

PCI Express Card

Software Installation Guide

About This Document

This document describes the PCI Express card software installation guide.

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Revisions

Revision	Date	Description of Changes
R2013-1.0	29 JAN 2013	Release R2013-1.0 - Updated Interfaces section: the DRIVERS=="?*" match can be used in 70-persistent-net.rules - Added udp-4x10g-240 firmware for the 4x10g-240 (Virtex 6) board
R2012-8.1	20 DEC 2012	Release R2012-8.1 - Updated Installing the Software Packages section - Updated Post-Installation section - Updated Uninstalling the Software Packages section - Updated Updating the Firmware section - Updated Board Recovery section - Updated RPfilter section
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3.4	08 NOV 2012	Updated Uninstalling the Software Packages section
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3.2	20 AUG 2012	- Updated section 2.4.1: superbook package is now part of the orderbook package - Updated section 2.2: supported Linux OS
3.1	15 JUN 2012	- Updated available Celoxica PCIe accelerator cards - The driver now supports linux kernel versions up to 3.2.0
3.0	02 MAR 2012	- Added OS recommendation for CentOS 5.x - Added details to the contacting support section - Added new Environment Variables section
2.9	21 FEB 2012	- New template - Updated Contacting Support section
<= 2.8		Older versions

1. Celoxica Accelerator Card Overview

Five Celoxica PCIe (PCI Express) accelerator cards are available:

- Celoxica 2x10G-155
- Celoxica 4x10G-240
- Celoxica 4x1G-155
- Celoxica 4x1G-110
- Celoxica 2x1G-LP-110

Celoxica supplies these cards with the necessary drivers, and offers developers a range of APIs that expose communications routines to applications without requiring them to manage low-level details.

Note:

Information in this document may be affected by your firmware version. Please ensure the firmware you have is up to date.

2. Installing and Uninstalling Software

The Celoxica PCIe Accelerator Cards include drivers, test examples, and firmware. This section describes how to install the drivers and examples and how to update your card's firmware.

Note:

If a previous version of Celoxica software is already installed, please remove the software old packages using the instructions provided in section 2.5.

2.1 Installing the Software Packages

2.1.1 RPM Packages

RPM packages are supplied for Red Hat type linux distributions.

1. Where rpms are supplied, install them using 'rpm -i' taking care to install the **celoxica-base** rpm first. For instance:

```
[you@yourmachine]$ rpm -i celoxica-base-5.22-  
r2012_6.4.x86_64.rpm  
  
[you@yourmachine]$ rpm -i celoxica-gmac-3.43-  
r2012_6.4.x86_64.rpm  
  
[you@yourmachine]$ rpm -i etc...
```

2. List the Celoxica packages installed:

```
[you@yourmachine]$ rpm -qa | grep celoxica
```

3. Reboot the machine to ensure that the kernel module is loaded.

2.1.2 DEB Packages

DEB packages are supplied for Debian type linux distributions.

1. Where .deb packages are supplied, install them using 'dpkg -i' taking care to install the **celoxica-base** deb first. For instance:

```
[you@yourmachine]$ dpkg -i celoxica-base_5.22-r2012-  
6.3_amd64.deb
```

2. List the Celoxica packages installed:

```
[you@yourmachine]$ dpkg -l | grep celoxica
```

3. Reboot the machine to ensure that the kernel module is loaded.

2.2 Pre-installation Requirements

Before installing the Accelerator Card, ensure that you have:

- Supported Linux OS:
 - Red Hat Enterprise Linux up to version 6.3 (32 or 64 bit), and equivalent CentOS versions
 - SuSE Linux Enterprise Server up to version 11.0 SP3 (64-bit)
 - Ubuntu LTS 12.0 (64 bit)

- Kernel source for the installed Linux kernel (kernel-devel and kernel-headers packages for the version of the operating system installed on the server). Linux kernels up to version 3.2.0 are currently supported.
- Software development tools installed on the server (gcc, make etc. to build examples).

Note:

Ensure that the version of gcc installed is that supplied with the version of the operating system. It is important that the gcc version be the same as was used to build the kernel image.

2.3 OS Recommendations

2.3.1 Interfaces

Interfaces acX are identified on Celoxica 10G cards by running command “ethtool --identify acX [NumSecs]” which flashes the LED adjacent to the relevant interface where:

1. acX specifies the interface to identify: e.g. ac0 or ac1
2. NumSecs specifies the number of seconds the LED will flash for. If not specified, the LED will continue to flash until Ctrl+C is pressed.

Celoxica strongly recommends using udev to configure the binding of physical interfaces to acX names. This is particularly important on multi-card installations, to ensure consistent ordering of interfaces - e.g. across reboots, swapping cards between PCIe slots or card replacements.

1. Depending on the Kernel and OS version, run udevadm -V or udevd -V (CentOS 6.*, Ubuntu 10.04 or later, SUSE 11.* or later) or run udevinfo -V for previous OS versions to get the udev version:

```
[you@yourmachine]$ cat /etc/redhat-release
CentOS release 6.2 (Final)
```

```
[you@yourmachine]$ udevadm -V
147
```

```
[you@yourmachine]$ cat /etc/redhat-release
CentOS release 5.6 (Final)
```

```
[you@yourmachine]$ udevinfo -V
udevinfo, version 095
```

2. The binding of physical interfaces to acX names is achieved by adding lines to /etc/udev/rules.d/70-persistent-net.rules according to the udev rule matching a Celoxica device:

If udev version is >= 139:

```
SUBSYSTEM=="net", DRIVERS=="?*", ACTION=="add",
ATTR{address}=="XX:XX:XX:XX:XX:XX", ATTR{type}=="1",
KERNEL=="ac?", NAME="acX"
```

If udev version is < 139:

```
SUBSYSTEM=="net", DRIVERS=="?*", ACTION=="add",
SYSFS{address}=="XX:XX:XX:XX:XX:XX", ATTR{type}=="1",
KERNEL=="ac?", NAME="acX"
```

Example where udev version is >= 139:

```
SUBSYSTEM=="net", DRIVERS=="?*", ACTION=="add",
ATTR{address}=="1a:04:40:7b:01:00", ATTR{type}=="1",
KERNEL=="ac?", NAME="ac2"
```

```
SUBSYSTEM=="net", DRIVERS=="?*", ACTION=="add",
ATTR{address}=="1a:04:40:7b:01:01", ATTR{type}=="1",
KERNEL=="ac?", NAME="ac3"
```

Example where udev version is < 139:

```
SUBSYSTEM=="net", DRIVERS=="?*", ACTION=="add",
SYSFS{address}=="1a:0e:4c:77:01:00", KERNEL=="ac?",
NAME="ac0"
SUBSYSTEM=="net", DRIVERS=="?*", ACTION=="add",
SYSFS{address}=="1a:0e:4c:77:01:01", KERNEL=="ac?",
NAME="ac1"
SUBSYSTEM=="net", DRIVERS=="?*", ACTION=="add",
SYSFS{address}=="1a:0e:4c:77:01:02", KERNEL=="ac?",
NAME="ac2"
SUBSYSTEM=="net", DRIVERS=="?*", ACTION=="add",
SYSFS{address}=="1a:0e:4c:77:01:03", KERNEL=="ac?",
NAME="ac3"
SUBSYSTEM=="net", DRIVERS=="?*", ACTION=="add",
SYSFS{address}=="1a:04:01:cb:01:00", KERNEL=="ac?",
NAME="ac4"
SUBSYSTEM=="net", DRIVERS=="?*", ACTION=="add",
SYSFS{address}=="1a:04:01:cb:01:01", KERNEL=="ac?",
NAME="ac5"
```

The ordering of interfaces must be preserved within the same board as shown in the above example. The following example is **not** correct:

```
SUBSYSTEM=="net", DRIVERS=="?*", ACTION=="add",
ATTR{address}=="1a:04:40:7b:01:00", ATTR{type}=="1",
KERNEL=="ac?", NAME="ac3"

SUBSYSTEM=="net", DRIVERS=="?*", ACTION=="add",
ATTR{address}=="1a:04:40:7b:01:01", ATTR{type}=="1",
KERNEL=="ac?", NAME="ac2"
```

2.3.2 Network Configuration Scripts

Network configuration scripts for interface 1 on a Celoxica board will not be automatically created, due to a limitation of our PCI device implementing only one function.

When installing a new Celoxica board in a server, the system administrator will have to manually create the file.

Warning:

Celoxica strongly recommends not to use NetworkManager to control the configuration of the Celoxica boards.

For example on a REDHAT distro:

1. `cd /etc/sysconfig/network-scripts/`
2. `cp ifcfg-ac0 ifcfg-ac1`
3. edit `ifcfg-ac1` to update HWADDR or DEVICE and IP setting

Once the physical interfaces have been bound to acX names as described in the previous section, the interface can be specified either by the parameter HWADDR or by the parameter DEVICE.

Usage of the HWADDR parameter:

```
TYPE=Ethernet
BOOTPROTO=static
IPADDR=10.0.1.1
NETMASK=255.255.255.0
IPV6INIT=no
ONBOOT=yes
HWADDR=XX:XX:XX:XX:XX:XX
```


Usage of the DEVICE parameter:

```
TYPE=Ethernet
BOOTPROTO=static
IPADDR=10.0.1.1
NETMASK=255.255.255.0
IPV6INIT=no
ONBOOT=yes
DEVICE=acX
```

2.3.3 ARPing

If ARPing is used on your network, run the following command to prevent the Operating System replying multiple times to an ARP probe:

```
[you@yourmachine]$ sudo sysctl -w
net.ipv4.conf.all.arp_ignore=1

[you@yourmachine]$ sudo sysctl -w
net.ipv4.conf.all.arp_announce=2
```

2.3.4 RPfilter

Disable `rp_filter` for the kernel to reply to the IGMP queries even when the source IP of the UDP multicast stream is not on the routing table.

Type “`cat /proc/sys/net/ipv4/conf/all/rp_filter`” command to verify the status.

This should print “0”.

```
[you@yourmachine]$ cat
/proc/sys/net/ipv4/conf/all/rp_filter
0
```

Otherwise edit file “`/etc/sysctl.conf`” and set “`net.ipv4.conf.all.rp_filter`” option to “0”. Restart the system for the changes to take effect.

2.3.5 Set the IGMP Version

When using an accelerator card to subscribe to market data on UDP multicast channels, the card sends out IGMP packets to join the appropriate multicasts. Celoxica recommends setting the IGMP version on the host system to 2 to ensure reliable subscription. This is because many routers still drop IGMP v3 packets by default, which means that an application using the Celoxica card may not receive any market data. The IGMP version setting is usually found in:

- `/proc/sys/net/ipv4/conf/ac0/force_igmp_version` for `ac0`, similarly for other interfaces
- `/proc/sys/net/ipv4/conf/all/force_igmp_version` for all interfaces on the system

By default these files contain ‘0’, which means that the OS is free to choose the version of IGMP to use. To force the OS to use v2, simply replace the ‘0’ with ‘2’.

2.3.6 Set the Timestamp Calibration CPU

Celoxica products access a library to calibrate the CPU timestamps in order to make high-precision latency measurements possible. By default this uses CPU 0. If CPU 0 is unavailable, set the environment variable using the following command, where 1 is the number of the CPU to be used for timestamp calibration:

```
[you@yourmachine]$ export CELOXICA_TS_CPU=1
```

2.3.7 CentOS 5.x

Setting a virtual ac port using `ifup` will fail on CentOS versions 5.x; the OS complains that the interface doesn’t exist. This is due to a shortcoming in the `ifup` script, which can be worked around as follows:

1. Edit `/etc/sysconfig/network-scripts/ifup`
2. Replace `MATCH='(eth|hsi|bond)[0-9]+\.[0-9]{1,4}$'`

with `MATCH='^(ac|eth|hsi|bond)[0-9]+\.[0-9]{1,4}$'`

Note:

There is no issue with CentOS version 6.x.

2.3.8 SuSE

For SuSE Operating Systems, use the following command to configure the library path.

```
[you@yourmachine]$ export
LD_LIBRARY_PATH=/usr/lib64/celoxica/
```

Note:

This command needs to be used each time the host server is rebooted.

2.3.9 ASPM

Make sure ASPM is not enabled by BIOS, ASPM putting the card into unrecoverable fail state.

For CentOS versions 6.x, disabling ASPM is done by adding “`pcie_aspm=off`” to the `grub.conf`. The BIOS setting is sufficient for previous CentOS versions.

2.4 Post-Installation

2.4.1 Initial Check

1. Verify that board is detected by BIOS/OS by running “`lspci | grep -i celoxica`” command. This command should list the number of boards installed on the server. Following shows example log for 4x1G-110 card:

```
[you@yourmachine]$ lspci | grep -i celoxica
04:00.0 Ethernet controller: Celoxica Unknown device
0005
```

2. Verify that low-level drivers are loaded properly by running “`lsmod | grep -i celoxica`” command. Following shows example output:

```
[you@yourmachine]$ lsmod | grep -i celoxica
celoxica_pcie          174876  0
mii                    38849   1 celoxica_pcie
```

3. Confirm the Accelerator Card(s) is (are) working by running “`acx -v -v -i`” at the command prompt. This prints information about your card(s), in particular the interface names and their MAC addresses in the following format (this example shows output for the Celoxica 2x10G-155 card):

```
[you@yourmachine]$ acx -v -v -i

Board 0

=== CLX Compatible acx ===

Board type           : Celoxica 2x10G-155
Firmware version     : 0x50603 (329219)
Device 0 family      : Xilinx Virtex-5
Device 0 part number : xc5vlx155tff1136-2
Bitfile name         : 'UDP '
Bitfile version      : 5.6
Bitfile flags        : 0x00000001
Bitfile date         : Thu Nov 22 18:42:17 2012
Bitfile revision     : 329219
Queue interface      : Supported
  DMA queues         : 16
  Number of Ethernet ports : 2
  Line arbitration support table : EMPTY
```

```
Serial           : 4X1-001-1011-01
[ac4] MAC Address 0 : 1a:04:03:f3:01:00
[ac5] MAC Address 1 : 1a:04:03:f3:01:01
Info changed      : Thu Feb 16 11:12:35 2012
DMA core version   : 0x050a00cc
Logging the acx output to file '/tmp/acx.log'
```

Warning:

The acx utility requires some PCIe transactions.

Celoxica strongly recommends not to use the acx command while the user application is running.

4. Run `copy_celoxica_examples` command, which copies the example tests and configuration files to your home directory, this allows you to make adjustments to examples without affecting the original files.

```
[you@yourmachine]$ copy_celoxica_examples
Copying Celoxica examples to /autohome/you/celoxica-
examples...
...done
```

2.4.2 NIC Test on UDP Cards

The `nictest` application runs the Accelerator Card as a NIC (Network Interface Card) emulator. This enables testing of basic card functionality.

1. Connect the `ac0` port of the Accelerator Card to your network using a CAT-5e or CAT-6 cable for 1G card, and Twinax or fiber OM3, OM4 for 10G card.
2. Bring the network interface up using a static network address that is valid on your network:

```
[you@yourmachine]$ sudo ifconfig ac0 192.168.0.1 up
```

3. Change to `nictest` install directory for the example:

```
[you@yourmachine]$ cd ~/celoxica/examples/base/nictest
```

4. Build the example:

```
[you@yourmachine]$ make
```

5. Run the example:

```
[you@yourmachine]$ ./nictest
Setting up Celoxica card for NIC emulation [OK]
NIC emulation running. Press Ctrl+C to exit
....
```

6. Ping another machine in the network using the `ac0` interface:

```
[you@yourmachine]$ ping -I ac0 192.168.0.2
PING 192.168.0.2 (192.168.0.2) 56(84) bytes of data.
64 bytes from 192.168.0.2: icmp_seq=1 ttl=64
time=0.098ms
64 bytes from 192.168.0.2: icmp_seq=2 ttl=64
time=0.067ms
```

7. This confirms that the Accelerator Card is functioning normally
8. Exit the example in the Step 4 by pressing `Ctrl+C`

2.5 Uninstalling the Software Packages

2.5.1 RPM Packages

1. Uninstall the rpms using 'rpm -e' taking care to uninstall the celoxica-base rpm last.

For example:

```
[you@yourmachine]$ rpm -e celoxica-gmac  
[you@yourmachine]$ rpm -e etc...  
[you@yourmachine]$ rpm -e celoxica-base
```

2.5.2 DEB Packages

1. Purge the debs using 'dpkg --purge' or 'dpkg -P' taking care to purge the celoxica-base deb last.

```
[you@yourmachine]$ dpkg -P celoxica-base_5.22-r2012-  
6.3_amd64.deb  
or  
[you@yourmachine]$ dpkg --purge celoxica-base_5.22-  
r2012-6.3_amd64.deb
```

Note:

It may not be sufficient to just remove the package using the remove option: Celoxica recommends using the purge option instead.

2.6 Updating the packages

The current update procedure involves removing the current packages (see section 2.5) and installing the new packages (see section 2.1).

2.7 Updating the firmware

Updated firmware is occasionally shipped with the software packages. If instructed to install an update by a Celoxica engineer, perform the update using one of the methods below.

2.7.1 Using the Script Supplied

The simplest method for updating the firmware is to use the supplied script: **celoxica_firmware_update**. The script checks whether the firmware installed is the latest version (as per the packages installed on the host system) and performs the update and read-back check if necessary. The update procedure is:

1. Run the script:

```
[you@yourmachine]$ celoxica_firmware_update
```

2. Power-cycle the server.

Note:

It is important that the server be power-cycled (powered off and then back on) to ensure that the newly flashed firmware is loaded onto the FPGA. Reboot is NOT sufficient to load the new firmware.

2.7.2 Using the Raw Commands

A Celoxica engineer may instruct you to update the firmware using the 'raw' commands - for instance, if downgrading or installing some alternative version of the firmware. The manual update procedure is:

1. Install the firmware from `/usr/share/celoxica/hardware/pcie` using the `acx` utility. The specific bitfile to flash onto the card depends on the type of card you have installed, the functionality required, and the application. A Celoxica engineer can advise on which bitfile to use. The format of the command is as follows:

```
acx -I acX -wcb 1
/usr/share/celoxica/hardware/pcie/<clb-file>
```

Where:

- **acX** specifies one of the interfaces on the board to be reprogrammed (see section 2.4.1 for details on identifying the interfaces bound to each board).
- **clb-file** is one of the following:
 - **udp-2x10g-155.clb** for UDP functionality on Celoxica 2x10G-155 board
 - **udp-4x1g-155.clb** for UDP functionality on Celoxica 4x1G-155 board
 - **udp-4x1g-110.clb** for UDP functionality on Celoxica 4x1G-110 board
 - **udp-2x1g-lp-110.clb** for UDP functionality on Celoxica 2x1G-LP-110 board
 - **toe-4x10g-240.clb** for TCP-offload functionality on Celoxica 4x10G-240 board
 - **udp-4x10g-240.lcb** for UDP functionality on Celoxica 4x10G-240 board as supported on the 2x10g-155 board i.e. A/B arbitrage and hardware symbol filtering

For example:

```
For Celoxica 4x1G-155:
```

```
[you@yourmachine]$ acx -I ac0 -wcb 1
/usr/share/celoxica/hardware/pcie/udp-4x1g-155.clb
```

For Celoxica 2x1G-LP-110:

```
[you@yourmachine]$ acx -I ac0 -wcb 1
/usr/share/celoxica/hardware/pcie/udp-2x1g-lp-110.clb
```

The board is uniquely identified by the specified interface `acX`. There is therefore no need to use the `acx` utility for each interface available on the board.

2. Power-cycle the server.

Note:

It is important that the server be power-cycled (powered off and then back on) to ensure that the newly flashed firmware is loaded onto the FPGA. Reboot is **not** sufficient to load the new firmware.

2.8 Verifying firmware

Firmware image supplied with the release can be compared with Board flash contents using the following command.

For example:

For Celoxica 4x1G-155:

```
[you@yourmachine]$ acx -I ac0 -vcb 1
/usr/share/celoxica/hardware/pcie/udp-4x1g-155.clb
```

2.9 Board Recovery

Use the following steps to restore the firmware image on the board if a problem occurs during the user flashing process:

2.9.1 Xilinx Virtex-6 FPGA

1. Shutdown the server
2. Press the rear set recovery button on the card while powering up the server: The FPGA will be forced to read the backup firmware. Refer to *PCI Express Card Hardware Installation Guide* for the rear set recovery button location.
3. Attempt to reprogram the primary firmware using the procedures described in section 2.7, or as instructed by a Celoxica engineer.
4. Shutdown the server
5. Restart the server

2.9.2 Xilinx Virtex-5 FPGA

1. Shutdown the server
2. Install jumper to select backup slot. Refer to *PCI Express Card Hardware Installation Guide* for jumper location.
3. Power up the server
4. Attempt to reprogram the primary firmware using the procedures described in section *Updating the firmware*, or as instructed by a Celoxica engineer.
5. Shutdown the server
6. Remove Jumper
7. Restart the server

3. Environment Variables

The following table lists the environment variables that can be used by the Celoxica products.

Variable	Usage
CELOXICA_REGISTER_NO_SIGABRT	The register library traps the SIGABRT signal and the pending logs are flushed before the application quits. If the variable is set, any pending logs will be lost on application assert or abort.
CELOXICA_AFFINITY_REGISTER	Specifies the CPUs on which the Celoxica register thread is allowed to run, as a bitmask. The Celoxica register thread is used across the product range for logging, and is not latency-critical.
CELOXICA_AFFINITY_OTHER	Specifies the CPUs on which other non-latency-critical Celoxica threads are allowed to run, as a bitmask. Such threads include the network emulation thread, which enables the accelerator card to exchange non-offloaded traffic with the OS network stack, the Order Book snapshot management thread and the GMAC scheduler thread. This environment variable also sets the affinity for the Celoxica register thread, if CELOXICA_AFFINITY_REGISTER is not set.
CELOXICA_REGISTER_DIR	Specifies the location of the log file generated by the Celoxica register thread. If not set, the log file is written to ./log/default.log
DO_NOT_CALIBRATE	CPU calibration is disabled when the variable is set.

4. Contacting Support

4.1 FAQ

1. Following an Installation / Failure

Installation/Failure	Reboot Type/Workaround	Comments
After firmware installation	Power-Cycle/Cold-Boot	FPGA gets configured with new firmware image only after power-cycle.
After Driver package installation	Restart/Warm-Boot	There is a known issue with synchronizing DMA pointers within hardware and driver. This is a workaround.
After other package installation	None	
On 10G card, “nictest” shows link down on one of the interface after power-cycle/reboot when the interface is properly connected to switch.	Run “celoxica_10g_phy_reset.sh board_num”	This is a known issue. As a workaround, run phy reset script to restart link negotiation.
On 1G card, “nictest” shows link down on one of the interface after power-cycle/reboot when the interface is properly connected to switch.	Run “celoxica_1g_phy_reset.sh board_num i/f_num”	This is a known issue. As a workaround, run phy reset script to restart link negotiation.

2. Packet drops

The firmware (both 1G and 10G cards) is able to perform FCS checking so that corrupted packets are detected and subsequently dropped. If the user detects packet drops, the user should check `CRCErrors` count returned by the GMAC API

call `GMACStatsQueueGlobal()`. A count greater than zero indicates a likely network infrastructure fault such as bad cabling, bad SFPs or a faulty switch.

3. Library links

The following table provides the library per product to dynamically link to. Linking to these libraries automatically sets up the link to all dependencies. It is therefore recommended to only link to these libraries.

Product	Library Name
GMAC	libgmac.so
GXA	libgxa.so
OB	libob.so
UB client	libub_api.so
GXA Lite client	libgxa_lite_api.so

4.2 Contacting Support

In order to resolve issues in a timely manner, it is usually important to reproduce the issue either in the client's environment or our environment. The information below will help in accomplishing this. Please read through the following points before contacting support.

First, please try to identify if the problem is GMAC/OB application specific, GXA application specific, or related to the overall stability of the driver/kernel/network. If you are not sure, look at all of the following sections.

4.2.1 Applications Related Problem

When seeing unexpected data (e.g., negative prices, inconsistent security definition data, etc.), it's worth contacting the trader(s) or somebody experienced with the feed. He/she will be able to confirm whether this behavior is expected or not.

First, try running Celoxica provided example code to reproduce the problem. This can help in reproducing the issues and identifying whether the issue is related to Celoxica products or the client's software or network and server configurations.

1. Provide all config files or configuration including all data files specified in configuration, e.g., the symbol ref file.

2. Send the list of installed packages and board information, e.g., the output of running the commands:

a) `rpm -qa | grep celoxica`

b) `and acx -v -v -i`

3. Make sure you run with at least minimal verbosity, so errors are reported and all logs are supplied.

a) For GMAC

- `gmac.verbosity` set to at least 2
- `gmac.adc-verbosity` set to at least 5

b) For GXA

- `gxa.logging-sockets` set to yes
- `gxa.adc-verbosity` set to at least 2
- `gxa.verbosity` set to at least 2
- `gxa.markets.market.parameters.verbosity` set to at least 5

4. Send all output from the terminal when able. Some of the extensive logging is only output to the terminal. Additionally:

a) For GMAC

- `recovery.log` as specified by `gmac.recovery-logfile`
- `gmac.recovery-log-socket` set to yes to enable the logging of data from the recovery socket to the recovery log file

b) For GXA

- `audit.log` as specified by `gxa.audit-log`
- `plugin.log` as specified by `gxa.markets.market.parameters.logging-file`
- `socket.log` as specified by `gxa.logging-file` with `gxa.logging-sockets = yes`

5. Where applicable, provide the PCAP files from the network traffic (from the network port through which GXA and/or GMAC is communicating to the exchange) on the switch for the timeframe in the log files.

6. For GXA related issues, please make sure that you call the exchange if you see unexpected behavior (e.g., unexpected disconnects from the exchange, unconfirmed orders, etc.). The exchange will be able to provide additional information based on their logs. It is also important to request this information from the exchange right after the incident occurs, because verbose exchange logs are only kept temporarily.

4.2.2 Stability Driver / Kernel / Network Related Problem

Please provide the following logs:

1. Basic logs:

- a) send the file `host_query.txt` that is created by running the script `celoxica_host_query.sh`
 - b) send the output from running `sudo dmidecode`
 - c) `ethtool acX`, where X is the interface number associated with the board, i.e. `ethtool ac0`
 - d) `ifconfig -a`
 - e) chassis logs if there was unexpected reboot, system crash
 - f) copy of kernel logs: `/var/log/messages`
2. For network interface related issues provide the following in addition to the basic logs mentioned above.
- a) `nictest` output
 - b) "`celoxica_board_regs.pl`" (for 10G cards)
 - c) "`celoxica_sfp_dump.sh board_num if_number`" (for 10G cards)