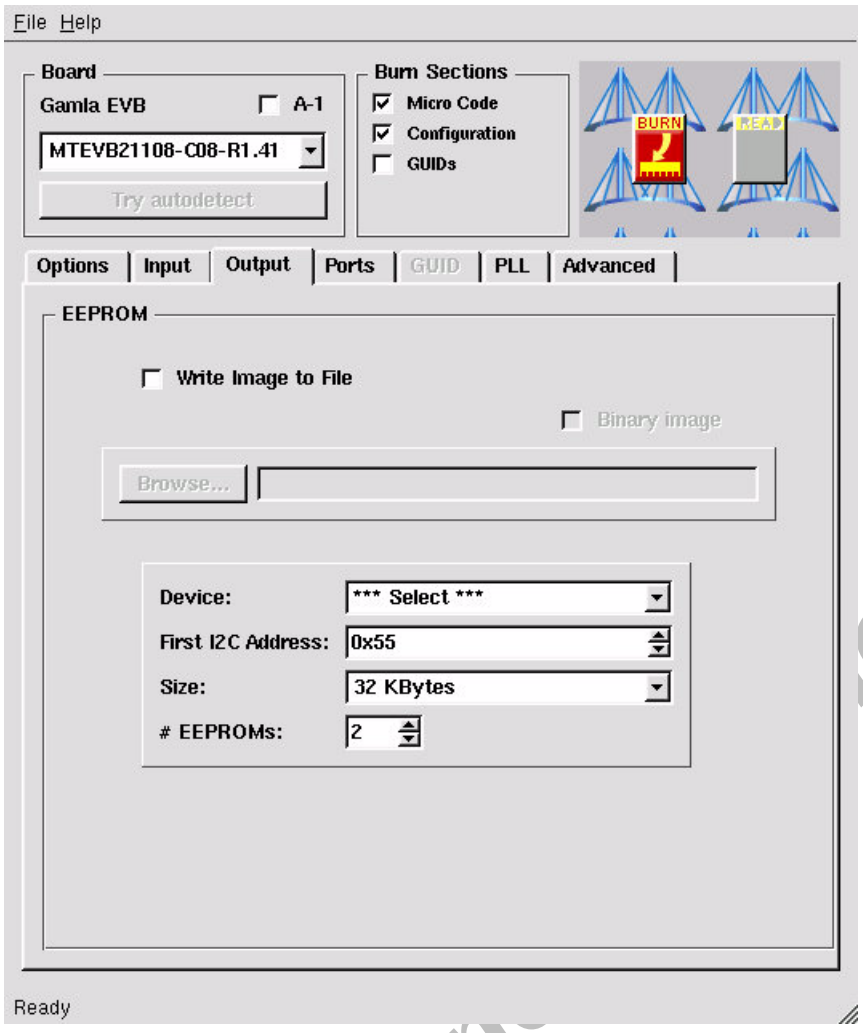
The support for these interfaces on the supported operating systems is described in Section 12.3, "Selecting the Type of Board," on page 100.

12.2 Starting the EMT Tool

The MST driver must be started prior to running EMT tool. **To start EMT:**

- Start the MST driver (mst start or mst restart).
- Enter `EMT` at the command line.

Upon starting, the EMT utility displays the following initial **EMT – EEPROM Manager Tool** window:

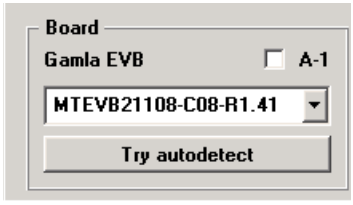


12.3 Selecting the Type of Board

The EMT utility enables you to select the board to whose EEPROMs you want to burn the Firmware.

The upper left corner of the main window of EMT contains the following Board frame, enabling you to choose (from a list of supported boards) the board where you want to burn the Firmware.

Note: JNI's MT21108 (GAMLA) board is also supported. (For information about the default configuration of this board, see "JNI MT21108 Board: Default Configuration" on page 113.).



To select the board to which EMT burns the firmware:

1. From the select box, choose the board.
   – ***or*** –
   Click **Try autodetect** to automatically detect and select the board where the firmware will be burned.
2. From the Board frame (shown above) located at the top of the main window, choose the board where you want to burn the firmware.

The A-1 check box indicates which version of the InfiniBridge (Gamla) MT21108 device is included with this board. If the box is checked, the board is using the most current version of the InfiniBridge device; if the box is not checked, the board includes a previous version of the device.

12.4 Selecting Parts of the EEPROM to Burn

EMT enables you to burn only selected parts of an EEPROM while leaving other parameters unchanged. You can select the parts you want to change in the Burn Sections frame of the EMT interface, located to the right of the Board frame.

To select the parts of the EEPROM to change:

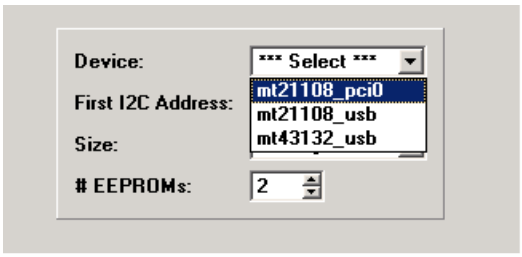
- In the following Burn Sections frame, select the sections of the EEPROM you want to change.

Each of the three options has its own configuration tab that is enabled only when its corresponding option is selected.

- Selecting **Micro Code** enables the Input tab, where you specify the Ucode and configuration files that EMT burns to the EEPROMs or saves to file. This tab and its operations are described in Section 12.6, "Selecting the Firmware that Is Burned to EEPROMs," on page 103
- Selecting **Configuration** enables the Options tab, where you set the operational mode of the device to which you are burning the firmware. This tab and its operations are described in Section 12.7, "Selecting the Operational Mode of the Device," on page 105.
- Selecting **GUID** enables the GUID tab, where you configure/change the board's GUID. This tab and its options are described in Section 12.8, "Configuring the GUID of the Board," on page 109.

12.5 Selecting the Interface for Burning the EEPROM

In the following section of the Options tab (of the main EMT window), you can select the interface EMT uses to burn the EEPROM:

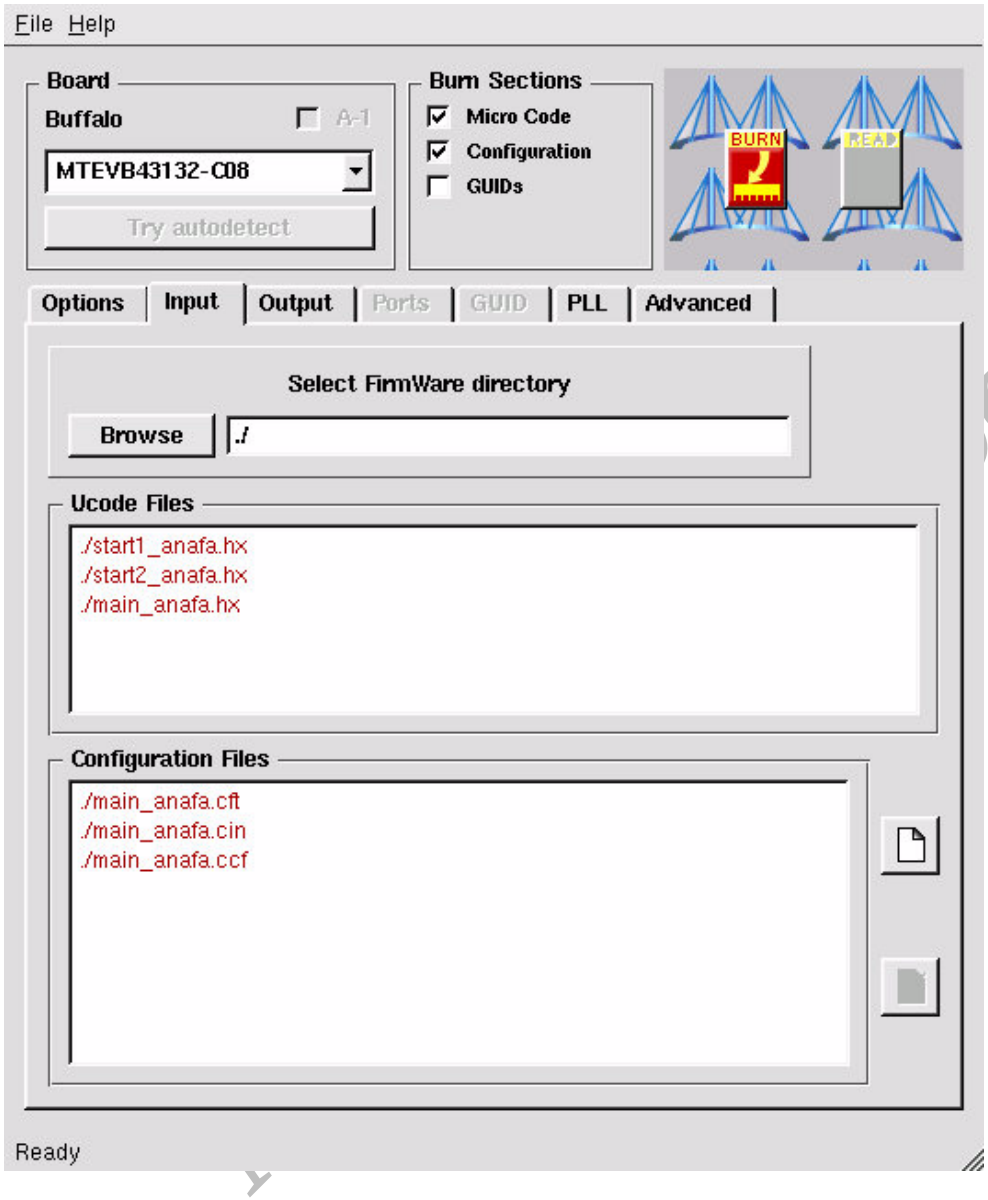


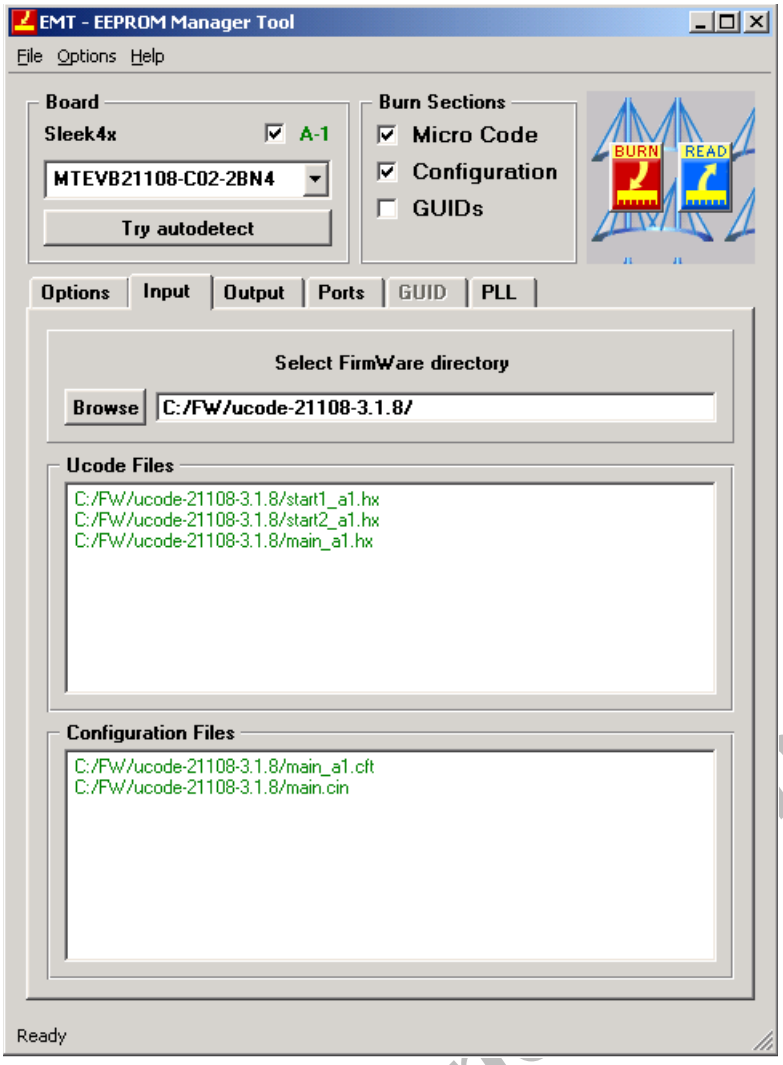
These boxes and fields enable you to specify the following:

- **Device** – Displays a list of interfaces through which EMT can carry out the burning process.
- **First I^2C Address** – The address of the EEPROM on the I2C bus.
- **Size** – The size of the EEPROM on the board.
- # EEPROMS – The number of EEPROMs to which EMT burns the firmware.

12.6 Selecting the Firmware that Is Burned to EEPROMs

The following Input tab defines the Ucode and Configuration files constituting the Firmware that EMT burns to the EEPROMs or saves to file:





These files are chosen automatically by EMT once the board type is selected in the Board frame.

> Note: If the files are displayed in green, EMT has found them in their default location. If the files are displayed in red, EMT has not located them. All the files must reside in the same directory and you must browse (via the Browse button) to the files' location.

12.6.1 Saving the Firmware to File

After you have specified the Firmware that you want to burn to the EEPROM, EMT enables you to save the Firmware to an image on a file that you can burn to a target EEPROM later, via the command interface. Burning the saved Firmware image via the command interface is described in "Running the EMT Command Line" on page 113.

To save the firmware to file:

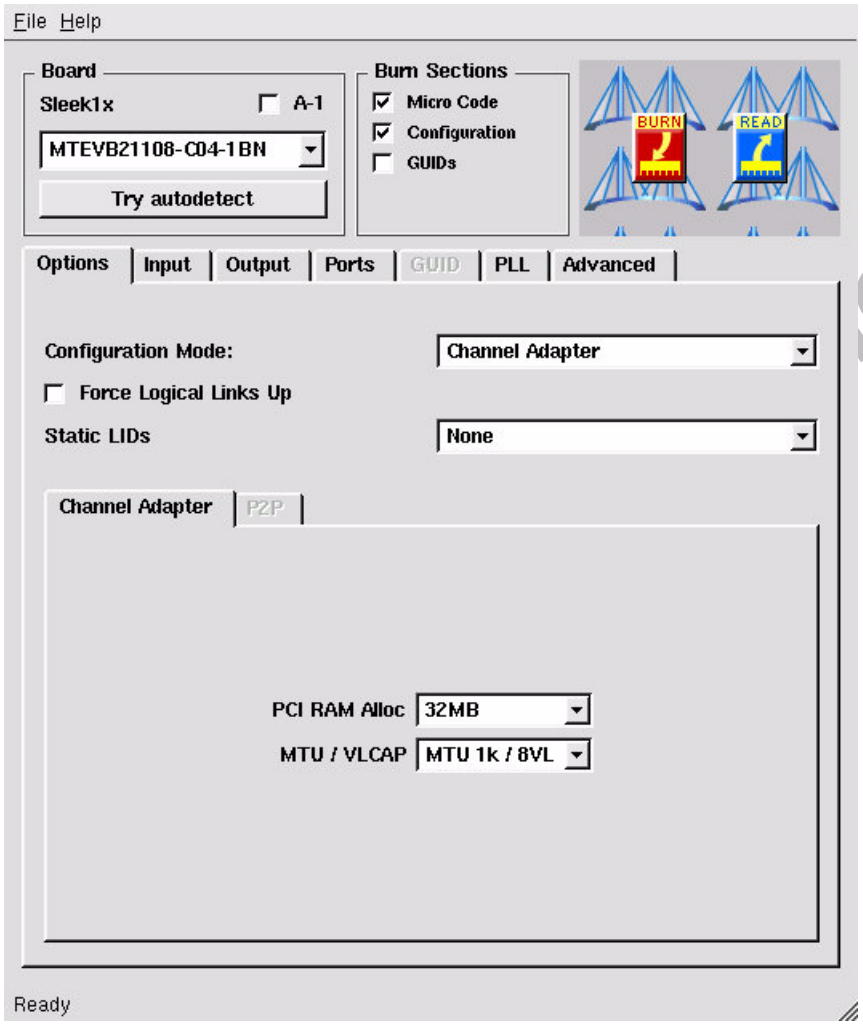
1. Select the Write Image to File check box, located near the top of the Output tab of the main EMT window.
2. Click the Browse button and specify the name and location where this file will reside.

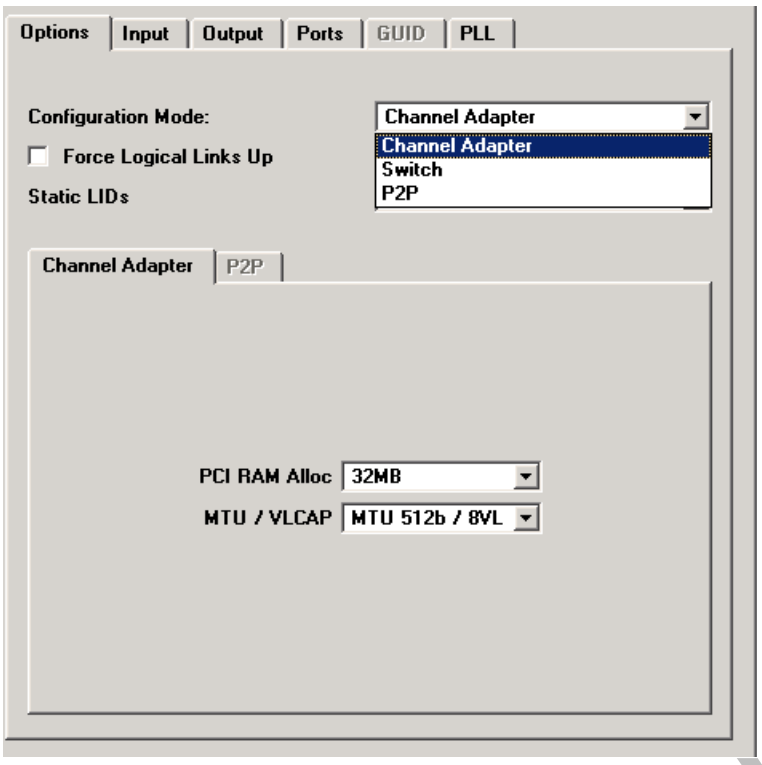
12.7 Selecting the Operational Mode of the Device

EMT enables you to set the operational mode of the device to which you are burning the Firmware. You can configure the device to function as:

- A channel adapter, in which case it functions as an HCA and/or TCA.
- An IB switch.
- A PCI-to-PCI bridge over an IB link.

You can set the operational mode and its associated parameters via the Options tab of the main EMT window. The following tab is enabled when the Configuration check box in the Burns Section frame is selected:



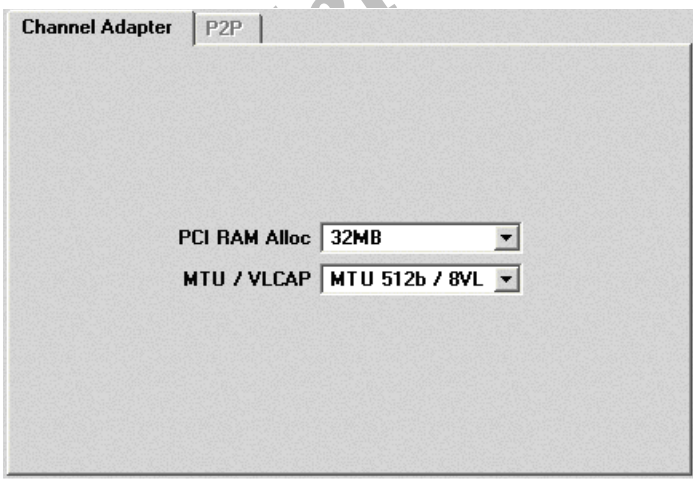


To set the mode of operation of the device you are burning:

- Select the mode of operation from the Configuration Mode select box. The options are:

  Channel Adapter – Sets the device to function as a channel adapter (HCA and/or TCA). The parameters associated with the Channel Adapter operational mode are described below, in “Setting Parameters for Channel Adapter Operations” on page 107.
  Switch – Sets the device to function as an IB switch.
  P2P – Sets the device to function as a PCI-to-PCI bridge over an IB link. The parameters associated with the P2P operational mode are described below, in “Setting Parameters for Channel Adapter Operations” on page 107.

When Channel Adapter is selected in the Configuration Mode select box, the following Channel Adapter tab is enabled:



This tab contains the following fields where you set parameters for the Channel Adapter operational mode:

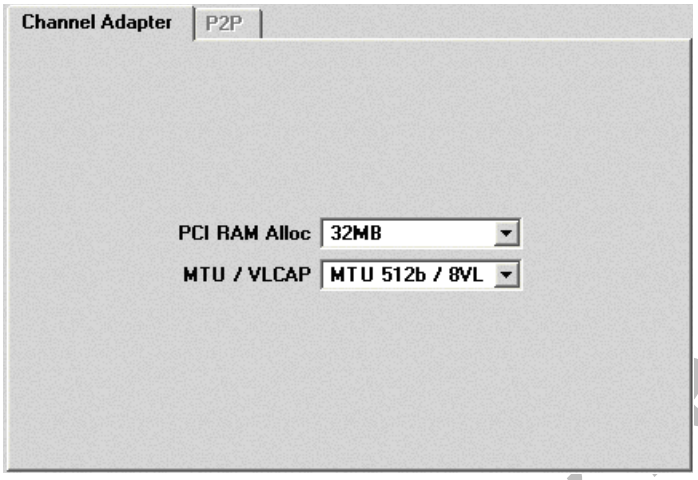
- PCI RAM Alloc – Specifies the amount of RAM the device will request from the PCI controller.
- MTU/VLCAP – Specifies the Maximum Transfer Unit (MTU) and Virtual Lane Capabilities (VLCAP) that are supported by the device.

This Options tab additionally has the following fields setting operational parameters of the device:

- **Force Logical Links Up–** When selected, sets the device to force logical links at boot-time.
- **Static LIDs** – Enables you to select the static LID corresponding to the logical port in use by the board.

12.7.1 Setting Parameters for Channel Adapter Operations

When Channel Adapter is selected in the Configuration Mode select box, the following Channel Adapter tab is enabled:

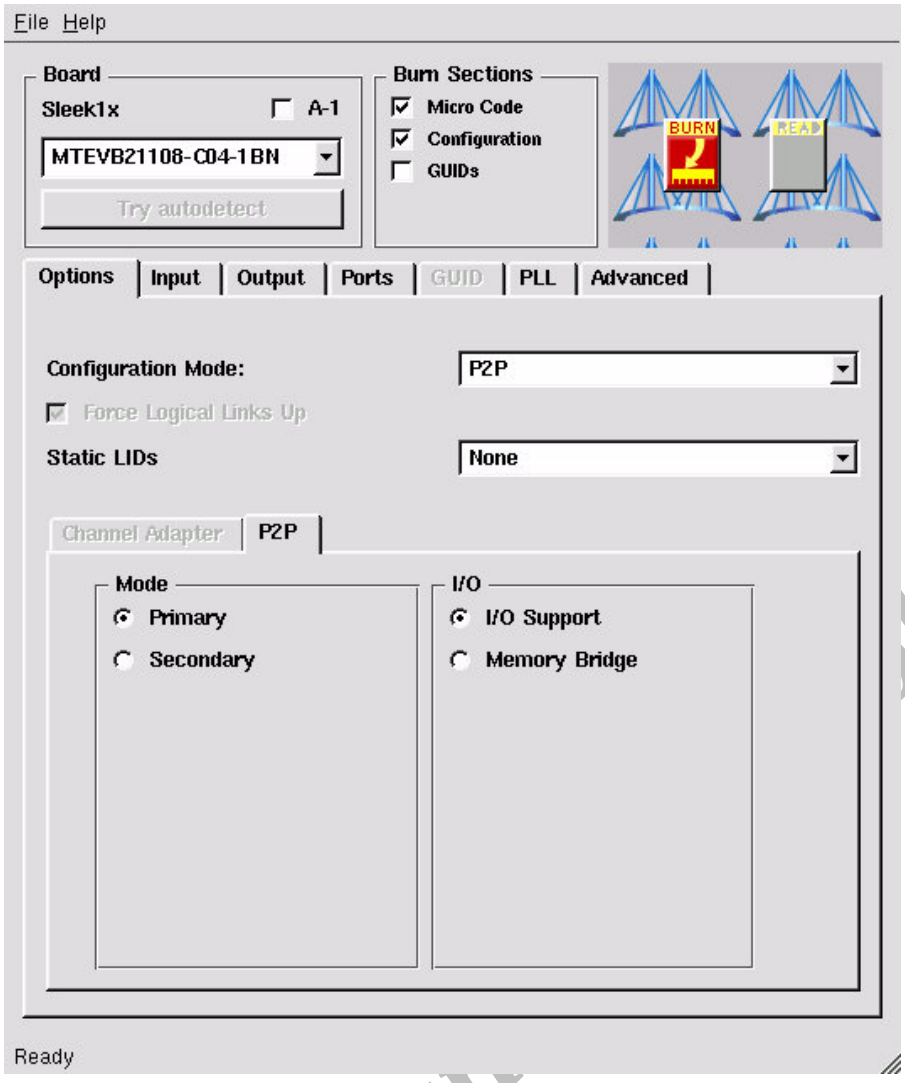


This tab contains the following fields where you set parameters for the Channel Adapter operational mode:

- PCI RAM Alloc – Specifies the amount of RAM the device will request from the PCI controller.
- MTU/VLCAP – Specifies the Maximum Transfer Unit (MTU) and Virtual Lane Capabilities (VLCAP) that are supported by the device.

12.7.2 Setting PCI-to-PCI Operations

If P2P is selected in the Configuration Mode select box, the following P2P tab is enabled:



This tab contains the following fields where you set parameters for the PCI-to-PCI (P2P) operational mode:

Static LIDs – Assigns a static LID (local ID) for both the Primary and Secondary EVB InfiniBridge boards. For both boards you need to select the static LID corresponding to the logical port in use.

The P2P tab includes the Mode and I/O sections, with the following options:

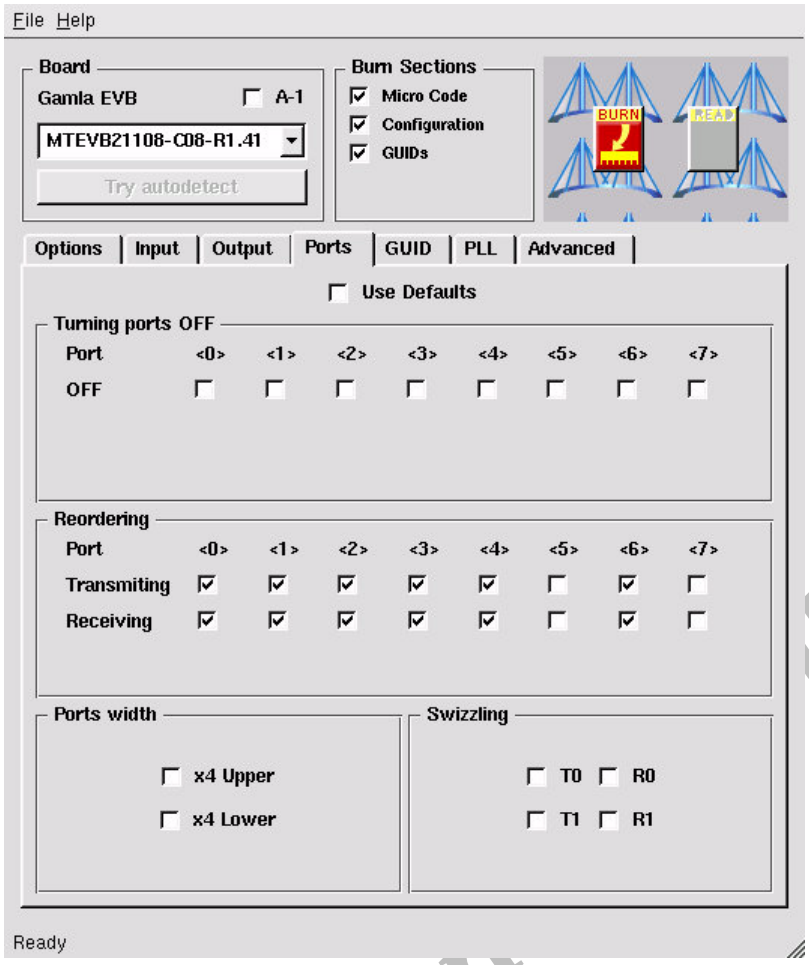
Mode – Specifies whether the selected board functions in Primary or Secondary mode.

I/O – Specifies the types of transactions that the P2P bridge transfers between the end nodes of the P2P bridge.

I/O Support – Sets the P2P bridge to transfer PCI transactions and memory transactions between the end nodes.
Memory Bridge – Sets the P2P bridge to transfer only memory transactions between the end nodes of the bridge.

12.7.3 Controlling the Device's Ports

The following Ports tab enables you to control the ports of the device whose EEPROMs you have selected to burn.



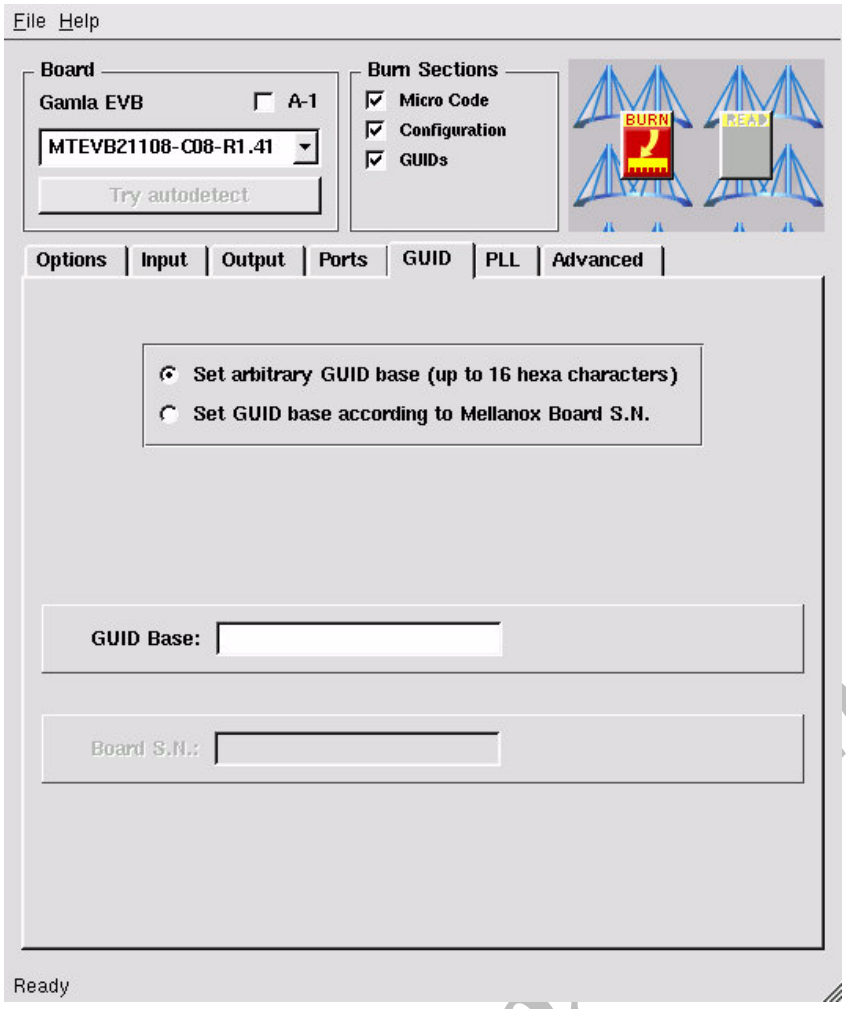
The Ports tab contains the following options:

- **Use defaults** – Sets the device to use the default ports.
- **Turning ports OFF** – Turns off a selected port by stopping the power supply to it.
- **Reordering** – reorders the bits of the port, for both the Transmit and Receive directions. The reordering of bits can be changed from MSB to LSB, and vice versa.
- **Ports width** – Defines whether the upper four ports, lower four ports, or both, work in 4x mode.
  Note: This is relevant for the MT21108 device.
- **Swizzling** – Port BIT reordering for boards with two 4x ports:

  T0 and R0 = Port 0
  T1 and R1 = Port 1

12.8 Configuring the GUID of the Board

If the GUIDs check box is selected in the Burns Sections frame, the GUID tab is enabled. This tab enables you to define the global identifier of the board to which you are burning the Firmware.



This tab contains the following fields which let you define the GUID for the board you are burning:

- **Set abitrary GUID base (up to 16 hexadecimal characters)** – Selecting this button enables the GUID Base box, where you can specify a...???
- **Set GUID base according to Mellanox Board S.N.** – Selecting this button enables the Board S.N. box, where you enter the serial number of your Mellanox-supplied board.
-
- **GUID Base** – The 64-bit Global Unique Identifier assigned to the device.

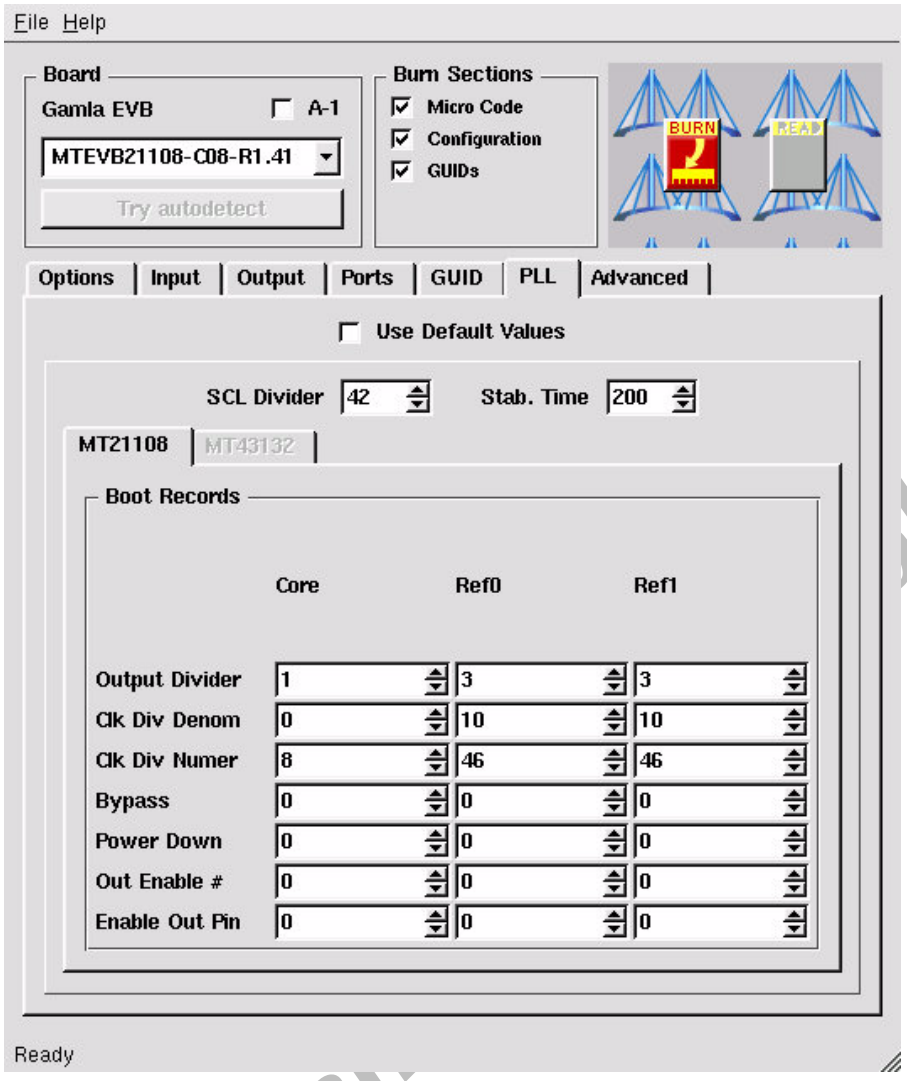
  Note: This tab is not relevant for devices operating in the P2P mode.

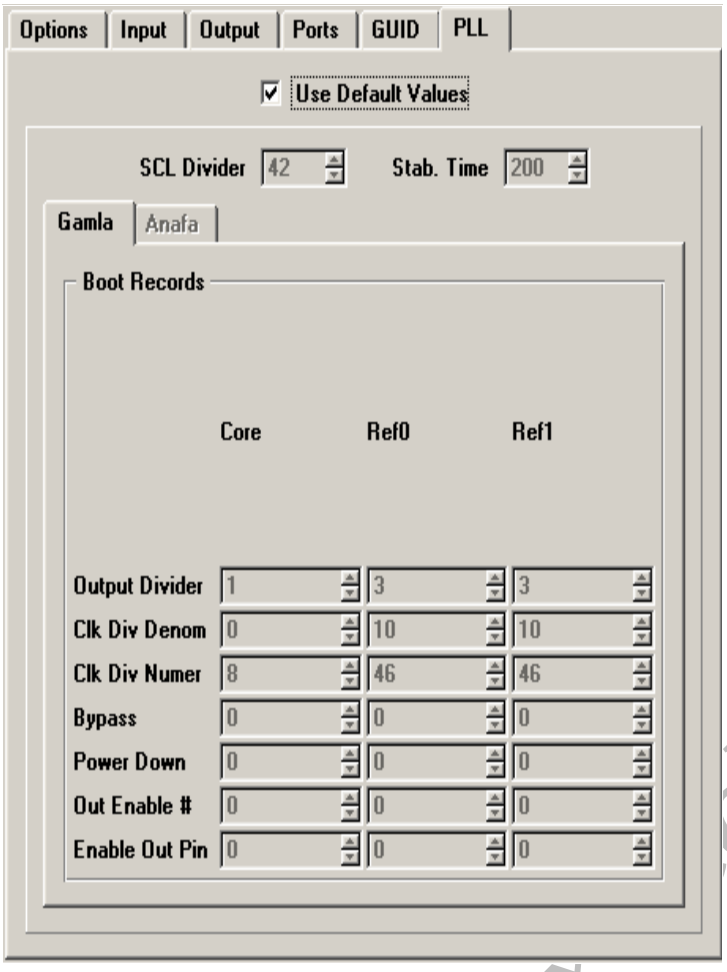
- **Use Board S.N** – Selecting this check box enables the Board S.N. text box, where you enter the serial number of your Mellanox-supplied board.
- **GUID Base** – The 64-bit Global Unique Identifier assigned to the device.

  Note: This tab is not relevant for devices operating in the P2P mode.

12.8.1 Setting the Internal Clocks of the Device

The following PLL tab enables you to change and tune the internal frequencies of the device.





When you have selected a board with the InfiniBridge (MT21108) device, the Gamla tab is enabled.

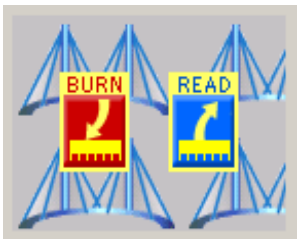
When you have selected a board with the InfiniScale (MT4312) device, the Anafa tab is enabled.

12.9 Burning the Firmware to the EEPROMs

After you have finished all the configuration tasks for the target device and the Firmware to be burned, you can use the EMT interface to burn the Firmware and configuration to the selected board's EEPROMs.

To burn the firmware to the EEPROMs:

- Click the following **BURN** button:



EMT displays a Progress dialog box showing the progress of the burning operation.

The READ button reads the some (not all) of the current configuration from the board.

12.10 Running the EMT Command Line

The EMT command line enables you to burn a previously prepared image. The creation of this image is enabled by the Output tab, and is described in Section 12.6.1, "Saving the Firmware to File," on page 104.

To display EMT command line syntax:

- Start EMT with the "-help" parameter. The following short help message is displayed:

Usage:

/emt [***EEPROM_image_file***] –bm <DEV> [***options***...]**Switches**:

-bsn <BSN> – Force board serial number to BSN.
-bm <DEV> – Burn using dev.
-guid <GUID> – Force GUID base to GUID.
-bs <I2C_slave> – I2C address of the first EEPROM; 0x55 by default.
-es <SIZE> – Size of each EEPROM in bytes; 0x8000 by default.
-ne <N> – Number of EEPROMS; 2 by default.

The parameters in this syntax are as follows:

EEPROM_image_file – Filename of the EEPROM image previously prepared by the EMT utility (see Section 12.6.1, "Saving the Firmware to File," on page 104).

-**bsn** – Overwrites the Board Serial Number, even if it is different from that in the EEPROM image file.

-**guid** – Overwrites the Base GUID, even if it is different from that in the EEPROM image file.

-**bs** – Sets the EEPROEM I^2C slave address.

-**es** – Sets the size of each EEPROM.

-**ne** – Sets the number of EEPROMs.

Example

```
emt my_image_file –guid 16H
```

12.11 JNI MT21108 Board: Default Configuration

EMT supports the JNI MT21108 board.

The following describes the default JNI board configuration programmed by EMT:

board name = "JNI-HCA-IBP-1x02"
nick name = "IBP-1x02"
eeprom
I2C slave address = 0x51
EEPROM size = 32KB

Number of EEPROMs = 2
Port width = 0 0 (1x)
Swizling = 0 0 0 0 (no)
Port off = 1 1 1 1 1 0 0 1
TX port reordering = 1 1 1 1 1 1 1 1
RX port reordering = 1 1 1 1 1 0 1 0
Board ID = 8
CA Ucode files = start1_ca.hx, start2_ca.hx, main_ca.hx
CA Ucode data files = main.cft, main_mod.cft, main.cin

13 adevmon: Device Monitoring Utility

13.1 Overview

Like the Infinivision tool, adevmon provides compact and convenient viewing of the modules, registers and sub-fields accessible from the CR bus. You can use the monitoring utilities to directly edit CR values, and you can easily customize the utility for your individual projects through an external configuration file.

For information about this device monitoring utility, see the "infinivision" chapter in Part I of this manual. The screens and operations of infinivision and adevmon are identical, with the following exception:

adevmon is started by running: `% adevmon`

14 eburn Utility

eburn is a command line utility that burns firmware to the EEPROM of an InfiniScale device.

14.1 Installation and Setup

eburn is part of the MST toolkit, whose requirements and installation procedure are described in Tools Installation (page 14). The installation copies the eburn utility to /usr/bin.

14.2 Operation

The MST driver must be started prior to running eburn tool. **To start eburn:**

- Start the MST driver (mst start or mst restart).
- Run eburn with the following command line syntax:

```
eburn <firmware_image_file> [options...]
```

where:

firmware_image_file – the firmware image that is burned to the EEPROM of an InfiniScale device. This image can be prepared via the EMT utility (see "EMT Tool" on page 99).

Note: You should not save the firmware image in binary format.

options can be:

-h – Print this message

-s – Silent mode – do not print progress.

-v – Verify only, do not burn.

-bsn <*BSN*> – Force board serial number to *BSN*.

-bm <*DEV*> – Burn using dev

-guid <*GUID*> – Force GUID base to GUID. May have special value "keep" (see below).

Note that if "-bsn" switch specified, the GUIDs will be calculated and burn according to this BSN by default. If you do not wish to burn GUIDs, specify "-guid keep". If neither "-bsn" nor "-guid" are specified, GUID won't be burn. If both "-bsn" and "-guid" are specified and "-guid" value isn't "keep", both BSN and GUID will be burned according to specified values.

15 gz_burn Utility

15.1 Overview

This release of gz_burn includes the following main features:

- Burns all/selected InfiniScale devices in these switch platforms: MTEK43132-M96-2P (Gazelle) and MTEK 14332-M16-5 (Gnu).
- Burns blade info eeprom.
- Gets the status of FW in all/selected InfiniScale devices.

gz_burn can work after it has been connected to the MTEK43132-M96-2P (Gazelle) network I2C bus or directly to the MTEK43132-MSX12-4x/MTEK4312-SP8 (Leaf/Spine). Selection of the blade and/or InfiniScale device enables working with a subset of blades (L*, S*, L[1-3]) and a subset of InfiniScale (L*A1, S2A[12]). gz_burn can be used for MTEK 43132-M16-5 (Gnu) switch platforms.

15.2 Installation and Setup

The gz_burn utility is part of the MST toolkit, whose requirements and installation procedure are described in Tools Installation (page 14). The MST installation copies the gz_burn utility to /usr/bin.

15.3 Operation

The MST driver must be started prior to running gz_burn tool. **To start gz_burn:**

- Start the MST driver (mst start or mst restart).
- Run gz_burn with the following command line syntax:

  `gz_burn` [*OPTIONS*]

where [OPTIONS] can be:

`-hw` – Selects HW device type. Supported devices are: *gazelle_i2c, gnu_i2c*. The default device is *gazelle_i2c*.

`-d|--dev` – Selects MST device to access HW boards. The default mst device is */dev/mst/mtusb*.

`--emt` – Runs the emt utility. The default is "emt".

`-h|--help|--man` – Displays a help message, in the form of an extended manual page.

Bus/Device Selection

-p – Specifies bus selection pattern.

Operations

-b|--burn – Performs burn operation.

-s| --stat – Prints a status report.

--bi – Burns blade info eeprom on chassis bus.

Additional Parameters

-i|--image – Specifies the image to burn. For MTEK43132-M96-2P (Gazelle) this must be a filename. For MTEK43132 -M16-S (Gnu) this must be the name of the directory containing images.

--bsn – Specifies BSN base. By default, bsn is not programmed.

---guid – Specifies GUID base for the blade. By default, GUID is not programmed.

--bv – Specifies blade version information.

--leaf|--spine – Forces gz_burn to work over leaf/spine only.

For information about additional options, run `gz_burn --man`.

OTHER_OPTIONS

-v|--ver – Prints version and exits.

-c – Prints configuration report.

-r|retry – Specifies number of retries for burning and other operations.

--no-color – Do not use color in output.

Description

gz_burn allows you to retrieve the status of, or burn specific devices on, the MTEK43132-M96-2P (Gazelle) I2c Management Bus. In general, command line options specified to gz_burn must define desired operation(s), bus(es) on which this operation should be performed and additional parameters for operation.

The following operations can be requested. They are listed in the same order that gz_burn performs them if more then one operation is requested.

`burn` – -b|--burn

`get status -s|--stat` – This is the default operation.

gz_burn can be run on a subset of MTEK43132-M96-2P (Gazelle) I2c buses. Currently supported I2c buses are:

S[1..4]A[1..3] InfiniScale on MTEK43132-SP8 (Spines) (Example S1A2)

S[1..4]CH Chassis Bus on MTEK43132-SP8 (Spines) (Example S2CH)

L[1..8]A[1..7] InfiniScale on MTEK43132-MSX12-4x (leafs) (Example L2A4)

L[1..8]CH Chassis Bus on MTEK43132-MSX12-4x (leafs) (Example L7CH)

To select bus(es) on which you want to perform an operation, you can specify perl/grep like pattern by -p option. By default, the pattern is '*', which means all buses. S* is all MTEK43132-SP8 (spines), L* is all MTEK43132-MSX12-4x (leafs), L*CH is chassis bus for all MTEK43132-MSX12-4x (leafs), e.t.c. Additional information is given in the following EXAMPLES section.

Examples

`gz_burn -b -i=gazelle.eeprom' – Burns all InfiniScale in MTEK43132-MSX12-4x (Gazelle) with an image from the file gazelle.eeprom.

`gz_burn -s' – Gets the full MTEK43132-M96-2P (Gazelle) status.

`gz_burn -b -p *CH -s' – Gets the status of the entire chassis bus.

`gz_burn -b -p L2A* -i=gazelle.eeprom' - Burns InfiniScale devices on MTEK43132-MSX12-4x 2 (Leaf 2).

gz_burn -d /dev/mst/calibre -s – This might print a status report similar to the following:

```
Connected to bus Gazelle I2C Primary bus
Disconnecting HUB Seg3,4 to prevent collisions
Present Boards: L1(v1) L2(v1) L3(v1) L4(v1) L8(v1) S1(v1) S2(v1)
Gazelle I2C Primary bus Status Report
-----------------------------------
L8A1  FW 05.00.0000-071 GUID=0002c901080482c0 BSN=MT31320B2403030131
L8A2  FW 05.00.0000-071 GUID=0002c901080482c8 BSN=MT31320B2403030132
L8A3  FW 05.00.0000-071 GUID=0002c901080482d0 BSN=MT31320B2403030133
L8A4  FW 05.00.0000-071 GUID=0002c901080482d8 BSN=MT31320B2403030134
L8A5  FW 05.00.0000-071 GUID=0002c901080482e0 BSN=MT31320B2403030135
L8A6  FW 05.00.0000-071 GUID=0002c901080482e8 BSN=MT31320B2403030136
L8A7  FW 05.00.0000-071 GUID=0002c901080482f0 BSN=MT31320B2403030137
L8CH  Blade EEP: ver=1 BSN=MT31320B240303013

L4A1  FW 05.00.0000-071 GUID=0002c90108048a30 BSN=MT31320B022403030301
L4A2  FW 05.00.0000-071 GUID=0002c90108048a38 BSN=MT31320B022403030302
L4A3  FW 05.00.0000-071 GUID=0002c90108048a40 BSN=MT31320B022403030303
L4A4  FW 05.00.0000-071 GUID=0002c90108048a48 BSN=MT31320B022403030304
L4A5  FW 05.00.0000-071 GUID=0002c90108048a50 BSN=MT31320B022403030305
L4A6  FW 05.00.0000-071 GUID=0002c90108048a58 BSN=MT31320B022403030306
L4A7  FW 05.00.0000-071 GUID=0002c90108048a60 BSN=MT31320B022403030307
L4CH  Blade EEP: ver=1 BSN=MT31320B02240303030

L3A1  FW 05.00.0000-071 GUID=0002c90108048480 BSN=MT31320B2403030171
L3A2  FW 05.00.0000-071 GUID=0002c90108048488 BSN=MT31320B2403030172
L3A3  FW 05.00.0000-071 GUID=0002c90108048490 BSN=MT31320B2403030173
L3A4  FW 05.00.0000-071 GUID=0002c90108048498 BSN=MT31320B2403030174
L3A5  FW 05.00.0000-071 GUID=0002c901080484a0 BSN=MT31320B2403030175
L3A6  FW 05.00.0000-071 GUID=0002c901080484a8 BSN=MT31320B2403030176
L3A7  FW 05.00.0000-071 GUID=0002c901080484b0 BSN=MT31320B2403030177
L3CH  Blade EEP: ver=1 BSN=MT31320B240303017

L2A1  FW 05.00.0000-071 GUID=0002c90107fdb270 BSN=MT31220B2003030261
L2A2  FW 05.00.0000-071 GUID=0002c90107fdb278 BSN=MT31220B2003030262
L2A3  FW 05.00.0000-071 GUID=0002c90107fdb280 BSN=MT31220B2003030263
L2A4  FW 05.00.0000-071 GUID=0002c90107fdb288 BSN=MT31220B2003030264
L2A5  FW 05.00.0000-071 GUID=0002c90107fdb290 BSN=MT31220B2003030265
L2A6  FW 05.00.0000-071 GUID=0002c90107fdb298 BSN=MT31220B2003030266
L2A7  FW 05.00.0000-071 GUID=0002c90107fdb2a0 BSN=MT31220B2003030267
```

```
L2CH  Blade EEP: ver=1 BSN=MT31220B200303026

L1A1  FW 05.00.0000-071 GUID=0002c90107f88a10 BSN=MT31320B1703030081
L1A2  FW 05.00.0000-071 GUID=0002c90107f88a18 BSN=MT31320B1703030082
L1A3  FW 05.00.0000-071 GUID=0002c90107f88a20 BSN=MT31320B1703030083
L1A4  FW 05.00.0000-071 GUID=0002c90107f88a28 BSN=MT31320B1703030084
L1A5  FW 05.00.0000-071 GUID=0002c90107f88a30 BSN=MT31320B1703030085
L1A6  FW 05.00.0000-071 GUID=0002c90107f88a38 BSN=MT31320B1703030086
L1A7  FW 05.00.0000-071 GUID=0002c90107f88a40 BSN=MT31320B1703030087
L1CH  Blade EEP: ver=1 BSN=MT31320A240203005

S2A1  FW 05.00.0000-071 GUID=0002c90107fdafd0 BSN=MT31220B2003030201
S2A2  FW 05.00.0000-071 GUID=0002c90107fdafd8 BSN=MT31220B2003030202
S2A3  FW 05.00.0000-071 GUID=0002c90107fdafe0 BSN=MT31220B2003030203
S2CH  Blade EEP: ver=1 BSN=MT31220B20030302

S1A1  FW 05.00.0000-071 GUID=0002c90107fdab00 BSN=MT31220B2003030091
S1A2  FW 05.00.0000-071 GUID=0002c90107fdab08 BSN=MT31220B2003030092
S1A3  FW 05.00.0000-071 GUID=0002c90107fdab10 BSN=MT31220B2003030093
S1CH  Blade EEP: ver=1 BSN=MT31220B200303009

PROBLEM SUMMARY ====================================================
ERROR: L1A3: bad BSN, doesn't match L1CH
ERROR: L1A4: bad BSN, doesn't match L1CH
ERROR: L1A5: bad BSN, doesn't match L1CH
ERROR: L1A6: bad BSN, doesn't match L1CH
ERROR: L1A7: bad BSN, doesn't match L1CH
ERROR: L1A1: bad BSN, doesn't match L1CH
ERROR: L1A2: bad BSN, doesn't match L1CH
```

Part IV: USB to I^2C Adapter

This part includes the User's Manual for MTUSB-1, Mellanox's USB to I^2C Adapter.

16 MTUSB-1 USB to I2C Adapter

16.1 Overview

The MTUSB-1 is a USB to I^2C-bus adapter. This chapter provides the user with hardware and software installation instructions. It also describes a functionality test which can be run after adapter HW and SW installation to verify that communication over the USB and I^2C busses has been established correctly.

16.1.1 Scope

It is highly recommended that this chapter is carefully read in its entirety before any attempt to install and/or use the hardware and software contents of this package.

16.1.2 Revision History

Table 5 - MTUSB-1 Revision History

Revision	Change	Date
0.0	Initial version	25-Mar-2004

16.1.3 Package Contents

Please make sure that your package contains the following items and that they are in good condition.

- One page with instructions pointing to this User's Manual
- One MTUSB-1 device
- One USB Cable: USB_A to USB_B 1.8m
- One I2C Cable: 9pin male/male 1.8m
- One Converter Cable: 9pin female to 3pin 0.3m

16.1.4 System Requirements

The MTUSB-1 is a USB device which may be connected to any Personal Computer with a USB Host Adapter (USB Standard 1.1) and having the following specifications:

- Linux operating system (See "Supported Platforms" on page 125. below).
- At least one USB connection port (USB-Standard 1.1).
- MST Tool driver set (supplied by Mellanox).

16.1.5 Supported Platforms

MTUSB-1 supported platforms are the same as those of the MST tools package. See "Supported Platforms and Operating Systems" on page 13.

16.2 Hardware Installation

To install the MTUSB-1 hardware, please follow these steps:

1. Connect one end of the I2C cable to the MTUSB-1 and the other end to the system/board you wish to control via the I2C interface. If the system/board uses a 3-pin connector instead of a 9-pin connector, connect the provided converter cable as an extension to the I2C cable, then connect the converter cable to the system/board.
2. Connect one end of the USB cable to the MTUSB-1 and the other end to the PC.

16.3 Software Installation

The MTUSB-1 device requires that the Mellanox Software Tools (MST) package be installed on the Linux PC to which MTUSB-1 is connected. (See Chapter 1 of *MST User's Manual* for installation instructions.) Once you have MST installed, you may verify that your MTUSB-1 device is detected by MST software.

To detect your MTUSB-1 device, follow these steps:

1. Start the MST drivers by entering:

```
mst start          (or mst restart if mst start was run earlier)
```

2. To obtain the list of MST devices enter:

```
mst status
```

If MTUSB-1 has been correctly installed, "***mst status***" should include the following device in the device list it generates:

/dev/mst/mtusb-1

For further details related to MST operations, please refer to *MST User's Manual*.

16.4 MTUSB-1 Functionality Test

After you have verified that the MTUSB-1 device has been detected by the MST driver, you can run a special test called '*mtusb1_test*' which is normally installed under /usr/mst/bin (or wherever the mst/bin subdirectory resides). This test will check the functionality of the MTUSB-1 device (and its environment) on various levels such as: electrical (no device short circuits), firmware version, communication with the driver on USB bus, communication with target on I^2C bus, and others.

The test performs the following steps:

1. Checks Firmware version of the device for correctness and proper burning. This includes testing the USB connection of driver to MTUSB-1 device for correctness.
2. Requests the user to disconnect from the I^2C target in order to verify that MTUSB-1 is free of internal short circuits.
3. Requests the user to reconnect the target to MTUSB-1 in order to ensure communication over the I^2C bus is correct. The test will drive the I^2C bus signals SDA and SCL in a sequence aimed to verify that no shorts hinder their operation.
4. Finally, it scans for all slave devices connected to the I^2C bus and lists their addresses. This will enable the user to verify that all expected I^2C devices exist and respond (assuming the user has the list of I^2C slave devices and their addresses).

Following is an example of an *mtusb1_test* run:

```
> /usr/mst/bin/mtusb1_test
Check FW Version : PASSED
Please disconnect I2C cable from target device. Press Enter...
SDA SCL Lines Idle status test : PASSED
SDA SCL HI/LOW transition test : PASSED
Please Connect I2C cable to target device. Press Enter...
SDA SCL Lines Target test : PASSED
SDA SCL HI/LOW Target transition test: PASSED
Send I2C STOP to Target : PASSED
I2C Slave devices Scan. Found devices: 0x48 0x51 0x52 0x53 0x54 0x55 x6c 0x77
Test PASSED
```

Appendix A: InfiniScale III MT47396 Firmware Initialization File (.INI)

The Mellanox Technologies firmware burning tool **is3burn** requires a firmware (FW) file to get initialization and configuration information. (Please see is3burn documentation.) This file is either supplied by Mellanox, or by the user. The command line option "-fw" of is3burn uses a *Mellanox-supplied* FW (image) file; the "-conf" option uses a *user-supplied* FW configuration (**.INI**) file. (For information on is3burn and how to call the .INI file, see "is3burn EEPROM Management Tool" on page 81.)

Even if the user does not have a FW configuration file ready, it is possible to have is3burn create one. However, the user still needs some pre-existing FW file for is3burn to use in this process. Once this configuration file is created, its initialization and configuration information can be modified to suit the user's specific system.

To begin with, the .INI file is a text file composed of several initialization and configuration *sections*. The user may choose to include all sections and all attribute settings in the final .INI file, and modify some of the attributes as required. Alternatively, the user may choose to keep only the sections with changes to the existing settings, with only those attributes that are to be modified.

This appendix includes the following sections:

> Note: For the full details of each .INI section, please refer to the *InfiniScale III MT47396 Firmware Release Notes*.

A.1 .INI File Format

The .INI file is actually a concatenation of (a part or all) section specific initialization and configuration settings. Each section in the .INI file starts with its name between square brackets, e.g. [EEPROM], [General], etc. The section name is followed by one or more lines of configuration settings and comments, as in the partial .INI file shown below. Note that comment lines start with a semicolon.

Example:

```
[EEPROM]
; This is a comment line
amount = 0x4
eeprom1_address = 0x56
eeprom1_size = 64

[General]
PortsBufferingMode = SAF
DEVID = 0xb924
VID = 0x2c9
AutoPowerSave = Enable
; End of (partial) .INI file
```

A.2 List of .INI File Sections

The .INI file sections are:

- EEPROM
- PSID
- General
- Special
- ENP0
- MISC
- IB_TO_HW_MAP
- IB_TO_LED_MAP
- PortDisable
- LinkWidthSupp
- PLL
- REV_LANE
- Polarity
- SERDES_Equa_CFG
- SERDES_OutPut_Voltage
- SERDES_Pre_Amp_OutPut
- SERDES_Pre_Emp_Out
- SERDES_Pre_Emp_Pre_Amp
- Credits_Time

Note: For the full details of each .INI section, please refer to the *InfiniScale III MT47396 Firmware Release Notes*.