BACKBOX®

BackBox® E4.11 VTC Server Installation

ETINET

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Introduction

This guide documents the installation and configuration of a BackBox Virtual Tape Controller (VTC) on a Windows 2016 and Windows 2019 server.

This Installation Guide is organized in four sections.

- Server preparation

- Fiber Channel Card installation

- VTC Software installation.

- VTC Initial configuration.

The BackPak Troubleshooting and Messages Manual complements the troubleshooting hints provided in some activity descriptions.

Server preparation

This section documents the preparation of a Windows server who will act as a Virtual Tape Controller (VTC) for BackBox environment.

Current BackBox version has been certified to run on Windows Server 2016 and Windows Server 2019.

Upload VTC Package

First step is to upload the current VTC software package on the server. The BackBox package is available to download from us. Ask your ETINET representative for credential and exact location of the package.

<p style="text-align:center">Table 1 - ZIP file to download</p>

ZIP file	Content
BackBox-Ev.vv-yyyymmdd.zip	ETI-NET release software

Once uploaded, unzip the BackBox software, the following image show the content of the zip file.

Install Additional Roles and Features

The next step of the preparation is to make sure all needed roles and features have been install on the server. To do so we provide a PowerShell script that will automatically check and add any missing component to the Windows installation.

Before doing so PowerShell execution policy must be set up properly to do the following action:

- While logged as local administrator, start a PowerShell command window, type the following command to allow script execution:

```
Set-ExecutionPolicy -ExecutionPolicy RemoteSigned -Scope LocalMachine
```

- Ensure the policy is in force:

```
Get-ExecutionPolicy -List
```

Scope	ExecutionPolicy
-----	---------------
MachinePolicy	Undefined
UserPolicy	Undefined
Process	Undefined
CurrentUser	Undefined
LocalMachine	**RemoteSigned**

Once this is done, proceed with the execution of the ETINET script for roles and features. From the location where the BackBox package was unzipped, go to the VTCserverScripts-YYYYMMDD folder, right-click on the file **VTCserverStdRolesAndFeatures.ps1** and click on the **Run with PowerShell** (or launch the script from the opened PowerShell command line).
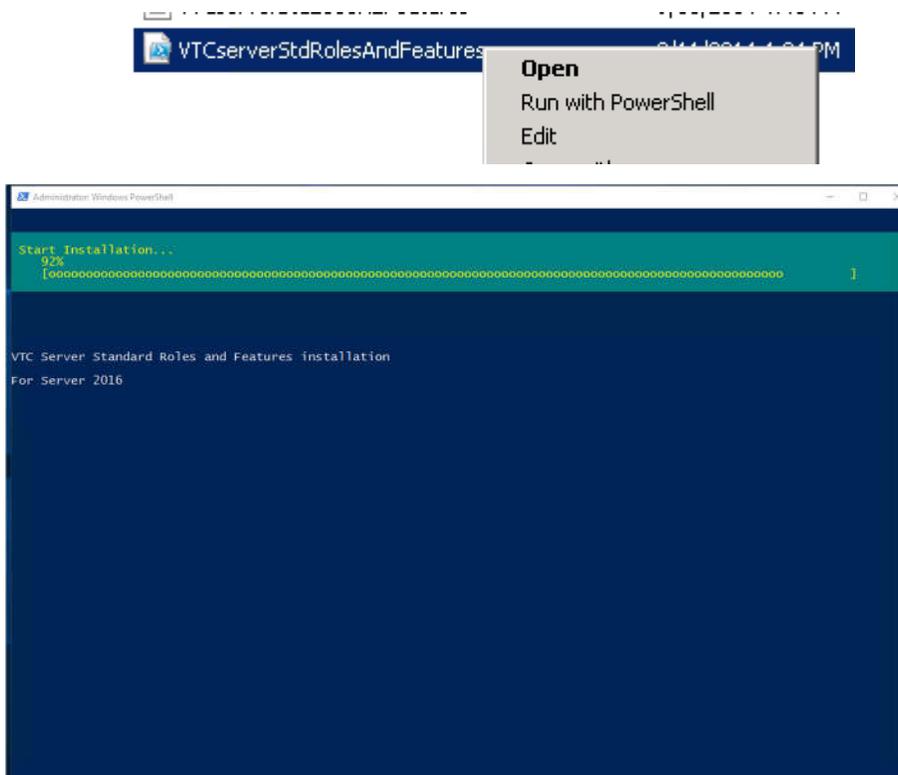
Note: Some features will require rebooting the server. Re-execute this script until it show there is no more features needed to be installed.

Install FC cards in VTC

IMPORTANT NOTES:

The PCI boards, as well as the server components, are easily damaged by static electricity that can be discharged when you touch them. You <u>must</u> use anti-static procedures, such as grounded wristbands, when handling the cards outside of their anti-static bags and during the installation procedure.

Prerequisites

ATTO Celerity FC-82EN or FC-84EN adapter

ATTO Celerity FC-162P or FC-164P adapter

Administrator account under Windows

NOTE: This procedure is illustrated with a 2-U rack-mount ProLiant DL380 and a PCI-X FC42XS card. While specific hardware orientations and assembly steps may vary from one server model to another, the general procedure will be the same. See the ATTO Technology "Installation and Operation Manual Celerity FC host adapters" for details about other adapters listed above.

If the server is running, shut it down from the Windows Start menu.

Disconnect both AC power cords from the rear of the chassis.

Disconnect any cables connecting to any cards that may already be installed in the PCI riser Cage.

Slide the server chassis fully out of the rack on its rails.

Remove the top cover, opening it using its latch.Unscrew the plastic knobs that secure the PCI riser cage to the chassis and lift the riser cage out of the chassis.

Place the riser cage upright on a clean flat surface.

Example of a HP Proliant PCI riser cage, removed from server chassis

Remove the Fibre Channel PCI card from its antistatic bag and insert it into one of slot, marked as "64-bit/133MHz" (for FC-41XS or FC-42XS models only.) Snap the plastic clip in place to hold the top of the card bracket.

Celerity FC-42XS 4 Gbps dual-port PCI-X Card

Re-install the PCI riser cage in the Proliant chassis, tightening it securely to the backplane using the attached plastic knobs.

Replace the server cover, securing it in place with the latch in its center.Slowly push the server back into the rack.

Reconnect any cables that were disconnected in step c.

Re-insert the two power cords in the rear of the server.

Power up the server and log on to it using the local adminstrator account. After logon the Windows Plug & Play wizard could prompt for "New Hardware found" and ask to search and install coresponding driver. Select the "Cancel" button for all pop-up windows that occur (one per channel installed). FC adapter drivers will be installed in a subsequent step.

Go to **Administrative Tools** ⇒ **Computer Management** and check if you can see the Fibre Channel Controller(s) in the **Device Manager**
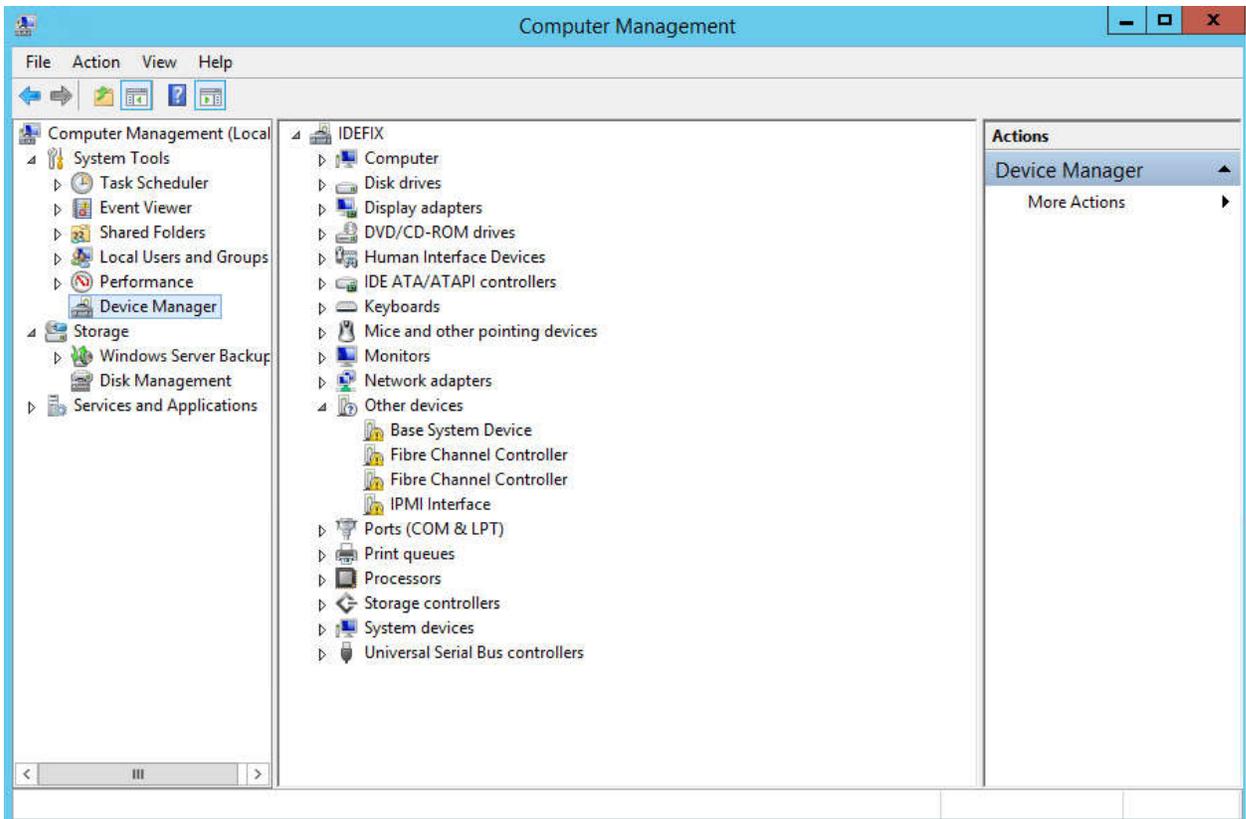
Windows Device Manager

In the above example you can see the new FC ports and are ready to install the Celerity driver.

Install FC Drivers in Windows

Prerequisites

ATTO configuration tool, driver and firmware of the FC card. You will find all installer in the installation package location **AttoCelerityFC-YYYYMMDD**

Administrator account under Windows on the server acting as the Virtual Tape Controller

IMPORTANT NOTE: During the initial installation you will need to install the driver before updating the firmware with the latest flash bundle. For an upgrade of firmware and driver after initial installation, it is recommended to upgrade the ATTO configuration tool to the latest version, upgrade the firmware to the latest flash bundle and finally update the driver version.

Verify BackPak software requirements

Components	Version	OS	Location
ATTO Configuration Tool	4.32	Server 2016 Server 2019	Tools\win_app_configtool_432
ATTO Celerity driver **FC-81EN** **FC-82EN** **FC-84EN**	2.07.0f1	Server 2012 R2 Server 2016	FC8\win_drv_celerity8\2.07.0f1\x64
ATTO Celerity driver **FC-161P** **FC-162P** **FC-164P**	1.62.0f1	Server 2016 Server 2019	\AttoCelerityFC-20191101\FC16 \win_drv_celerity16\1.62.0f1\x64\Win10 \AttoCelerityFC-20191101\FC16 \win_drv_celerity16\1.62.0f1\x64\Win
ATTO Celerity flash **HBA** **FC-81EN** **FC-82EN** **FC-84EN**	01/11/2019		FC8\win_fls_celerity8_180406\flsbundle_celerity8_2019_11_01

Components	Version	OS	Location
ATTO Celerity flash **HBA** **FC-161P** **FC-162P** **FC-164P**	01/11/2018		FC16\win_fls_celerity16-32_181101\flsbundle_celerity16-32_2018_11_01 If your flash bundle is older then 30/01/2018 you must first upgrad to that version before installing this one
ATTO Celerity flash **HBA** **FC-162P** **FC-164P**	30/01/2018		** Must install this version before doing the 01/11/2018 one ** FC16\win_fls_celerity16-32_180130\flsbundle_celerity16-32_2018_01_30

Install the FC adapter driver

Reach the appropriate installer at the location indicate in the software requirement table and double-click on **Setup.exe** and follow the installer's instructions.

During this installation, you could be prompted for Version Signature mismatch (see next figure). For each popup windows (one for each Channel), press the **Continue Anyway** button.

Although we recommend using the latest release of driver available, ATTO does not usually sign all their release. If you absolutely require signed driver, they are provided in the package inside folder marked has signed (ex: FC8\win_drv_celerity8\1.95-Signed).
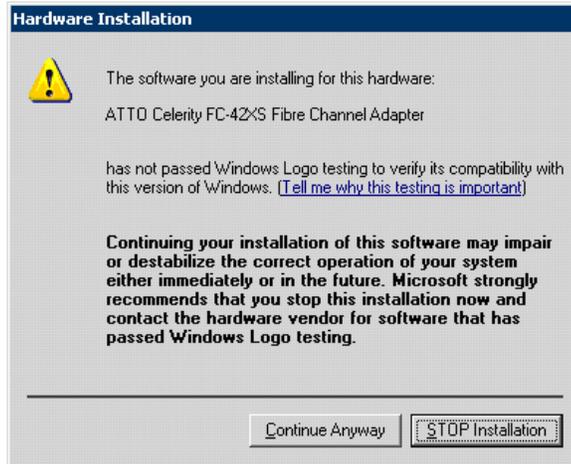
Windows driver validation warning dialog box

In the **Device** Manager, verify that all FC adapters were installed correctly.
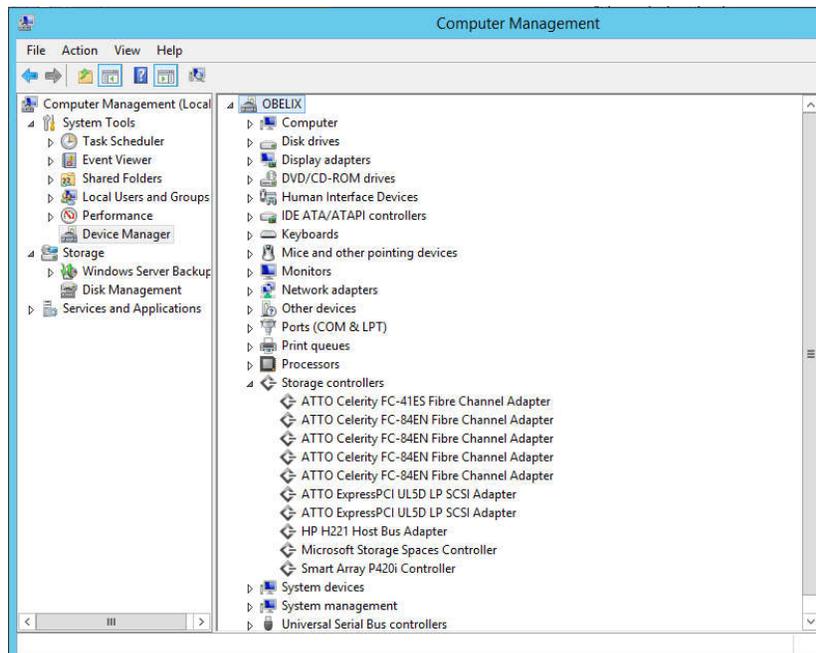
Windows Device Manager display of FC devices after driver installation

Install the FC Configuration Tool

Perform this sub-task only if there is no ATTO Configuration Tool already installed or the currently installed version is an older one.

Access the **repository folder** and navigate to the **AttoCelerityFC-20191101** directory, sub directory **Tools\win_app_configtool_432**

Double-click on **ConfigTool_432.exe** and follow the installer's instructions. You should accept all default and choose a Full installation. If a previous version of the ATTO configuration tool is already installed, you may be prompted to uninstall the old version first.

Validate FC card channel parameters

Start the **ATTO ConfigTool** (from the Windows Start menu ⇒ All Programs ⇒ ATTO ConfigTool.) After it opens, you will need to login with a user with the local administrator privilege. To login, try to expend the *localhost* node in the left pane.

Once login, you will be able to expand the **localhost** node in the left pane. For each Celerity Device listed perform the following:

In the Basic info tab, check the Driver version id is matching the driver version that you just installed. If not, you will need to re-install the Celerity driver. (See ***Installing the Celerity driver*** section.)
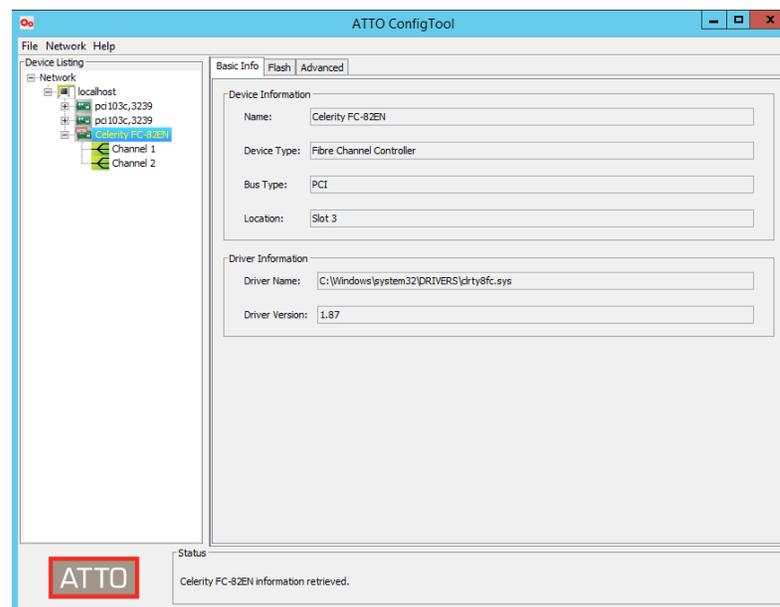
FC adapter and driver basic information display

In the Basic info tab, check if the driver version is 1.87 or above (for any FC-8xEN Adapter) to match the driver version that was just installed. If not, it will be necessary to re-install the Celerity driver.
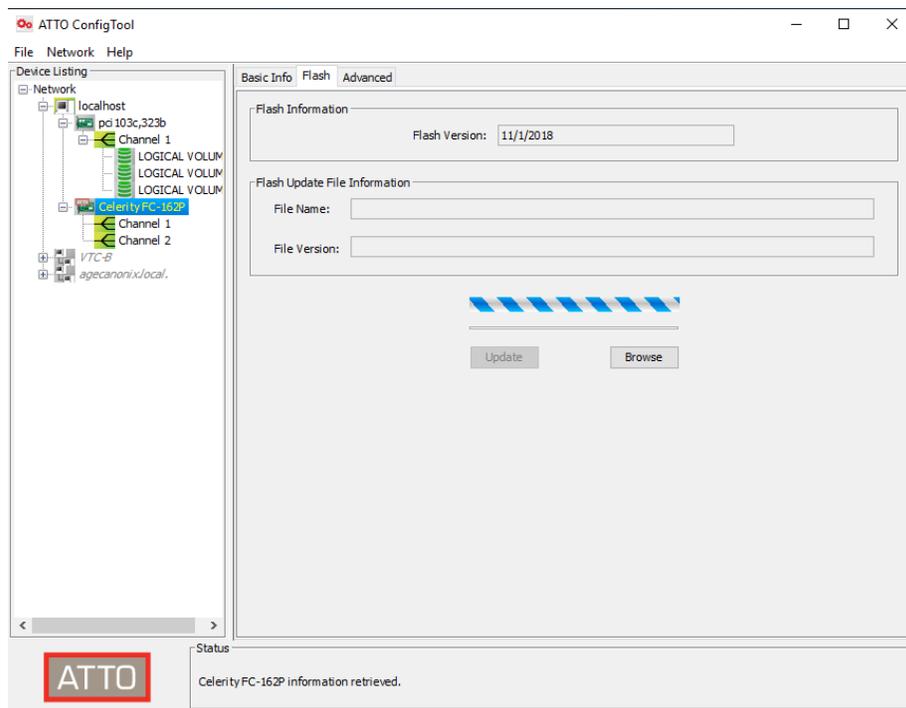
FC adapter Flash version validation

Now, expand the current **Celerity Device** node in the left pane.

For each Channel listed, verify that default values match the ones shown in the NVRAM figure. If not, update all mismatched fields. In particular, one parameter that may require changing is the **Connection Mode**. It must be set to "Point-to-Point".

When done with the changes for each port, press the **Commit Button**. Wait for the Commit confirmation status message before continuing (see Commit confirmation figure). You **must** press the **Commit** button for each Channel being updated.

Note: You can complete all parameters and Flash updates before restarting the server.

Note: If a FC switch is to be used to share use of a single NonStop FC port with multiple VTC FC ports, the following additional settings may be required:

> ➢ Configure a FC switch zone and customize switch setting

There is no single cookbook for this. Each switch and environment may require different settings. Contact your ETI-NET account representative for assistance.
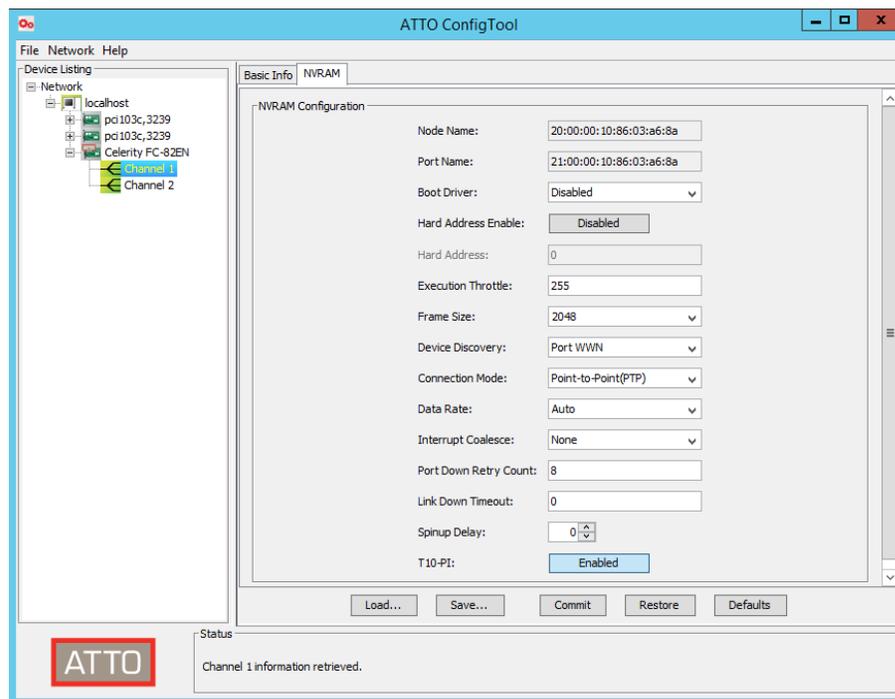
FC-8 adapter channel NVRAM parameter validation
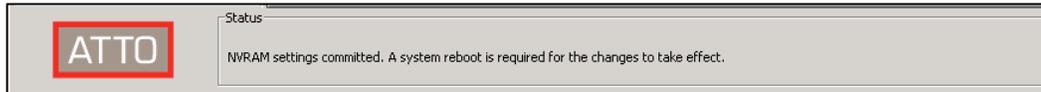
FC adapter NVRAM settings changes commit confirmation

Update FC adapter flash version

NOTE: This step is only required if the Flash version is older than **4/6/2018** (FC-8xEN and FC-16xP models)
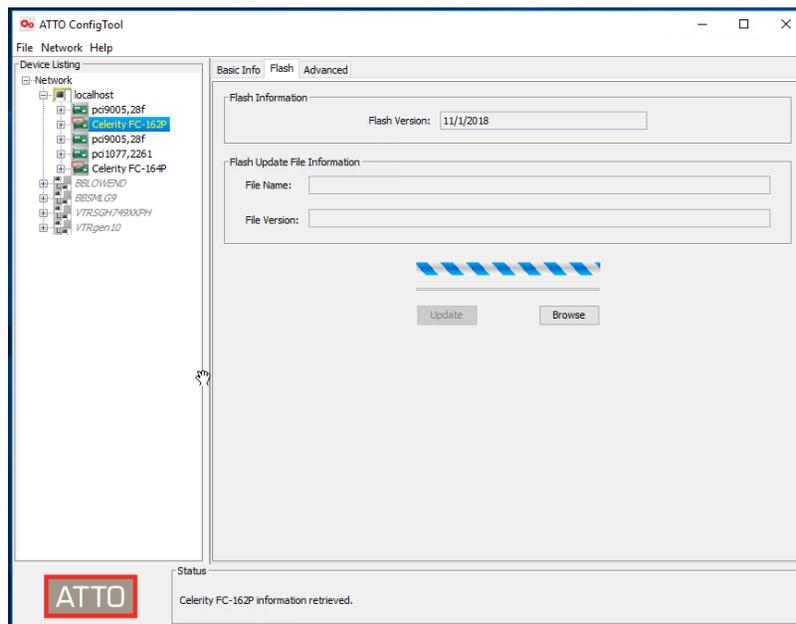
Example of older FC adapter Flash version

To update the Flash version, first press the **Browse** button. Then navigate up to the **repository folder**, **AttoCelerityFC-20191101 \FC8** or **\FC16** directory, and select the Flash Bundle file proposed by the Configuration Tool. To complete the selection, press the **Open** button. You will then be allowed to review the selected Flash Bundle file information and then start the process by pressing the **Update** button.

Wait for the Flash completion status message before proceeding to any other activities. Complete all others Celerity device Flash update.

IMPORTANT: Do not power off or otherwise interrupt server operation until the Flash update reports completion. Doing so could damage the FC card being updated.

Note: You can complete changes to all parameters and Flash updates, as well as setting Target mode (as described in the following section) before restarting the server. It is not necessary to restart multiple times.
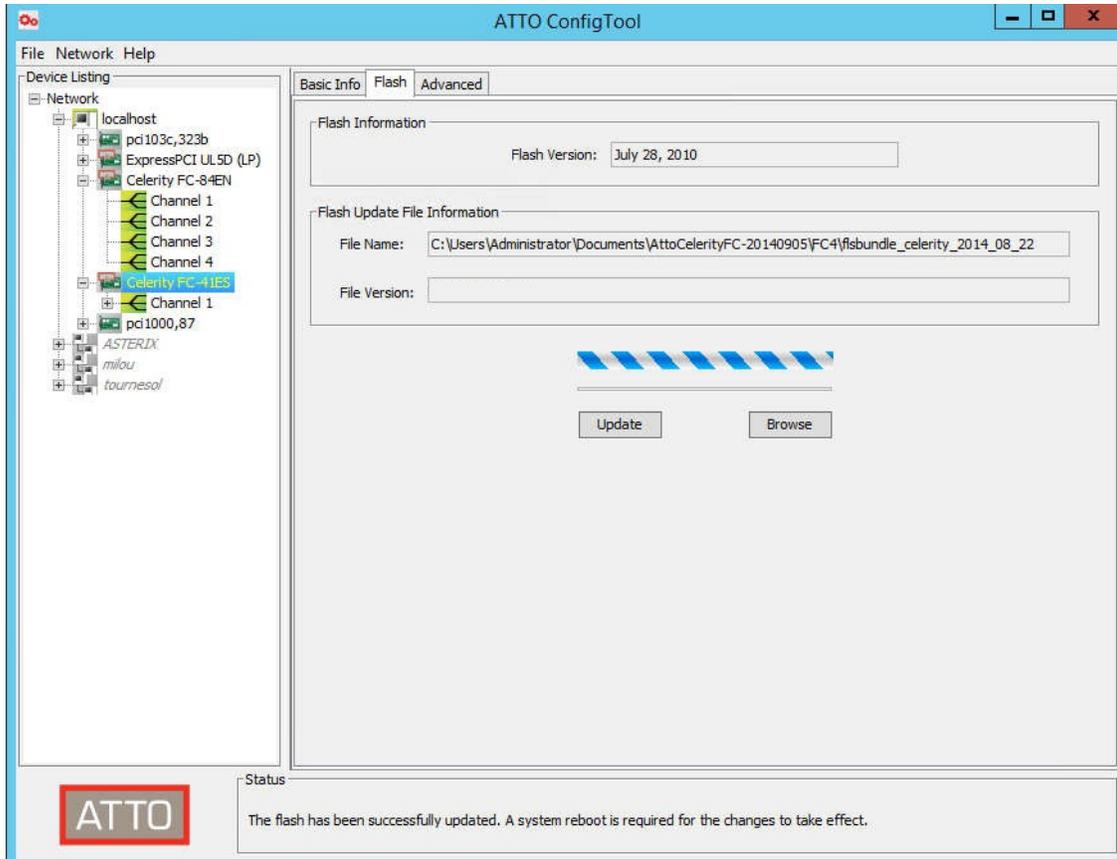
FC adapter Flash update completion confirmation

Enable Target Mode

Upon initial installation the ATTO Celerity driver only supports Initiator mode usage. To be able to emulate tape devices the ATTO Celerity driver must be configured to support Target mode. This is done by running a script that updates a Windows Registry entry. It normally only needs to be done once, but it may be required again if Target mode has been disabled during subsequent installations.

Update Registry entries for FC adapters

Access the **repository folder** and navigate to the **AttoCelerityFC-20191101\RegistryFiles** directory, sub directory **FC-8** or **FC-16** (according to your card). Double-click on the **Clrty8FC-Enable-TARGET.REG** file, you will be prompted for a confirmation. Press the **Yes** button.
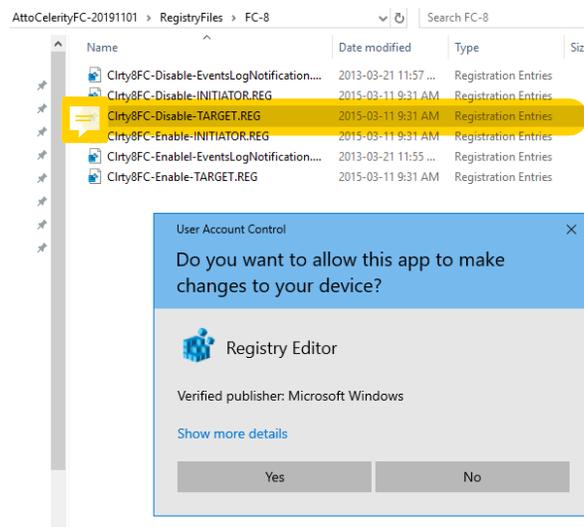
Confirmation request for Windows Registry update permission

You can use the VTC Management Console if the VTC software is already installed

Right-clicking on the FC node let you configure ATTO registry entries, to enable/disable Initiator and Target mode Celerity HBA features. Those features are based on family model and are applied to all ATTO Celerity HBA installed on the server. ATTO Celerity family models supported are FC-8 and FC-16. Family model will be shown only if one or more Celerity HBA is installed on the server.
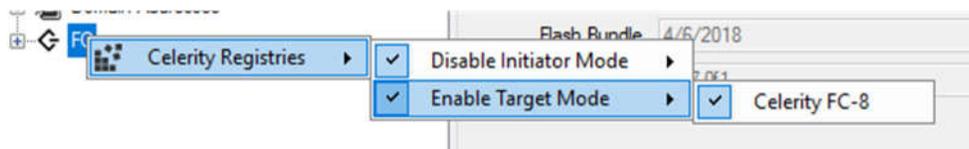
When enabled, the feature will be checked ✓. A diamond indicates that the feature is enabled only for part of the HBAs on the server ◆. To enable or disable a feature, simply check or uncheck the feature on the model and **Save** the modification.

Restart VTC server

To complete Target mode activation, you must restart the server. When the server has restarted, log in to it using the local administrator account.

VTC software Installation

Next step is to proceed with the actual BackBox VTC software installation. VTC software is located inside of the \VTC-E4.XX.XX folder of the BackBox package you downloaded.

To start the installation double click on the setup.exe program, click next
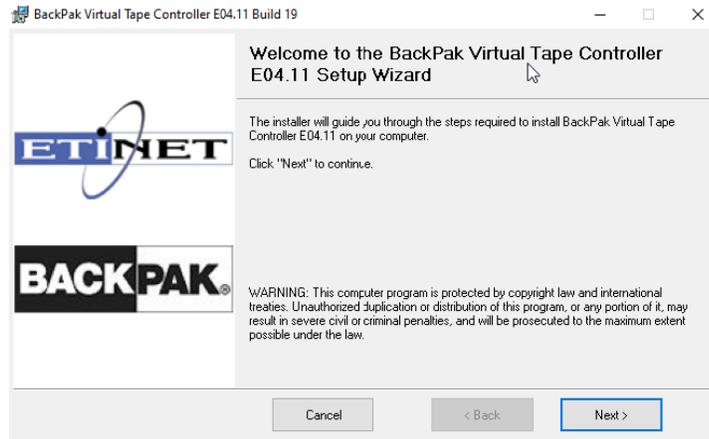
You will then be prompted to read and accept the license agreement. Accept it to proceed with the installation, a complete copy of the license agreement is available at the end of the present document.

Installation is now ready to proceed, click next button to start the actual installation
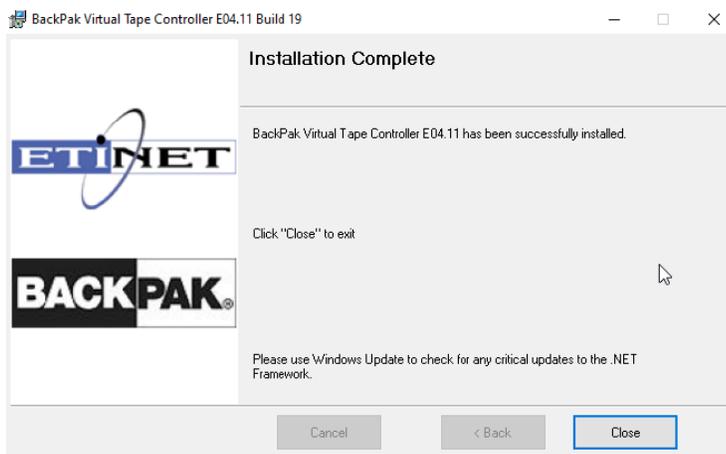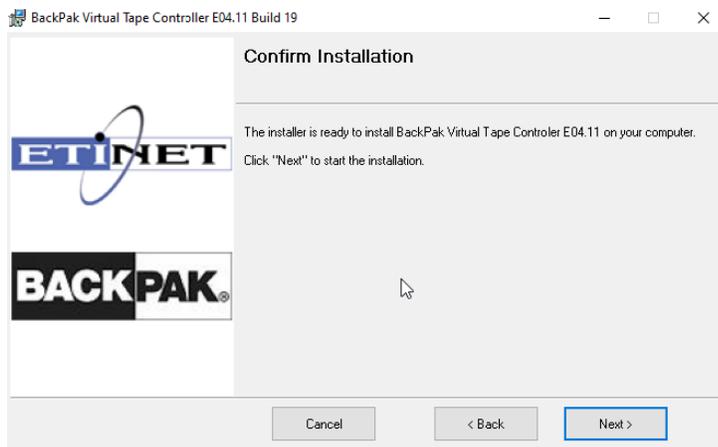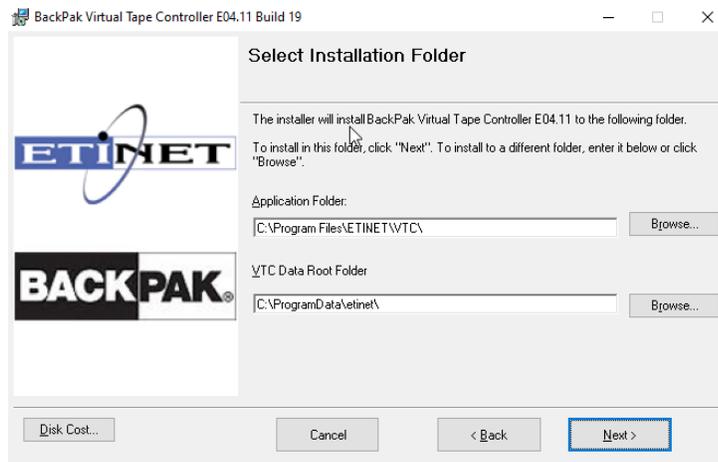
Once the installation process is over, click the close button.

BackBox VTC software installation is now over, you are ready to start basic configuration of the VTC.

VTC Initial Configuration

Now that the card and software are all install, it is time to start the VTC configuration. Steps to be perform are:

- collect information

- verify and adjust the VTC tape devices

- connect to the NonStop

- verify the connectivity

After this section you VTC server will be ready for to use by the actual BackBox system.

Collect related information for configuration

Fill in the content for **Table INF-3c Fiber Channel Tape Devices**. This will help to complete the VTC software configuration, the Domain configuration and validate the FC connectivity between the VTC and the NSK system.

For each Celerity FC Channel on a single server, record a value in the appropriate field:

➢ The Windows Server Name

➢ From the ATTO configuration Tool:

   o PCI slot number (Basic Info). This information will help to physically locate a specific set of FC ports on that card in the server.

   o Channel number within each card (Expand the **Celerity FC-XXXX** in the Device Listing). This information will help to physically locate a specific FC port on that card.

   o WWN Port Number (NVRAM **Port Name** field). **This information is required** to validate CLIM configuration via CLIMCMD (CLIM attachment), and to complete the VT Controller software configuration.

Assign the NSK FC port that will be used to connect to each VTC FC port and complete the table entry information for the remaining fields.

Configure BackBox Virtual Tape device entries

To view the VTC virtual tape device entries you must use the VTC Management Consol. There under the FC node (1), you will have listed all FC card available for use by the VTC. If you select a card, you will see listed the port by their WWN. When you select a port you will see in the right window the devices currently provisioned for this port and the type of device this port his (in the picture LTO3) (2). By default the number of port configure is 8.
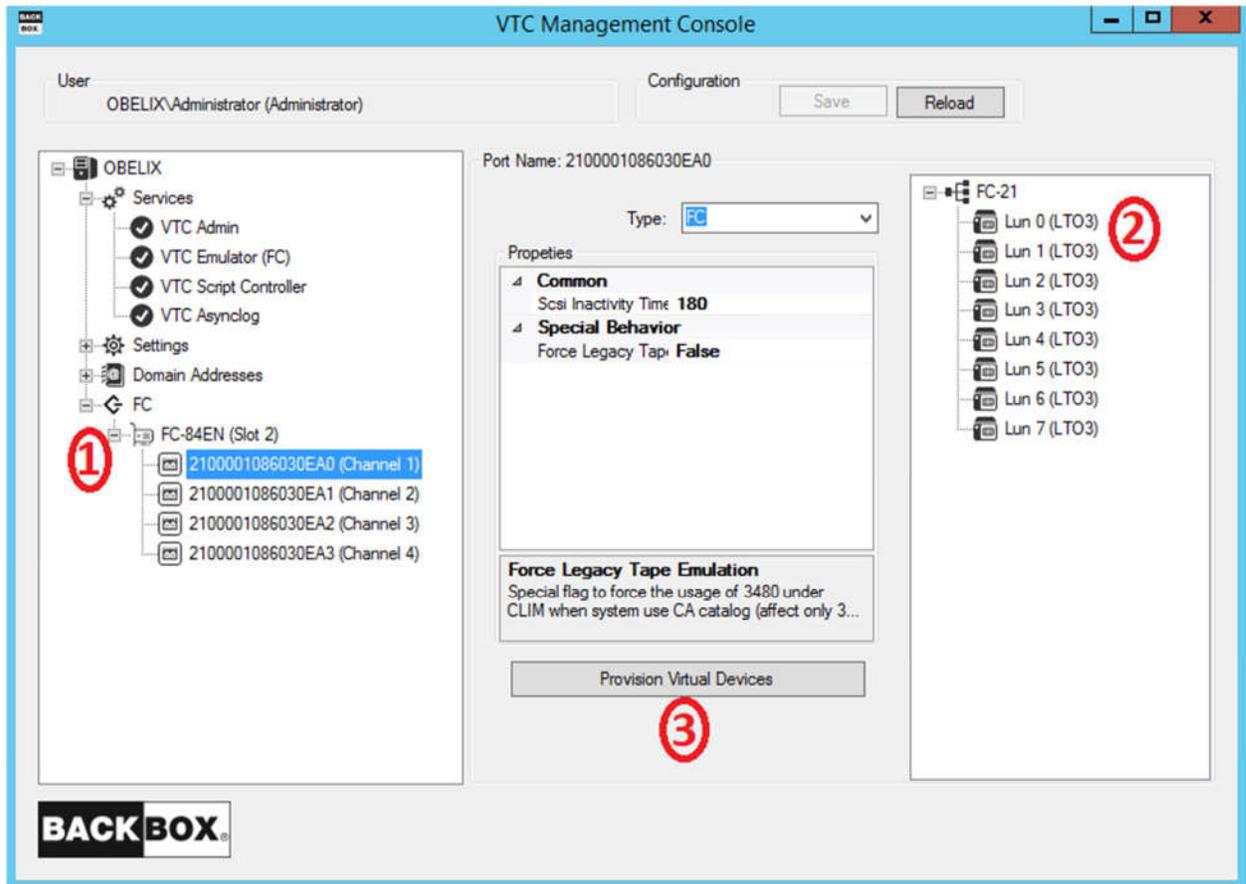
Adding/Removing devices

To add or remove device attach to a port, click the Provision Virtual Devices button (3). This will bring up the following dialog box:
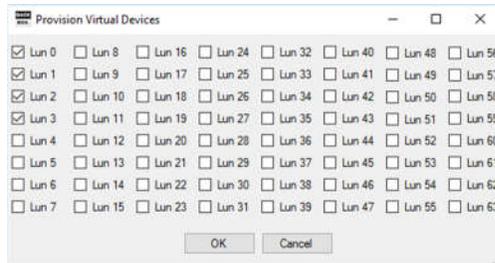
Each selected box represent a Virtual Tape Device that will be available on the NonStop. Click ok when satisfied with the provisioning. Restart VTC services by right clicking on the services node and then select the restart option.

Ports Configuration Automatic update rules

When the VTC (FC) Emulator service start, it will manage the file according following rule:

- When a new ATTO fiber channel is discover and not list in the port configuration, it will be automatically added into a Fiber Card element. For each channel of the card, a Fiber Port element of type FC will be added to the Card element. Each Fiber Port element will have 8 Device elements using lun 0 to 7 with LTO3 as default emulation.

- If an ATTO fiber channel HBA is replace by a new HBA, information of Fiber Card and Fiber Port elements related to the replaced HBA are update with the new one. All Device element and Option previously configure under the old HBA are kept as is. If the new HBA contain more channels then the previous one, new Fiber Port elements are added with 8 Device elements each (lun 0 to 7, LTO3 emulation). If the HBA contain less channels then the previous one, extra Fiber Port elements are deleted.

- If an ATTO fiber channel HBA is removed from the server, Fiber Card and Fiber Port elements related to it are deleted.

- If an ATTO fiber channel HBA is move into a different PCI slot, Fiber Card and Fiber Port elements related to the Fiber Card are updated. All previous Device and Option elements of the Fiber Card are lost. For each Fiber Port of the Fiber Card element, 8 new Device elements (lun 0 to 7, LTO3 emulation) are set. Moving a HBA from one slot to another is considered has deleted from the previous slot (with all his devices) and added has a new one with default devices assigned.

When hardware change occurs on the server, start the VTC Management Console and validate wwn information and slot number shown under the FC category node. If not valid, restart the VTC (FC) Emulator service to force the update and click on the **Reload** button to refresh the port configuration. Sometime a race condition appends between the time the service is start and the time the new hardware is discovered and initialize.

Connect FC cables to NonStop FC ports

FC links for NonStop systems are implemented using multi-mode optical cables (50/125μm or 62/125 μm) with LC connectors. For cable specifications, refer to "Cabling Requirements" section in the Product Requirements manual.

IMPORTANT: Optical cables are easily damaged. They must never be bent at a sharp angle, coiled with a tight radius or crushed. Excess cable should be coiled with at least a 4" diameter.

IMPORTANT: The tips of the connectors should be protected from dust or dirt (keep them capped while running the cables), and never touched directly.

IMPORTANT: You should ensure that the LC connector on each end of the FC cable is fully seated (plastic tab should snap back up and the SFP optical transceiver module must be firmly seated in its PCI card receptacle.)

Note: FC cables can be connected and disconnected regardless of whether the BackBox VTC is powered up or not.

When a FC link-level connection is established between the NonStop FC port and the BackBox FC card, the Link LED should be illuminated solid at both ends. If the Link LED is off on the BackBox card, or flashing on the NonStop port, then link level communications has not been established. This could be for any of the following reasons (listed in order of likelihood):

- FC cable is not plugged into the correct NonStop SAC port;
- FC cable is defective, or one of its LC connectors is not fully seated;
- CLIM port is defective;
- The BackBox FC card is defective.

Once the FC link lights are both on solid, indicating low-level connectivity, proceed on to check the high-level connectivity by issuing commands described in the section on testing FC connectivity.

Refer to the above FC Card Bracket details be able to locate a physical Fiber Channel port according your card model and bracket size.

Bracket layout for Celerity FC-81EN, FC-82EN and FC-842EN (PCIe)

Speed & Link LEDs

SFP LC optical connector

ATTO
FC81EN

Speed & Link LEDs

SFP LC optical connectors

ATTO
FC82EN

LEDs indicate online status & speed per channel

SFP optical connectors

ATTO
FC84EN
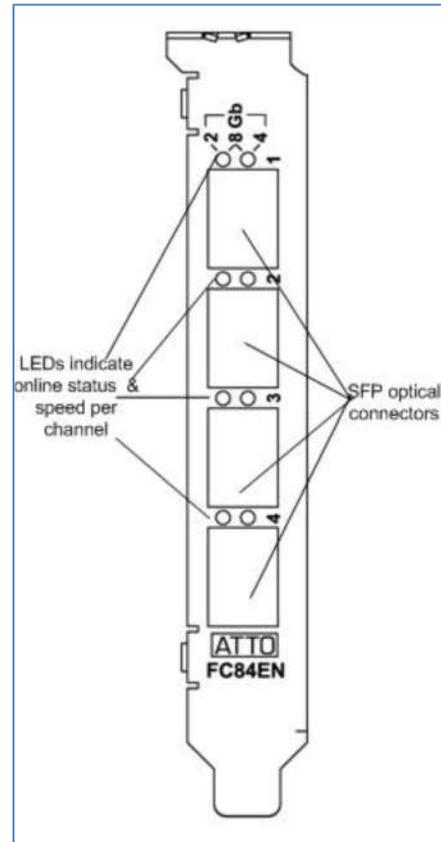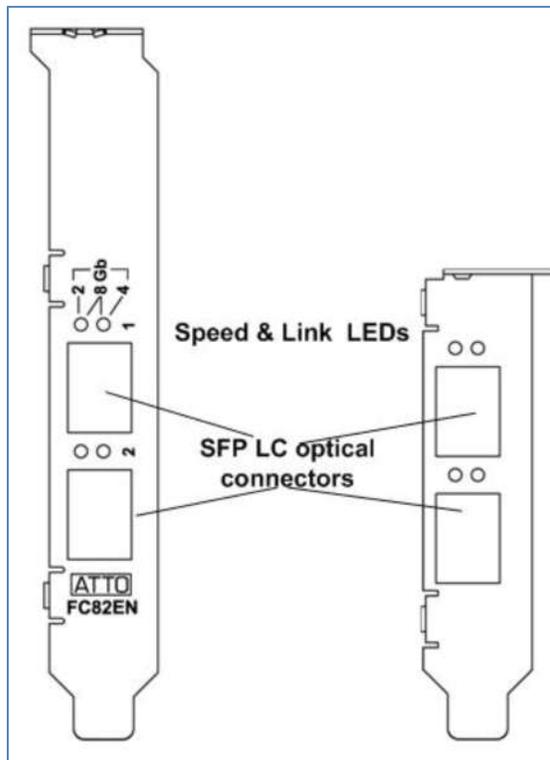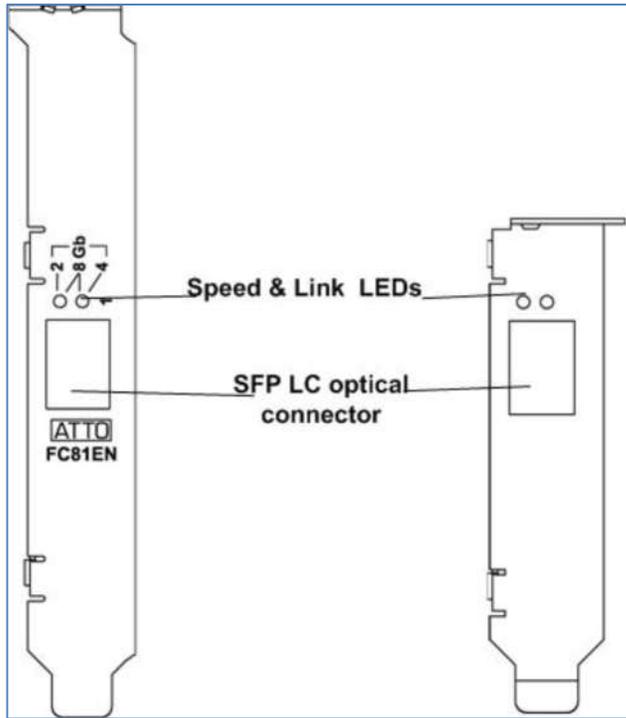
Test FC connectivity to the NonStop system

Test FC connections to CLIM ports

At a TACL prompt, perform the following command for the CLIM name to which the FC cables have been connected:

```
climcmd <clim-name> lsscsi -e
```

This command lists all of the devices attached to the CLIM, as seen by its Linux O/S. Note the results for future reference. (The two lists of HP SAS disks attached to the particular Storage CLIM used in the example have been abbreviated with "etc…")

```
$DATA15 ETIH411 4> climcmd s100231 lunmgr -e
-- Enclosure table --
lun     type    stable address
1       3       tape HP Ultrium4-SCSI #3432980001
2       3       tape HP Ultrium4-SCSI #3432980002
3       3       tape HP UltriumM8801A #BB01B02E00
4       3       tape HP M8505 #BB02FAE400
5       3       tape HP M8505 #BB03962A00
6       3       tape HP UltriumM8801A #BB01B02E01
7       3       tape HP M8505 #BB03962A01
8       3       tape HP M8505 #BB02FAE401
9       3       tape HP UltriumM8801A #BB023B7C00
10      3       tape HP M8505 #BB03B99F00
11      3       tape HP M8505 #BB03B99F01
12      3       tape HP M8505 #BB02FAE403
13      3       tape HP Ultrium5-SCSI #VG00000000
14      3       tape HP M8505 #BB030EA001
15      3       tape HP M8505 #BB03B98C00
16      3       tape HP M8505 #BB03B98C01
17      3       tape HP M8505 #BB023B7C00
18      3       tape HP M8505 #BB02FAE402
19      3       tape HP M8505 #BB030EA000
20      3       tape CPQNSD 5257 #0974061831
21      3       tape HP M8505 #BB023B7C01
22      3       tape HP M8505 #BB023B7C02
23      3       tape HP M8505 #BB023B7C03
24      3       tape HP Ultrium1-SCSI #0974062087
25      3       tape IBM ULT3580-TD4 #0974061575
26      3       tape HP M8505 #BB03962E00
27      3       tape HP M8505 #BB03962E01
28      3       tape HP UltriumM8801A #BB03B98C00
29      3       tape HP UltriumM8801A #BB03B98C01
30      3       tape HP M8505 #BB023B7C04
31      3       tape HP UltriumM8801A #BB023B7C01
51      6       changer STK L180 #3432980000
100     1       enclosure 5001438028b91880

200     1       enclosure 5001438025601dc0
```

In this example multiple virtual tape devices emulating LTO-3. LTO-4and LTO-6 tape drives have been recognized on the CLIM. BackBox VTC virtual tape drive always +show a serial number starting with #BB combine with the last 6 digit of the WWN of the port used and a sequential number (starting at 0).

CLIM device configuration

HP's Storage CLIM uses Debian Linux on a standard Proliant server platform with standard FC HBAs to provide FC ports for the NS system it is connected to via ServerNet. The HP CLIM applications software provides a layer of indirection in SCSI (FC) device addressing that must be taken into account. Unlike all other NonStop systems, at the SCF level there is no awareness of the actual FC addressing (WWN) or device LUNs presented by the VTC. Instead SCF deals with CLIM names and virtual LUN numbers assigned within each CLIM.

The virtual LUN numbers are assigned by a *lunmgr* process within each CLIM.

More information about the CLIM and its management can be found:

HPE NonStop Cluster I/O Protocols (CIP) Configuration and Management Manual

The list of available CLIMs in a system is displayed by the SCF command :

SCF INFO CLIM $ZZSTO.*, detail

Notice the CLIMCMD commands use a different CLIM naming syntax; when SCF reports \CGNAC2.$ZZSTO.#SCLIM001, CLIMCMD commands require the name: SCLIM001

IMPORTANT: Since Storage CLIMs also implement the paths from the NS Blade host to attached SAS disks, you should consult your HP NonStop system support engineer before attempting the CLIM re-configuration procedure described below.

The procedure for connecting a BackBox VTC FC port to a Storage CLIM port is as follows:

1. Determine the name of the Storage CLIM to which the FC cable from the BackBox VTC will be connected. NonStop systems typically ship with two Storage CLIMs. Each Storage CLIM can house up to two dual-port FC HBAs.

2. Before connecting anything new to the CLIM, check what currently-attached devices are seen by its Linux I/O system. At a TACL prompt on the NonStop system, type the following commands (note that in the following examples the value of <clim-name> is s1002531):

   a. `climcmd <clim-name> lsscsi –e`

   This will list all of the SCSI devices attached to the CLIM, as seen by Linux.

   b. `climcmd <clim-name> lunmgr --print`

```
$SAS22 BPAK 8> climcmd s1002531 lunmgr --print
comForte SSH client version T9999H06_18Dec2008_comForte_SSH_0083
lun     type    stable address                          volatile address
101     1       enclosure 500143800041b180, bay 1       0:0:1:0
102     1       enclosure 500143800041b180, bay 2       0:0:2:0
103     1       enclosure 500143800041b180, bay 3       0:0:3:0
etc…
```

```
201     1        enclosure 5001438000406d00, bay 1      1:0:0:0
202     1        enclosure 5001438000406d00, bay 2      1:0:1:0
203     1        enclosure 5001438000406d00, bay 3      1:0:2:0
etc…
Termination Info: 0
```

This displays the currently-attached devices that are already mapped by the CLIM's *lunmgr*. The devices listed in this example are all SAS disks for use by the NonStop system.

3. Configure virtual tape devices on the BackBox VTC and cable it to a CLIM FC port.

   a. Ensure that the configuration for the FC port is rightly done in the VTC Management consol (number and type of devices).

   b. Ensure that the **VTC Emulator (FC)** service is started in Windows on the VTC. If you have modified the config since the VTC was re-booted, you will need to stop and restart this service to ensure that the devices are correctly presented to the NonStop system.

   c. Connect the FC cable between the VTC's FC adapter port and a free FC port on the Storage CLIM.

   d. For the purposes of CLIM & SCF configuration it is not necessary to know the physical port number on the CLIM, but this information may be useful for later OSM fault diagnosis.

4. Verify that the newly attached virtual tape devices are recognized correctly by the CLIM and then initiate their mapping by *lunmgr*. At a TACL prompt on the NonStop system, type the following commands (note that in these examples the value of <clim-name> is s1002531):

   a. `climcmd <clim-name> lunmgr -s`

      This command causes *lunmgr* and Linux on the CLIM to re-scan the attached devices so that it will see the new BackBox virtual tape devices.

      ```
      $SAS22 BPAK 30> climcmd s1002531 lunmgr --scan
      comForte SSH client version T9999H06_18Dec2008_comForte_SSH_0083
      Termination Info: 0
      ```

   b. `climcmd <clim-name> lsscsi –e`

      This command lists all of the devices now attached to the CLIM, as seen by its Linux O/S. Note the results for future reference.

   c. `climcmd <clim-name> lunmgr --approve`

      This command tells the CLIM's *lunmgr* to add each of the newly Linux-recognized devices to its LUN mapping table and assign them virtual LUN numbers. (This command implicitly performs a *lunmgr --update* command.)

IMPORTANT: The virtual tape devices should be mapped one at a time as illustrated below. DO NOT use the "yesall" option for the `--approve` command. It has the potential to disturb the configurations of other devices attached to the CLIM.

```
$SAS22 BPAK 32> climcmd s1002531 lunmgr --approve
comForte SSH client version T9999H06_18Dec2008_comForte_SSH_0083
OK to assign lun 1 to tape HP M8505 #BBF0FE2000? y
Termination Info: 0
$SAS22 BPAK 33> climcmd s1002531 lunmgr --approve
comForte SSH client version T9999H06_18Dec2008_comForte_SSH_0083
OK to assign lun 2 to tape HP M8505 #BBF0FE2001? y
Termination Info: 0
$SAS22 BPAK 34> climcmd s1002531 lunmgr --approve
comForte SSH client version T9999H06_18Dec2008_comForte_SSH_0083
OK to assign lun 3 to tape HP M8505 #BBF0FE2002? y
Termination Info: 0
$SAS22 BPAK 35> climcmd s1002531 lunmgr --approve
comForte SSH client version T9999H06_18Dec2008_comForte_SSH_0083
OK to assign lun 4 to tape HP M8505 #BBF0FE2003? y
Termination Info: 0
$SAS22 BPAK 36> climcmd s1002531 lunmgr --approve
comForte SSH client version T9999H06_18Dec2008_comForte_SSH_0083
OK to assign lun 5 to tape HP M8505 #BBF0FE2004? y
Termination Info: 0
$SAS22 BPAK 37> climcmd s1002531 lunmgr --approve
comForte SSH client version T9999H06_18Dec2008_comForte_SSH_0083
OK to assign lun 6 to tape HP Ultrium 4-SCSI #BB010FE205? y
Termination Info: 0
```

In the above example the `--approve` command was used 6 times, once for each of the previously discovered virtual tape devices. Before responding "`y`" to each confirmation request, the device information should be checked.

In this example the first 5 devices were identified as "`tape HP M8505`" as in the Linux device discovery, with serial numbers "`BBF0FE2000`" through "`BBF0FE2004`" (the # prefix character is not part of the serial number). The 6th device was identified as "`tape HP Ultrium 4-SCSI`" with the serial number "`BB010FE205`".

The BackBox device serial number structure is based on fiber channel port name and the device LUN enabled in the VTC local configuration. In these examples:

Devices serial numbers are structured as:

`BB`	BackBox virtual tape device
`010FE2`	Attached to VTC FC port with WWN ending with "01 0F E2"
`05`	LUN number of each device define in the VTC local configuration (0-63)

Note: This is only valid for BackBox virtual tape devices. If the device in the confirmation request line does not confirm to this model and serial number format, simply reply "`n`" to cancel the mapping.

d. `climcmd <clim-name> lunmgr --print`

Lists the LUNs mapped by the *lunmgr* and now available for use by SCF.

```
$SAS22 BPAK 39> climcmd s1002531 lunmgr --print
$SAS22 BPAK 39..
comForte SSH client version T9999H06_18Dec2008_comForte_SSH_0083
lun     type    stable address                         volatile address
1       3       tape HP M8505 #BBF0FE2000              4:0:0:0
2       3       tape HP M8505 #BBF0FE2001              4:0:0:1
```

```
3          3          tape HP M8505 #BBF0FE2002               4:0:0:2
4          3          tape HP M8505 #BBF0FE2003               4:0:0:3
5          3          tape HP M8505 #BBF0FE2004               4:0:0:4
6          3          tape HP Ultrium 4-SCSI #BB010FE205      4:0:0:5
101        1          enclosure 500143800041b180, bay 1       0:0:1:0
102        1          enclosure 500143800041b180, bay 2       0:0:2:0
103        1          enclosure 500143800041b180, bay 3       0:0:3:0
etc…
201        1          enclosure 5001438000406d00, bay 1       1:0:0:0
202        1          enclosure 5001438000406d00, bay 2       1:0:1:0
203        1          enclosure 5001438000406d00, bay 3       1:0:2:0
204        1          enclosure 5001438000406d00, bay 4       1:0:3:0
etc…
Termination Info: 0
```

In this example the assigned CLIM virtual LUNs for the new tape devices are shown in the left column as LUNs 1-6. The right column shows their corresponding "physical" addressing, with the right-hand digit representing the VTC's virtual tape device LUN (as defined in the VTC local configuration). So you can see the correspondence.

Note: The default VTC device LUN numbering starts at 0, while the *lunmgr* virtual LUN numbering for tape devices starts at 1. **This can be a source of confusion, as the LUN numbers used by SCF must be the *lunmgr* virtual LUN numbers.**

5. Using the CLIM name and the virtual LUN numbers for virtual tape devices from the *lunmgr PRINT* command, create an obey file for SCF to ADD those devices (see below).

6. In SCF, execute the obey file to add the new devices, and then START them. For the first instance of starting devices after their configuration it is recommended that they be started one at a time, with the results observed in the EMS log entries.

Add Tape Drive in SCF

NSK Tape I/O Processes – Best Practices

Input/Output operations from NonStop applications to BackBox virtual tape devices use the same Guardian I/O process (IOP) as for physical tape drives. The program file for the default Tape IOP is **$SYSTEM.SYSTEM.OTPPROCP**, and its version depends on the SYSnn currently in use.

Tape IOP hints

The following are some helpful hints for Tape IOP utilization.

1. Definition of virtual tape devices (as for physical tape devices):
   - Is best done via an SCF Obey file.
   - Typing definitions directly into SCF can lead to errors.

2. CPU allocation for the TAPE IOP's:
   - It is a good idea, for CPU load balancing, to allocate the TAPE IOPs in different CPUs.
   - Depending on how many NS CPUs the system has, relative to the number of virtual tape drives to be configured, avoid CPU 0 and 1 if possible.

     Over the years, HP has reported a few instances where the Tape IOP connected to a physical tape drive caused a CPU to crash. These are very infrequent cases and fixes are provided in the regular HP maintenance. But to minimize the risks, if the system contains more than 2 CPUs, it is advisable to avoid using CPUs 0 and 1, since if either of these CPUs (which manage ServerNet) crash this could have grave consequences for the system.

Note: *This is not a problem or limitation specific to BackBox, but rather a warning about rare, but possible behavior of HP's Tape IOP.*

3. Tape IOP version:

   It is also advisable to check the version of the Tape IOP, and to use the latest version wherever possible, to avoid potential problems.

   The version of the Tape IOP in use can be found as follows:

   > **SCF INFO TAPE $VTxxxxx, DETAIL**

   Note the full path of the filename, and use it in the following command:

   > **VPROC $SYSTEM.SYSnn.OTPPROCP**

   The result will be a number of lines, of which one be similar to:

   ```
   T0021G05^02SEP05^ABM^05SEP05
   ```

   In this particular instance, the Tape IOP version is "ABM", from Sept 2005.

4. Tape device reconfiguration:

   Once a device has been STARTED, the tape IOP continues to run, even after the device has been STOPPED. Sometimes this can present a problem in determining whether a problem has been solved or not, since the results of initial SCSI operations may have been retained by the Tape IOP.

For instance, if FC speed negotiation was performed at initial device connection, but then the BackBox was shut down, SCSI cables/ports changed, and then the devices STARTED in SCF, correct speed negotiation may not be performed.

IMPORTANT: For this reason it is advisable to **ALWAYS** issue **SCF RESET <device>, FORCE** commands for all virtual tape devices in a BackBox VTC if they are to be shut down and/or re-cabled. Once re-cabling is complete and the BackBox VTC re-booted (causing the VTC SCSI Emulator Service to be re-started), then **SCF START** commands can be issued.

Add CLIM-attached Tape devices in SCF

While you may name virtual tape devices as you wish, the following naming terminology is suggested to simplify recognition of virtual tape devices in the actual subsystem configuration, such as in OSM displays:

$VTanxyy, where:

a is a code to identify a specific VTC Server (arbitrarily "A" in this example);

n is the last digit of the CLIM name ("1" in this example);

x is the CLIM FC port number ("4" in this example);

yy is the virtual LUN number assigned by the *lunmgr*.

So for the configuration example above, the virtual tape devices would be named $VTA1401 through $VTA1401.

The following SCF ADD command example corresponds to that example, with the FC cable connected to FC port 0 on Storage CLIM S1002531.

```
ADD tape $VTA1401, &
    SENDTO STORAGE, &
    PRIMARYCPU 2, &
    BACKUPCPU 3, &
    CLIM S1002531, &
    LUN 1
```

SCF ADD command example for CLIM-attached device

OSM display of CLIM-attached virtual tape devices

Information about virtual tape devices and their status can be obtained graphically in OSM. The virtual tape devices are listed, along with any physical tape devices connected to the system, in a group called "Tape Collection". By expanding this group and clicking on an individual device, as shown in the illustration below, the state and configuration of the device can be displayed.

In the example the device $VT000 is connected to CLIM S1002531 as LUN 1, and has a status of UP.

If there was a problem with the device, its icon would be flagged in OSM in yellow or red.

OSM display for CLIM-attached VT devices

SCF INFO and STATUS for CLIM-attached devices

As with FCSA or VIO-attached virtual tape devices, information about the configuration and status of CLIM-attached virtual tape devices can be obtained via SCF.

Display CLIM configuration information:

```
info clim $zzsto.<clim-name>, detail

   9-> info clim $zzsto.S1002531,detail

   STORAGE - Detailed Info CLIM \BLDESYS.$ZZSTO.#S1002531

    Configured Devices:
      Type     Name          Primary CPU    Backup CPU    Lun
      TAPE     $VTA1401      2              3             1
      TAPE     $VTA1402      3              2             2
      TAPE     $VTA1403      0              1             3
      TAPE     $VTA1404      1              0             4
      TAPE     $VTA1405      2              3             5
      TAPE     $VTA1406      3              2             6
      DISK     $SYSTEM-P     0              1             101
      DISK     $DSMSCM-P     1              0             102
      DISK     $SAS32-P      0              1             103
      DISK     $SAS03-P      0              1             104
      Etc…
```

Display CLIM status:

```
status clim $zzsto.<clim-name>, detail

   13-> status clim $zzsto.s1002531,detail

   STORAGE - Detailed Status CLIM \BLDESYS.$ZZSTO.#S1002531

    Configured Devices:
      Name         State      Substate       Primary PID  Backup PID
      $VTA1401     STARTED                    2,454        3,824
      $VTA1402     STARTED                    3,825        2,453
      $VTA1403     STARTED                    0,683        1,559
      $VTA1404     STARTED                    1,566        0,684
      $VTA1405     STARTED                    2,455        3,826
      $VTA1406     STARTED                    3,829        2,456
      $SYSTEM-P   *STARTED                    0,257        1,257
      $DSMSCM-P    STARTED                    1,296        0,323
      $SAS32-P    *STARTED                    0,315        1,312
      $SAS03-P    *STARTED                    0,319        1,304
      etc…
```

Display Tape device information:

```
info tape <device-name>, detail

   4-> info tape $VTA1401,detail
   STORAGE - Detailed Info TAPE configuration \BLDESYS.$VTA1401
   *BackupCpu............................. 3
   *CLIM................................. S1002531
```

```
*Compression........................... ON
*Density............................... 6250
*HighPin............................... ON
*LUN................................... 1
*MaxOpens.............................. 4
*PrimaryCpu............................ 2
*Program............................... $SYSTEM.SYSTEM.OTPPROCP
*RecSize............................... 2048
*StartState............................ STARTED
```

Note: The LUN value reported is the CLIM virtual LUN number, not the VTC's FC LUN number.

Display Tape device status:

```
status tape <device-name>, detail
```

```
5-> status tape $VTA1401,detail
STORAGE - Detailed Status TAPE \BLDESY.$VTA1401

Tape Process Information:
  LDev  State       Primary   Backup    DeviceStatus
                    PID       PID
   464  STARTED     2,445     3,818     NOT READY

Tape I/O Process Information:
  Library File.......
  Program File....... $SYSTEM.SYS00.OTPPROCP

Current Settings:
  ACL................ NOT INSTALLED     Buffer Level...... RECORD
  Checksum Mode...... NORMAL I/O       *Compression....... ON
 *Density............ 38000             Media Type........ Not applicable
  Opens.............. 0                *RecSize........... 2048
  Short Write Mode... ALLOWED, PADDED   SubType........... 15
  Volume Switching... TRANSPARENT
```

Display device information to help locate CLIM-attached devices

The following command displays the relation between the virtual LUN assigned to the device by the CLIM and the serial number of that specific device:

```
climcmd <clim-name> lunmgr --enclosures

$SAS22 BPAK 18> climcmd S1002533 lunmgr --enclosures

comForte SSH client version T9999H06_07Jan2010_comForte_SSH_0087

-- Enclosure table --

lun     type    stable address

1       3       tape HP M8505 #BBF0FE2000

2       3       tape HP M8505 #BBF0FE2001

3       3       tape HP M8505 #BBF0FE2002

4       3       tape HP M8505 #BBF0FE2003
```

```
5       3       tape HP M8505 #BBF0FE2004

6       3       tape HP Ultrium 4-SCSI #BB010FE205

100     1       enclosure 500143800041b180

200     1       enclosure 5001438000406d00

-- Enclosures present --

dev     lun     type    stable address                    controller
                serial #                revision
sg41            3       tape HP M8505 #BBF0FE2000        slot 1, port 2
                BBF0FE2000              VE03
sg42            3       tape HP M8505 #BBF0FE2001        slot 1, port 2
                BBF0FE2001              VE03
sg43            3       tape HP M8505 #BBF0FE2002        slot 1, port 2
                BBF0FE2002              VE03
sg44            3       tape HP M8505 #BBF0FE2003        slot 1, port 2
                BBF0FE2003              VE03
sg45            3       tape HP M8505 #BBF0FE2004        slot 1, port 2
                BBF0FE2004              VE03
sg46            3       tape HP Ultrium 4-SCSI #BB010FE205   slot 1, port 2
                BB010FE205              VE03
sg40    200     1       enclosure 5001438000406d00      slot 4, port 1,
expander 1      SGA750006E              2.16
sg20    100     1       enclosure 500143800041b180      slot 5, port 1,
expander 1      SGA750006B              2.16
Termination Info: 0
```