ATTO

ATTO Technology, Inc.

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ATTO Celerity
Fibre Channel Host Adapter
Troubleshooting Guide

OVERVIEW

This document describes troubleshooting techniques that can be used to identify and resolve issues associated with the ATTO Celerity Fibre Channel Host Adapter.

Before continuing with this guide, verify that the latest host adapter driver and flash bundle are installed for your operating system. If you are experiencing an interoperability or protocol issue, chances are that other users have already reported the same thing. ATTO releases driver and flash bundle updates numerous times a year and there is a good chance your issue has already been resolved. The latest drivers can be obtained from the "Driver Download" section of the ATTO web site.

Also verify that you are using the latest versions of third party applications and storage devices. In addition to the steps listed below, we highly recommend you explore the following additional technical resources:

▪ Read the information posted in the support section of the ATTO web site [www.attotech.com/support]. The known issues and workarounds are listed.

▪ The known issues section of the Product Release Notes document may also be helpful in identifying a potential issue. Product Release Notes can be obtained in the "Driver Download" section of the ATTO web site.

▪ The "Installation and Operations Manual" explains proper techniques and tips used for installation, operation, and configuration of the host adapters. The "Utilities Manual" explains how to configure and tune your host adapter for optimal performance in given configurations. It also explains how the ATTO "ConfigTool" management GUI can be used to monitor operation of the host adapter and the connections to your storage targets. Both of these manuals can be found in the support section of the ATTO web site.

ATTO spends a great deal of time testing third party applications and products. This testing ensures that each supported configuration performs as indicated and operates successfully. Interoperability matrices are available in the support section of the ATTO web site. While these are not all inclusive, the listed products are a good baseline for assuring that they have been tested and should work in your system. Storage and system providers' web sites are the best sources for detailed configuration information including hardware and firmware/drivers/software for each component supported.

The ATTO ConfigTool is a great utility that can be used to monitor the connections between your host adapter and your storage. It will list and provide details on each connected device the host adapter sees. It will also allow you to configure the host adapter for specific modes of

operation. However, changing these settings can have adverse effects. ATTO recommends you leave the settings at their default values unless instructed to change them by an ATTO Technical Support representative or you have advanced knowledge of the Fibre Channel protocol.

TROUBLESHOOTING TECHNIQUES

There are a few categories that failures can be placed in:

- Hardware: A component completely or intermittently fails.

- Interoperability: One or more devices in the system interpret the protocol specification different than the others resulting in undesirable behavior.

- Design: There is an error in the implementation of the software or firmware that prevents or limits functionality.

- User Error: The system is unable to achieve expected behavior due to improper installation or configuration or the desired behavior is simply not achievable due to unrealistic expectations.

Troubleshooting steps need to be taken to isolate hardware failures and user errors, which can easily be remedied by replacing a piece of hardware or changing something, from interoperability or design errors which could require code changes and take considerable time to resolve.

Some of the problems common with most Fibre Channel installations include:

1) My operating system hangs, does not boot, crashes, or does not see the ATTO Fibre Channel HBA.
2) BIOS/EFI issues
3) My ATTO Celerity Fibre Channel HBA cannot find the Fibre Channel Storage volumes.

Unfortunately, these common problems can be caused by myriad of common installation mistakes/problems or combination of several problems.

Some of the following techniques may seem simplistic or overly obvious, but these are the ones that are commonly overlooked and can take several hours of frustration to locate. It is important to try only one technique at a time. While changing multiple variables may seem to be a time saver, it usually complicates the troubleshooting process. The goal is to observe the issue and systematically isolate it to identify the least common factors that cause it to occur. If the problem goes away, there is no sure way of knowing what actually resolved it. If the problem does re-occur, you may have actually fixed it with one change, but another change may have caused a similar symptom.

OBSERVATIONS

Take a step back and think about what is being observed. Ask the following questions:

- Has the configuration been working and all of a sudden now fails? If you can absolutely assure that nothing has changed, the issue is most likely due to a hardware failure. However, there are some very subtle changes that could have been made (maybe by a colleague) that could affect overall system behavior. What has changed? Has the switch or storage firmware been upgraded? Has something been added or taken away? Even something as seemingly innocuous as an upgrade to disk drive firmware in a RAID storage system can have unexpected effects on a SAN.

- What is the observed behavior compared to the expected behavior? When reporting an issue to ATTO, try to observe and report the overall "high level" problem as well as the details. For example, an overall problem may be that drives disappear during heavy I/O. The details would include if the host adapter reported or logged an error when this occurred. Providing enough detail is important towards achieving a quick resolution.

- Is the problem repeatable? If yes, can it be repeated on a non-production test system? Collecting information such as system error logs is often needed. Since production systems are not generally set up to collect this information in normal operation, it is important to be able to configure the system to collect data and recreate the problem on a non-production test system.

- What do the status LEDs indicate? Check the adapter and switch LEDs to determine the status. Refer to the appropriate product manuals to gain an understanding of what the LEDs indicate, but they are usually a good source of information towards identifying root cause.
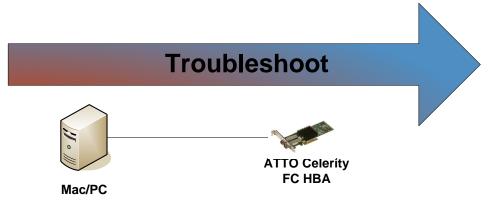
Record your observations. When an error is encountered, please insure you have an answer to each of the following questions when reporting it as an issue to ATTO Technical Support. This will expedite the ability to find a resolution tremendously.

QUESTION	ANSWER
1. Computer Model:	
2. Operating System and Kernel Version:	
3. PCI slot # and type:	
4. ATTO Driver version:	
5. ATTO Flash Bundle version:	
6. ATTO Configuration Tool version:	
7. Include the manufacturer, model number and firmware level for the switch:	
8. List the application(s) and version(s) that were running when the failure occurred.	
9. Did it ever work? Is this a new error that just started happening, or is this an error that has been existed since the first use?	
10. Does the error occur when you try it with a second host adapter (if possible)? For example, swap out one host adapter for another and see if error still occurs.	
11. Does the error occur when you try it with a different SFP (if possible)? For example, swap out one SFP for another and see if error still occurs.	
12. Is the adapter in default mode? Are there settings that have been adjusted that may be causing the problem? Do settings need to be adjusted to allow the device to function properly?	
13. Can the error be reproduced easily? How often does it fail? Does the error occur sporadically/randomly, or can it be reproduced every time?	

Once the problem is observed, attempt to determine where the problem originates. Begin by eliminating problem sources at a high level. Is it the server, network or the storage? If the network and storage can be eliminated, only the server and its components need to be examined.

Problem #1: My operating system hangs, does not boot, crashes, or does not see the ATTO Celerity Fibre Channel HBA.

Troubleshoot

**ATTO Celerity
FC HBA**

Mac/PC

With this problem, you will want to troubleshoot the host first. Troubleshooting should start with:

Host:
1) Try reseating the Celerity Fibre Channel HBA in the PCIe slot
2) Try plugging the Celerity Fibre Channel HBA into another PCIe slot if available. If this works, you could have a bad PCIe slot.
3) Verify that your host has the latest system updates (BIOS, EFI, firmware, OS, etc).
4) Remove any other non-vital PCIe controller cards from the system and see if the HBA is detected.
5) If the system is hanging or crashing in the Operating System:
   a. Verify that you are using the latest ATTO driver and firmware.
   b. Verify that your Operating System has the latest OS updates.

ATTO Celerity Fibre Channel HBA:
1) Disconnect any Fibre Channel devices from the controller and reboot the computer. If this resolves the issue, investigate the Fibre Channel cables or Fibre Channel target devices as described in the section below.
2) If the computer still does not boot, try installing the controller in a different computer. If the controller works in the new computer, report this as a possible interoperability issue between the controller and the computer.

3) If the system is hanging during the BIOS or EFI post, or if the hang is when accessing the BIOS/EFI setup utility, please refer to problem #2 – BIOS/EFI troubleshooting.

If you are still experiencing problems, see Appendix A to collect some logs and then contact Tech Support.

Problem #2: Troubleshooting BIOS/EFI issues:

This section describes troubleshooting techniques that can be used to identify and resolve BIOS/EFI issues associated with the ATTO Celerity Fibre Channel HBA. Some of these techniques may seem simplistic or overly obvious, but these are the ones that are commonly overlooked and can take several hours of frustration to find. It is important to only try one technique at a time. While changing multiple variables may seem to be a time saver, it usually complicates the troubleshooting process.

1) **The computer will not boot past its Power On Self-Test when the controller is installed.**
   - The controller may be improperly seated. Power down the computer and reseat the controller.
   - Try putting the controller in a different PCIe slot.
   - Disconnect any Fibre Channel devices from the controller and reboot the computer. If this resolves the issue, investigate the Fibre Channel cables or Fibre Channel target devices as described in the section below.
   - If the computer still does not boot, try installing the controller in a different computer. If the controller works in the new computer, report this as a possible interoperability issue between the controller and the computer. If the problem follows the controller, replace it with a new adapter.
   - Verify that the latest version of the computer BIOS is installed. *Use caution when updating the computer's BIOS. A mistake could leave the system in an unusable state*.

2) **The Celerity Fibre Channel HBA is installed in the computer but it does not appear during the system BIOS scan.**
   Note: The ATTO Technology banner should appear shortly after booting the computer.

   ```
   **************************************************
   *            ATTO Celerity Model™ Version X.XX        *
   *            Copyright ©  ATTO Technology, Inc.          *
   **************************************************
   ```

```
*** Press [Ctrl] [F] for Setup Utility ****
Channel 1 Celerity XXEN FW Version X.XX
```

- The controller may be improperly seated. Power down the computer and reseat the controller.
- Try putting the controller in a different PCI slot.
- Verify that the latest version of the computer BIOS is installed. Use caution when updating the computer's BIOS. A mistake could leave the system in an unusable state.
- Remove any non-vital PCI controllers from the system to determine if there is a PCI bus conflict.
- Disconnect any Fibre Channel devices from the controller and reboot the computer. If this resolves the issue, investigate the Fibre Channel cable or Fibre Channel target devices as described in the section below.
- If the computer still does not boot, try installing the controller in a different computer. If the controller works in the new computer, try updating the flash on the controller as described in the "Installation and Operations" manual. Then try it again in the original computer.
    - If it still fails, report this as a possible interoperability issue between the controller and the computer.
    - If the problem follows the controller, replace it with a new adapter.

3) **The computer freezes when the ATTO Banner is displayed during the system BIOS scan or when BIOS/EFI Config Utility is launched.**
    - Disconnect all devices from the Fibre Channel HBA and reboot the system.

If the system still freezes:
    - Remove any non-vital PCI controllers from the system to determine if there is a PCI bus conflict.
    - Remove the Fibre Channel HBA and test it in a different computer (not the same model). If the controller works properly, enter the ATTO Celerity Utility during the system BIOS scan by hitting Control-Z when prompted. Enter the controller configuration menu and disable the BIOS. There may be a BIOS conflict between the ATTO controller and the original computer. Place the controller back into the original machine and reboot.
        - If this resolves the issue, report this is as a BIOS conflict. Note that you can continue to operate. Disabling the BIOS will only prevent the computer from booting from an external drive connected to the controller.
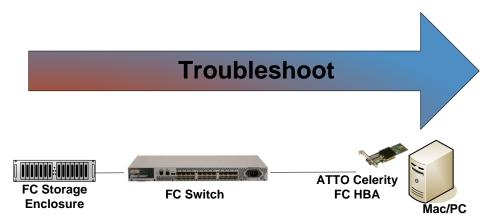
o   If the computer still hangs, replace the controller with a new one.

If the system no longer freezes after disconnecting the Fibre Channel devices:
- Check the Fibre Channel devices. Check for fault lights on the drives.
- Check cable integrity. Check the cables for solid connections. Make sure they are snapped in. Inspect cable ends for bent pins.
- Try attaching Fibre Channel devices one at a time with different cables, adding drives and cables until the problem occurs. This will help pinpoint the device or cable causing the problem.
- Watch the LED indicators on the Fibre Channel devices before, during, and after startup. Drive lights should also flash at startup as the Fibre Channel bus is scanned. This may give a clue as to the root cause of the issue.

Problem #3: My ATTO Celerity Fibre Channel HBA cannot discover the Fibre Channel Storage volumes.

When troubleshooting this kind of problem, the best approach is to troubleshoot the inside-out method.

Begin with the device(s) connected to the Celerity FIBRE CHANNEL HBA and work your way out:
Fibre Channel Storage Enclosure - Fibre Channel Switch - Fibre Channel HBA - Host

Hint: Take notice as to which drive or drives are not detected.
- Is it one drive?
- Is it a few drives, but they all seem to be associated with a specific cable, Host Adapter port, or part of the drive enclosure?

Fibre Channel Storage Enclosure:

1) **Check cable integrity**: Cables are the number one cause of problem in any Fibre Channel system. Cables that work on one Fibre Channel system will not necessarily will work on all Fibre Channel systems. Check the cables for solid connections.

2) **Check SFPs:** Intermittent SFPs can be the cause of numerous issues from not always detecting connected devices to inconsistent performance. Verify the SFP is rated for the speed of the devices.

3) **Power**: Make sure that the enclosure has the necessary power cabling and connections. Also a cause for drives not appearing can be insufficient or dirty power conditions. If the enclosure is connected to a UPS, try connecting it directly to the outlets instead. Also if the enclosure is sharing the circuit with many other devices, try placing the enclosure on its own circuit.

4) **External Fibre Channel Connectors:** Make sure the Fibre Channel Ports on the enclosure are in good condition.

5) **Fibre Channel Connector LEDs:** Many enclosures will have an LED on the Fibre Channel Ports to indicate if the links are up or not. If the LED does not light up, this may indicate a bad Fibre Channel cable or SFP.

6) **Enclosure Services:** Many enclosures will report fan speed, enclosure temperature, power levels, etc using an SES processor. Please refer to the Storage vendor's documentation to check these parameters.

7) **Host Mapping**: Verify that the specified Storage Volumes are created and are available. Many Storage arrays require the Storage volume to mapped to a specific Host; usually using the Fibre Channel HBA World Wide Node Name and/or World Wide Port Name. Check with Storage vendor for further details.

Fibre Channel Switch

1) First see if the Fibre Channel ports are up and running. You can check the LEDs on the switch port for link up. If the link is down, check the following:

   a. Date Rate Mismatch: Verify the Fibre Channel data rate of the switch port the HBA is plugged into is set to Auto. This should provide a link at the fastest possible speed. If the switch and the Celerity card are both set to auto and the link is still not working, try forcing both to same data rate (ex 16Gbps). If this fails, try a lower data rate for both the HBA and switch port.

   b. Connection topology: Verify that the switch port is configured as an N-Port or an F-Port.

   c. SFP: Verify that the SFP in the switch and the SFP in the Celerity Fibre Channel HBA it is attached to are using SFPs that are rated for the desired speed.

2) Verify if the switch has zoning enabled. If it is, verify that the Celerity Fibre Channel HBA

and the appropriate Fibre Channel storage devices are in the same zone. Please refer to Fibre Channel switch vendor's zoning documentation for further details.

ATTO Celerity Fibre Channel HBA:
1) First see if the Fibre Channel ports are up and running by verifying the LEDs on the HBA's bracket for link up. If the link is down, check the following:
   a. Date Rate Mismatch: Verify the Fibre Channel data rate of the target port the HBA is plugged into is set to Auto. This should provide a link at the fastest possible speed. If the switch and the Celerity card are both set to auto and the link is still not working, try forcing both to same data rate (ex 16Gbps). If this fails, try a lower data rate for both the HBA and switch port.
   b. Connection topology: Verify that the switch port is configured as an N-Port or an F-Port.
   c. SFP: Verify that the SFP in the switch/target and the SFP in the Celerity Fibre Channel HBA are rated for the desired speed.
3) Trying reseating cables into the ATTO Celerity Fibre Channel HBA.
4) If you have a dual channel ATTO Celerity Fibre Channel HBA, try swapping the cables around and see if the problem moves to the new connection. If it does, then the problem is most likely a cable problem. If it does not, you could have a bad Fibre Channel port or SFP on the Celerity Fibre Channel HBA.
5) Replace the cable.
6) Replace the SFP.

Host:
1) Verify that your host has the latest system updates (BIOS, EFI, firmware, OS, etc).
2) Verify that you are using the latest ATTO driver.
3) Verify that your Operating System has the latest OS updates.

If you are still experiencing problems, see Appendix A to collect some logs and then contact Tech Support.

Appendix A Contacting Support:

When you run into a situation where you cannot resolve an issue, please collect as much as possible of the following information before contacting ATTO Tech Support.

How to Gather Diagnostic Logs Used For Troubleshooting

These diagnostic logs can be useful when troubleshooting issues and will often be requested by ATTO Technical Support. There are two methods to collect the logs. The easiest is to use the ATTO ConfigTool to gathers events and other useful informational messages to a single archive. The logs can be collected with the one-button diagnostics menu item. It is recommended to install the ATTO ConfigTool service during the initial installation of the ATTO product to ensure that ATTO event logging is running and captures critical data at the time a failure occurs.

For headless systems, a script can be used instead of the ConfigTool to gather the logs.

1.0 - ATTO ConfigTool Download
The ATTO ConfigTool is a free utility available via the ATTO website. This application supports a variety of operating systems. Please visit the ATTO website (www.atto.com) for specific operating system support information and downloads.

2.0 - Using the ATTO ConfigTool with Both GUI and ConfigTool Service (Windows, macOS, and Linux)
Install the ConfigTool - Follow these installation instructions to install the full version of the ATTO ConfigTool to include the GUI and service
1. Launch the ATTO ConfigTool Installer
    o Windows - Run the ConfigTool_4xx.exe
    o Mac OS X – Mount the osx_app_configtool_4xx.dmg image and run the ConfigTool_4xx file
    o Linux – Extract the lnx_app_configtool_4xx.tgz package and run the ConfigTool_4xx.bin
2. Select FULL installation
3. Follow the on-screen instructions

Note: Oracle® Java version 1.5 or later is required to use the ATTO ConfigTool. Visit http://java.com for the latest Java updates for Linux and Windows. The latest Java runtime for Mac OS X can be obtained through Software Update.

Gather the logs with the ConfigTool GUI - *After the installation process simply open the ConfigTool and select **Help, Run Diagnostics.** Then choose a place to save the file output. It may take several minutes to gather the logs. See Figure 3 below.*

Figure 3 - Run Diagnostics generates an extensive log to aid in troubleshooting.

3.0 - ATTO ConfigTool Services Only (Linux)

Install only the ConfigTool service - *Follow the installation instructions below to install only the ATTO ConfigTool service. All Linux commands will be run within a terminal window and assumes the user has root access.*

1. Extract the Linux ConfigTool package: tar –xfz lnx_app_configtool_4xx.tgz
2. Change directory to the "Service" directory within the package extracted in step one and run this command to install the ConfigTool service: ./attocfgd.sei –install
3. Follow the on-screen instructions

Gather the logs with the diagnostic script - *After the installation process is complete the logs can be gathered by following these steps.*

1. Navigate to the provided linuxdiag.tar file
2. Extract the file: tar –xfz linuxdiag.tar
3. Open a terminal window, navigate to the file that was extracted in step 2, and run the script to gather logs: ./linuxdiag.sh
4. The script will create the logs and compress them into a file that can then be sent to ATTO technical support.

If troubleshooting a problem where host is freezing, crashing, or the Celerity HBA is not seen, try and get the system back to a known good state. This may require you removing the ATTO Celerity HBA. Once back to a known good state, run steps 1 to 5 above to collect the logs.

CONTACT INFORMATION

You may receive customer service, sales information, and technical support by phone Monday through Friday, 8:00 am to 6:00 pm Eastern Standard Time, or by email and web site contact form.

ATTO Technology, Inc.
155 CrossPoint Parkway
Amherst, New York 14068
Phone: (716) 691-1999
www.atto.com

Sales Support: sls@atto.com
Technical Support: techsupp@atto.com