

Application Note

January 2016

Install and Configure ATTO ThunderLink Bridge on Mac OS X for NEO Libraries







Summary

This application note describes how to install the ATTO ThunderLink (SAS&FC) Bridge driver and ATTO ConfigTool on Mac (10.10.3). To discover NEO devices on Mac with a Thunderbolt connection, the ATTO ThunderLink device drivers must be installed.

About This Document

Use the following information as a reference when implementing NEO tape libraries with ATTO ThunderLink Bridges on Mac OS X systems. This document describes in detail what Thunderbolt and ATTO ThunderLink Bridges are as well as how to install the ATTO supporting drivers and utilities. The driver installation is similar on the ATTO bridge product regardless of the interface type. The steps to install the driver for the ATTO ThunderLink FC Bridge FC2082 are the same as the SAS SH2068, only the filenames differ. The product references used in this document are the NEOs StorageLoader and the ATTO ThunderLink FC2082 Bridge; however, there are references to both products throughout this document. Refer to the Troubleshooting section of this document for resolutions to different issues you may encounter.

About Thunderbolt Interface

On Mac systems, Thunderbolt provides two channels on the same connector that is capable of 10Gb/s throughput both directions. This is 40 times faster than USB2, twice the speed of USB 3 and 25 times faster than FireWire. Thunderbolt is used for high-end or high-performance Storage Subsystem, which is ideal with the NEO tape library products.



NOTE: Thunderbolt connectivity to a NEO tape library using an ATTO ThunderLink Bridge is limited to the type of Apple Mac configuration. Some older Mac systems have an interface that will look like a Thunderbolt but in reality, it is a Mini Display Port, which is the same type of connector but passive. The difference is that a true Thunderbolt interface can provide power to a Thunderbolt device, which is active instead of passive.

Additional information under the topic *Which Macs have Thunderbolt Ports* section can be found here:

https://support.apple.com/en-us/HT204154

CAUTION: Connecting a NEO tape library to an unsupported Mac configuration can result in an inability to discover any of the tape library devices on the Mac system.

About ATTO ThunderLink SH 2068

This bridge acts as an external Thunderbolt to SAS/SATA adapter, connecting all-in-one systems and laptops to a 6 Gb/s SAS/SATA storage devices. The SH 2068 provides Mac OS systems the capability to use the Thunderbolt interface and attach to as a SAS alternative interface to any Overland Storage NEO tape library products.



Additional information on the ThunderLink SH2068 can be found here.

https://www.attotech.com/products/thunderbolt-desklink-devices/ThunderLink/thunderbolt-2-to-6gb-sas-sata/TLSH-2068-D00

SAS Specifications

- Up to 1375 MB/s maximum throughput
- Dual 20 Gb Thunderbolt with Display Port and device daisy-chain support
- Thunderbolt line speed performance
- SAS 2.0, SAS, SATA and SATA II support
- Supports up to 128 drives
- Thunderbolt certified for Mac and PC
- Support for Linux® operating systems when Thunderbolt-enabled systems become available)
- Exclusive Advanced Data Streaming (ADSTM) Technology
- ATTO Config Tool, a Graphical User Interface, for customized performance settings
- Proven interoperability with support for leading storage hardware & software vendors
- 3-year standard product warranty
- RoHS Compliant

The following image shows the cable connection of a Thunderbolt cable and SAS cable to an ATTO ThunderLink SH2068.



About ATTO ThunderLink FC 2082

This bridge acts as an external **Thunderbolt 2 to Fibre Channel adapter**, connecting all-inone systems and laptops to 8Gb/s Fibre Channel storage devices. With dual channel configurations, the 8Gb/s Fibre Channel Desklink Device is an ideal solution for users looking to achieve the highest I/O and data throughput for advanced video and access to IT applications. ThunderLink 8Gb/s Desklink Devices offer driver support for Mac OS X 10.9 or later when Thunderbolt-enabled systems become available), providing a single connectivity solution for customers with heterogeneous operating system environments.



Additional information on the ThunderLink FC2082 can be found here:

https://www.attotech.com/products/thunderbolt-desklink-devices/ThunderLink/thunderbolt-2-to-8gb-fibre-channel/TLFC-2082-D00

Fibre Channel Specifications:

- Up to 1600MB/s maximum throughput
- Dual 20Gb Thunderbolt 2 with Display Port and device daisy-chain support
- Exclusive Advanced Data Streaming (ADSTM) Technology
- Auto Negotiation to 8Gb and 4Gb devices
- Pluggable optical SFP+ LC modules included
- ATTO Config Tool, a Graphical User Interface, for customized performance settings
- 3-year standard product warranty
- RoHS compliant

The following image shows the cable connection of a Thunderbolt cable and SAS cable to an ATTO ThunderLink FC2082.



Required Information, Tools and Files

Before you begin these procedures, the following information, tools and files are required.

Prerequisites

- This document assumes the installer is familiar with Mac OS X.
- This document assumes the NEO tape library is connected and powered on. Additional information on setup can be found in the NEO Quick Installation or User Guide.
- This document assumes that the Mac system meets the bare minimum requirement to support the ATTO ThunderLink Bridge products.
- This document assumes the installer has read all ATTO ThunderLink Bridge documentation and is familiar with the products and processes required for the implementation.
- All ATTO software, which includes ATTO ThunderLink Drivers and Utilities, are found on ATTOs website.

https://www.attotech.com/register/?FROM=http://www.attotech.com/downloads.php

• Java is a required in order to install the ATTO ConfigTool.

Versions

The test environment uses the following versions:

- NEOs StorageLoader firmware v5.00 / 2.50n
- NEOxl 60, NEOxl 80 firmware v2.00
- NEOs T24, NEOs T48 firmware v5.00 / 3.20
- IBM ULTRIUM–HH6 FC firmware vD8E5
- IBM ULTRIUM–HH6 SAS firmware vE6R3
- ATTO ThunderLink SH 2068 driver version 1.2.0
- ATTO ThunderLink FC 2082 driver version 1.1.5
- ATTO ConfigTool version 4.20
- Mac Version 10.10.3

Download and Extract ATTO ThunderLink Drivers

- Download ATTO ThunderLink drivers from the Attotech Web Portal. https://www.attotech.com/register/?FROM=http://www.attotech.com/downloads.php
- 2. Double-click and extract the **dmg** package file.



This example shows a Fibre Channel ThunderLink FC2082 driver.





This example shows a SAS ThunderLink SH2068 driver.

ATTO ThunderLink Driver Installation Procedure

- **1.** Double-click the package to start the install wizard.
- 2. Click Continue.

This example shows a Fibre Channel ThunderLink FC2082 driver wizard.





This example shows a SAS ThunderLink SH2068 driver wizard.

- 3. When the Software License Agreement appears, select Continue.
- 4. Click Agree to continue the installation.
- **5.** Click **Install** to start the installation.



6. Provide the admin password and click Install Software.

Confi your	igTool_420 wants to make changes. Type password to allow this.
Userr	name: admin
Pass	word: ••••••

7. Click Continue Installation.

NOTE: You will be prompted to restart the computer after finishing the software installation.



8. Click Restart after completion of the installation.



ATTO ConfigTool Installation Procedure

1. Double-click the ATTO ConfigTool dmg file.



2. When the following Java SE dialog window appears, click **More Info**. Java is required to install ATTO ConfigTool.

-	To open " install the	ConfigTool_420" you n legacy Java SE 6 runt	eed to ime.
	Click "More download w	Info [®] to visit the legacy J ebsite.	ava SE 6
		More Info	OK

3. Repeat previous Step 1 after Java has been installed. When the following dialog window appears, click **Open**.



- 4. Enter the credentials when asked and click OK.
- 5. Review the introduction and click Next.
- 6. Review the license agreement and click Next.
- 7. Choose the installation folder and click Next.

8. Select either Full Installation or Application Only and click Next. The example shows the default of Full Installation.



- 9. When the installation summary appears, click Next.
- 10. When the Install Complete appears, click Done.
- **11.** To access the ATTO ConfigTool, select **Go Applications > ATTO ConfigTool**.



Verifying the NEO Tape Library on Mac

There are several ways to verify the NEO tape library on Mac OS natively or using ATTO utility such as ConfigTool. Native Mac OS tools are **System Profiler** | **Hardware** or use of the **ioreg** command line interface.

Verifying NEO devices with System Profiler | Hardware

 Navigate to System Profiler. Verify the devices from the SAS Hardware as shown below. The following image shows a NEO with one IBM LTO-6 SAS tape drive connected to ATTO SH2068 SAS Bridge.

			MacBook Pro	
Hardware	SAS Device Tree			
ATA	▼SAS Domain 0			
Audio	SCSI Target Device @ 0			
Bluetooth	SCSI Logical Unit @ 0			
Camera	SCSI Logical Unit @ 1			
Card Reader				
Diagnostics				0
Disc Burning	SAS Domain 0:			
Ethernet Cards	Verder ATTO Technology	1		
Fibre Channel	Product: ATTO ThunderLink	Inc. SH 2068		
FireWire	Revision: 179	0112000		
Graphics/Displays	Initiator Identifier: 65536	Initiator Identifier: 65536		
Hardware RAID	SAS Address: 50:01:08:60:00:04:1C:7E			
Memory				
NVMExpress	SCSI Target Device @ 0:			
PCI	SAS Address:	50:00:E1:11:C1:A0:C0:02		
Parallel SCSI	SCSI Target Identifier:	0		
Power	SCSI Peripheral Device Type:	1		
Printers	Manufacturer:	IBM		
SAS	Model: Revision:	E6B3		
SATA/SATA Express	The violation	20.10		
SPI	SCSI Logical Unit @ 0:			
Storage				
Thunderbolt	LUN Address: 00:00:0	00:00:00:00:00		
USB	SCSI Logical Unit @ 1-			
Network	Cool Logical Onit of 1.			
Firewall	LUN Address: 00:01:0	0:00:00:00:00:00		
Locations				
Malana				

2. Verify the devices from the FC Hardware as shown below. The following image shows a NEO with an IBM LTO-6 FC tape drive attached to an ATTO FC2082.



Verifying NEO devices with ATTO ConfigTool

1. Navigate to Go > Applications and select ATTO ConfigTool.



2. Browse the **localhost** and navigate down to the ThunderLink device. The following shows the SAS SH2068 with a NEOs tape library and drive attached. There are additional options when the Channel and NVRAM is open. The default configuration is the recommendation.

		ATTO ConfigTool
Device Listing		Basic Info Flash
V Network V I Iocalhost V ThunderLink SH 2068 V Channel 1 ULTRILM-HH6 FlexStor II ULTRILM-ING	Device Information Name: Device Type:	ULTRIUM-HH6 Sequential access device
	Bus Type:	SCSI
	Location:	Bus: 0 Target: 0 LUN: 0
0	Serial Number:	Not Available
	Driver Information	
	Driver Name:	Unknown: driver not loaded.
	Driver Version:	Unknown: driver not loaded.
	-HH6 information retrie	eved.

Device Listing		Basic Info Flash	
Vetwork	Device Information		
Channel 1 ULTRIUM-HH6 FlexStor II ULTRIUM-HH6	Device Type:	Sequential access device	
	Bus Type:	SCSI	
	Location:	Bus: 0 Target: 0 LUN: 0	
	Serial Number:	Not Available	
	Driver Information		
	Driver Name:	Unknown: driver not loaded.	
	Driver Version:	Unknown: driver not loaded.	
Status	ļ		

This example shows a two drive NEOs with the details of the tape drive selected.

Device Listing		ATTO ConfigTool Residuate Flash		
Network				
 Iocalhost ThunderLink SH 2068 	Device Information		1	
Channel 1	Name:	FlexStor II		
ULTRIUM-HH6	Device Type:	Medium changer device		
	Bus Type:	SCSI		
	Location:	Bus: 0 Target: 0 LUN: 1		
	Serial Number:	00L4U78P7792_LL0		
	Driver Information			
	Driver Name:	Unknown: driver not loaded.		
	Driver Version:	Unknown: driver not loaded.		
Status				
ATTO FlexStor I	l information retrieved.			

This example shows a two drive NEOs with the details of the library selected.

		ATTO ConfigTool	
Device Listing		Basic Info Flash	
Iocalhost Thunderlink SH 2068	Device Information		
Channel 1	Name:	FlexStor II	
	Device Type:	Medium changer device	
	Bus Type:	SCSI	
	Location:	Bus: 0 Target: 0 LUN: 1	
	Serial Number:	00L4U78P7792_LL0	
	Driver Information		
	Driver Name:	Unknown: driver not loaded.	
	Driver Version:	Unknown: driver not loaded.	
Status			
ATTO FlexStor I	l information retrieved.		

This example shows a NEOs library attached to an ATTO ThunderLink FC2082.

This example shows a two drive NEOs library attached to an ATTO ThunderLink FC2082. Both tape devices are on different channels.

	ATTO ConfigTool
Device Listing	Basic Info Flash Advanced
v I localhost	Device Information
Channel 1	Name: ThunderLink FC 2082
Channel 2	Device Type: Fibre Channel Controller
FlexStor II QA-MAC-84.local.	Bus Type: PCI
	Location: Thunderbolt 2
	Driver Information
	Driver Name: /Library/Extensions/ATTOThunderLinkFC16.kext
	Driver Version: 1.1.5
Status	
ATTO ThunderLink FC 2	32 information retrieved.

Verifying NEO Devices with Mac Command Line Interface

- **1.** Launch a terminal window.
- 2. Use the command ioreg.

The following ioreg output displays the library FlexStor II, the NEOs tape library models StorageLoader, T24 and T48.

	1 I I I I I I I I I I I I I I I I I I I	+-o IOSCSIHierarchicalLogicalUnit@000100000000000 <class 0x1000002fa,="" id="" ioscsihierarchicallogicalunit,="" matched,<="" registered,="" th=""></class>
0 ms), retain 8>		
	1	1 €
	1	"TPGS Information" = 0
	Í.	"CurrentPowerState" = 1
	1 I I	"INQUIRY Unit Serial Number" = "00L4U78P7792_LL0"
	1	"Product Identification" = "Textor II"
	1	"IOUnitLUN" = 1
	Î.	"IOUnitLUNBytes" = <000100000000000>
	Î.	"IOPowerManagement" = {"MaxPowerState"=1,"DevicePowerState"=1,"CurrentPowerState"=1,"Capability
verPowerState"=1}		
	1	"INQUIRY Device Identification" = ({"Identifier Type"=1,"Code Set"=2,"Identifier"="BDT 🔤exStor II 00L4U78P7792_
"=0})		
	1	"Peripheral Device Type" = 8
	i.	"IOUserClientClass" = "SCSITaskUserClient"
	1	"SCSI Logical Unit Number" = 1
	Í.	"SCSI Logical Unit Bytes" = <000100000000000>
	1	"IOCFPlugInTypes" = {"7D66678E-08A2-11D5-A188-0030657D052A"="IOSCSIArchitectureModelFamily.kext/Contents/PlugIns/SCSITas
Contents/PlugIns/SCSITaskLib	.plugin"}	
	1	"Vendor Identification" = "BDT"
	Í.	"IOMatchCategory" = "SCSITaskUserClientIniter"
	Î.	"SCSITaskUserClient GUID" = <3302d8a56ebf4606a6f1588df8ebbed5>
	1	"Product Revision Level" = "5.00"
	1	"Protocol Characteristics" = {"Write Time Out Duration"=30000, "Read Time Out Duration"=30000, "Physical Interconnect"="SA
dentifier"=0,"Physical Inter-	connect Lo	ocation"="External","Multiple Initiators"="True","SCSI Logical Unit Number"=1,"SCSI Logical Unit Bytes"=<000100000000000,"SAS
1148c60002>,"SCSI Domain Iden	ntifier"=0),"Unique SCSI Port Identifier"=<5000e11148cE0002>}
	1	"IOGeneralInterest" = "IOCommand is nct serializable"
	1	"SCSITaskDeviceCategory" = "SCSITaskUserClientDevice"
	1	1 }

The following **ioreg** output depicts a IBM LTO-6 ULTRIUM-HH6 Tape Drive in the NEOs StorageLoader.

+-c IOSCSITargetDevice <class (1="" 0="" 0x1000002f5,="" 13="" active,="" busy="" icscsitargetdevice,="" id="" matched,="" ms),="" registered,="" retain=""></class>
"Product Revision Level" = "E6R3"
"Peripheral Device Type" = 1
"Vendor Identification" = "IBM"
"INQUIRY Device Identification" = ({"Identifier Type"=1,"Code Set"=2,"Identifier"="IBM ULTRIUM-HH6 11C1A400B5","As
<pre>lentifier"=<5000e11148c60001>, "Association"=0}, {"Identifier Type"=4, "Code Set"=1, "Identifier"=<00000001>, "Association"=1}, {"Identif</pre>
<pre>i0002>,"Association"=1},{"Identifier Type"=3,"Code Set"=1,"Identifier"=<5000e11148c60001>,"Association"=2})</pre>
"Product Identification" = "ULTRIUM-HH6"
"INQUIRY Unit Serial Number" = "11C1A400B5"
"Protocol Characteristics" = {"Write Time Out Euration"=30000, "Read Time Out Duration"=30000, "Physical Interconnect"="SAS"
Location"="External","Multiple Initiators"="True","SAS Address"=<5000e11148c60002>,"SCSI Domain Identifier"=0,"Unique SCSI Port Id

Troubleshooting

Use the following section to help troubleshoot any device discovery related common issues.

I am unable to discover NEO devices using ioreg.

1. For Mac OS 10.10 or higher, use the following ioreg command with certain key words and parameters:

ioreg	-1	grep	FlexStor
ioreg	-1	grep	ULTRIUM
ioreg	-1	grep	ULT3580

2. For Mac OS 10.5.x and lower, export out to a text file and then complete searches. Use the following command:

ioreg > ioreg.txt

I am unable to discover NEO devices attached to ATTO Fibre FC2082.

Default configurations work without modifications for the FC2082 and NEO library. However, the Data Rate and Connection Mode may need to be set if devices are not found.

- **1.** In ATTO ConfigTool, click the **Channel** and **NVRAM**. The following shows **Auto** as the default for data rate.
- 2. Click the far right to select the appropriate setting, then select Commit.

	ATT	O ConfigTool	
Device Listing	_	Basic II	nfo NVRAM
Vetwork	NVRAM	Configuration	
 ThunderLink FC 2082 Channel 1 		Node Name:	20:00:00:10:86:04:1e:fe
Channel 2		Port Name:	10:00:00:10:86:04:1e:fe
FlexStor II		Boot Driver:	Disabled
▶ C QA-MAC-84.local.		Hard Address Enable:	Disabled
		Hard Address:	0
		Execution Throttle:	255
	0	Frame Size:	2048
		Connection Mode:	2 Gb/sec 4 Gb/sec 8 Gb/sec
		Data Rate:	✓ Auto
		Interrupt Coalesce:	None
		Port Down Retry Count:	8
		Link Down Timeout:	0
		Spinup Delay	
	Load	Save	Commit Restore Default

3. The Connection Mode Topology can also be configured.

	the second se	Al IO Contigiool	
Device Listing		Basic I	nfo NVRAM
V Network		NVRAM Configuration	
 ThunderLink FC 2082 Channel 1 ULTRIUM-HH6 ULTRIUM-HH6 FlexStor II QA-MAC-84.local. 		Node Name:	20:00:00:10:86:04:1e:fe
		Port Name:	10:00:00:10:86:04:1e:fe
		Boot Driver:	Disabled
		Hard Address Enable:	Disabled
		Hard Address:	0
		Execution Throttle:	255
	0	Frame Size:	Arbitrated Loop(AL) Point-to-Point(PTP)
		Connection Mode:	✓ AL Preferred PTP Preferred
		Data Rate:	Auto
		Interrupt Coalesce:	None
		Port Down Retry Count:	8
		Link Down Timeout:	0
		Spinup Delay	

I am unable to discover the NEO library (FlexStor II) with neither ioreg nor ATTO ConfigTool.

The following steps may be required to resolve any issues if a Tape Drive has been replaced.

- 1. Uninstall the ATTO ThunderLink SAS Driver. Navigate to Go > Applications > ATTO > ThunderLink SASHBA directory.
- 2. Click the Uninstall.command file. When the option Reboot appears, make sure to reboot the Mac.



3. Uninstall the utility ATTO ConfigTool. Navigate to Go > Applications > ATTO ConfigTool > Uninstall directory.



4. Click the **uninstall** file. Run through the uninstall wizard, then reboot the Mac.

- 5. Run the ATTO Thunderlink Driver installation using the osx_drv_tlsashba_120.dmg command.
- 6. Use the ATTO driver wizard to finish the installation, then reboot the Mac.
- 7. Run the ATTO ConfigTool installer using the osx_app_configtool_420.dmg command.
- 8. Use the ATTO ConfigTool installer wizard to complete the install and reboot the Mac.
- 9. After reboot, verify with ATTO ConfigTool the tape drive and library are discovered.
- **10.** From a command line, use the command **ioreg** 1 (Mac OS 10.10.x or higher) to discover both devices, as shown in this example:

ioreg - l | grep ULTRIUM
ioreg -l | grep FlexStor

I am unable to discover the tape drive with ioreg.

In some cases, replace the grep parameter of UTLRIUM with ULT3580.

Last Login: Fri Oct 23 89:49:26 on consols Snap2413706:~ admin5 loreg -L | grep ULT3 dentifier Type"3,"Code Set"3, "Identifier"-S000e111412c0012, "Association"=0},{"Identifier Type"4,"Code Set"2,"Identifier"=TBM ULT3580-HH6 19VT067996", "Association"=0},{"Identifier"=C000 Set"3,"Identifier"=C000 Set"3,"C000 Set"3,"Identifier"=C000 Set"3,"C000 Set"3,"Identifier"=C000 Set"3,"C000 Set"3,"Identifier"=C000 Set"3,"C000 Set"3,"Identifier"=C000 Set"3,"C000 Set"3,"Identifier"=C000 Set"3,"Identifier"=C000 Set"3,"C000 Set"3,"Identifier"=C000 Set"3,"Identifier"=C000 Set"3,"Identifier"=C000 Set"3,"Identifier"=C000 Set"3,"Identifier"=C000 Set"3,"Identifier"=C000 Set"3,"Identifier"=C000 Set"3,"Identifier"=C000 Set"3,"Identifier"=C000 Set"3,"IdentifierType"3,"C00 Set"3,"Identifier"=C000 Set"3,"Identifier"=C000 Set"3,"Identifier"=C000 Set"3,"Identifier"=C000 Set"3,"Identifier"=C000 Set"3,"Identifier"=C000 Set"3,"Identifier"=C000 Set"3,"Identifier"=C000 Set"3,"IdentifierType"3,"C00 Set"3,"Identifier"=C000 Set"3,"Identifier"=C000 Set"3,"Set 3,"Identifier"=S000 Set"3,"Identifier"=S000 Set"3,"Identifier"=S000 Set"3,"Identifier"=S000 Set"3,"Identifier"=S000 Set"3,"Identifier"=S000 Set"3,"Association"=1,"Identifier"=S000 Set"3,"Identifier"=S000 Set"3,"Ide