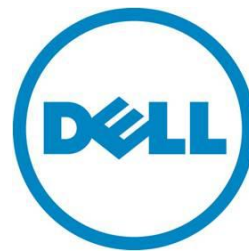

Ethernet Switch Deployment: CLI Comparison

Comparing command line syntax from each of the Dell modular Ethernet switch vendors

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Executive summary

As Dell brings comprehensive solutions to the data center, the server administrator may become responsible for the maintenance of switches and storage arrays. The Dell M1000e server chassis brings all of these elements under a single point of configuration. As such, this guide is meant to be a useful comparison of the different commands used to configure the switches available in the modular chassis. The end goal is to cross-reference new commands to those commands that the administrator may already know.

Introduction

The Dell PowerEdge M1000e Modular Server Enclosure supports more than a dozen server models and over 20 different I/O modules. When considering all combinations of servers, I/O modules, and subcomponents; there are a vast number of configuration options available to the PowerEdge user. This document is designed to note the similarities and differences between the four primary vendors of modular Ethernet switches available to the Dell modular user. This information is not restricted to the modular environment, but is designed to assist the modular server administrator to track some of the subtle differences found when configuring switches provided by multiple vendors.

For each step outlined in this document, we will compare different command line syntax used by the four current enterprise switch vendors supported in the Dell M1000e chassis. The vendors and operating systems are:

- Dell Force-10 Operating System (FTOS)
 - Dell Force10 MXL 10/40
- Dell PowerConnect Operating system (PCOS)
 - Power Connect M6220, M6348, M8024
- Brocade Fabric Operating System (FOS)
 - Brocade M8428-K
- Cisco Nexus Operating System (NXOS)
 - All Cisco Nexus Switches

There may be several devices, both modular and standalone, that will support the same operating system and command syntax. This document compares the available commands rather than dealing with the specific models or feature offerings of each switch.

The Cisco Nexus B22 Fabric Extender module must be managed remotely from a Cisco Nexus switch. Cisco commands included in this document are added as a point of reference, but the exact method of execution may differ from that of other modular switches.

Initial Switch Deployment

Typically the server administrator is not responsible for network administration, but in a modular environment the server administrator may be required to facilitate initial switch deployment. This section is intended for the administrator who has minimal experience with Ethernet switches.

Accessing the Switch Command Line

Any enterprise Ethernet switch has multiple management interfaces available to the administrator. These interfaces are divided into in-band management and out-of-band management. In-band management has the potential to interfere with the networking functions of the switch, and will not be covered in this document. There are typically two out-of-band ports available to access the operating system of an Ethernet switch. These are the serial management port and the IP management port. Either interface will offer identical configuration commands, but the serial interface is typically the default method used to deploy a switch. The administrator enables the IP management port from the serial connection, a process which is covered later in this document.

The first step the administrator must follow is to connect to the serial port of the switch. Though a proper serial cable is included with most switches, the cable is not necessary for configuration. The administrator can take advantage of the M1000e Chassis Management Controller (CMC) to host a serial connection to each IO module by typing the following command from the CMC command line.

>connect switch-x (where x is the number from 1 to 6 assigned to the switch slot of the chassis)

This internal serial connection is not available on the Cisco Fabric Extender I/O module.

Additionally, the CMC graphical interface contains the ability to assign an IP address for the management port of most modular switches.

Privilege Levels or Command Shells

The operating system for each Ethernet switch is divided into different privilege levels or command shells (depending on the switch vendor) through which certain configuration commands can be executed. A specific command is required to enter each command shell, and from within the shell only certain commands are available. The switch CLI displays a list of available commands when the administrator requests help. The help command being:

Dell Force10	Dell Power Connect	Brocade	Cisco Nexus
SwitchA> help (or ?)	SwitchA ?	SwitchA> ?	SwitchA> ?

Each command shell displays a different prompt to inform the administrator which shell is currently active. Upon initial connection to the switch, the administrator logs into the user-level shell. Very few commands are available in this shell, so the first step is to enter the privilege command shell. In this section, the full expected prompt is displayed.

Dell Force10	Dell Power Connect	Brocade	Cisco Nexus
SwitchA> enable SwitchA#	SwitchA> enable SwitchA#	SwitchA> cmsh SwitchA#	SwitchA> enable SwitchA#

From the privilege command shell, the administrator can enter the global configuration command shell:

Dell Force10	Dell Power Connect	Brocade	Cisco Nexus
SwitchA# configure SwitchA(config)#	SwitchA# configure SwitchA(config)#	SwitchA# configure SwitchA(config)#	SwitchA# configure terminal SwitchA(config)#

From the global configuration command shell, each of the switch interfaces has its own configuration shell. These interfaces include switch ports, management ports, and VLANs.

Dell Force10	Dell Power Connect
SwitchA(conf)# interface TenGigabit 0/1 SwitchA(config-if-te-0/1)# vSwitchA(conf)# interface vlan 32 SwitchA(config-if-vl-32)#	SwitchA(config)# interface tengigabitethernet 1/0/1 SwitchA(config-if-Te1/0/1)# SwitchA(config)# vlan 32 SwitchA(config-vlan32)#

Brocade	Cisco Nexus
SwitchA(config)# interface intengigabitethernet 0/1 SwitchA(config-if-int-0/1)# SwitchA(config)# interface vlan 32 SwitchA(config-if-vl-32)#	SwitchA(config)# interface ethernet 1/1 SwitchA(config-if)# SwitchA(config)# interface vlan 32 SwitchA(config-if)#

Each of the following command sets will now start by including the command to enter the proper configuration shell. To save space on the page, only the final character of the expected prompt will be displayed. Each list of commands will start from the global configuration shell.

Activate the IP Management Port of the Switch

All modular switches offered by Dell include an out-of-band IP management port. This port is connected to the management fabric of the M1000e chassis, which also includes all of the iDRACs in the chassis, and is accessed through the CMC management port.

Dell Force10	Dell Power Connect
# interface management 0/0 # ip address 172.31.31.41/16 # no shutdown	# interface out-of-band # ip address 172.31.31.41 255.255.0.0 172.31.0.1 # no shutdown

Brocade	Cisco Nexus
>ipaddrset Ethernet IP Address [10.1.1.1]: 172.31.31.41 Ethernet Subnetmask [255.0.0.0]: 255.255.0.0 Gateway IP Address [10.0.0.1]: 172.31.0.1	# interface mgmt0 # ip address 172.31.31.41/16 # no shutdown

Configure a Default Gateway for the Management Port

In most cases, the Management port is accessed from a segmented and routed network that will require a default gateway to be configured. This is a separate step on Force10 and Cisco switches. This command is performed from the global configuration shell.

Dell Force10	Dell Power Connect
# management route 0.0.0.0/0 172.31.0.1	(See section above)

Brocade	Cisco Nexus
(See section above)	# ip route 0.0.0.0/0 172.31.0.1

Create User Accounts on the Switch

The following commands are used to create user accounts on the switch.

Dell Force10	Dell Power Connect
# username TestUser password 0 Dell1234	# username TestUser password Dell1234 privilege 15

Brocade	Cisco Nexus
(Accounts are managed via graphical interface)	# username TestUser password Dell1234

Creating VLANs

All Dell modular switches can be divided into multiple broadcast domains called Virtual Local Area Networks (VLANs). The typical process to manage VLAN access is to first define the VLAN and then to assign two or more ports to that VLAN. The following commands are used to create a VLAN.

Dell Force10	Dell Power Connect	Brocade	Cisco Nexus
# interface vlan 32 # no shutdown # exit (The VLAN will not become active until a port is assigned to it)	# vlan 32 # no shutdown # exit	# interface vlan 32 # no shutdown # exit	# interface vlan 32 # exit # vlan 32 # state active # no shutdown # exit

Once a VLAN has been configured, ports can be associated to it. Ports that are assigned to the same VLAN will be able to pass traffic to each other. Ports not assigned to the VLAN will not pass traffic to each other without additional configuration in the network.

Configure Switch Ports for Access Mode

A switch port that requires access to only one VLAN, or broadcast domain, will typically be configured for Access mode. If a port must access multiple VLANs, it should be configured in trunk mode. Access mode is most often used for the switch ports that link directly with a server or some other end node device. During this configuration step, the port will also be assigned to a VLAN. Note the difference between Force10 and each of the other switch vendors. Using a Force10 switch, the assignment is performed from the VLAN configuration shell. Using other vendor switches, the assignment is performed from the port configuration shell.

Dell Force10	Dell Power Connect
<pre># interface TenGigabit 0/3 # switchport # no shutdown # exit # interface vlan 32 # untagged TenGigabitEthernet 0/3 # no shutdown</pre>	<pre># interface tengigabitethernet 1/0/3 # switchport mode access # switchport access vlan 32 # no shutdown</pre>

Brocade	Cisco Nexus
<pre># interface intengigabitethernet 0/3 # switchport # switchport mode access # switchport access vlan 32 # no shutdown</pre>	<pre># interface ethernet 1/3 # switchport access vlan 32 # no shutdown</pre>

Configure Switch Ports for Trunk or Tagged Mode

Ports that connect from one switch to another are typically configured as trunk ports. A trunk port typically requires access to multiple VLANs. A feature called VLAN tagging must be enabled to allow any port to access multiple VLANs. VLAN tagging is enabled for trunk ports by default from all vendor switches other than Force10. Note that the Force10 configuration steps require the administrator to enter both the port configuration shell and the VLAN configuration shell.

Dell Force10	Dell Power Connect
Force10 (uplink port is tagged in VLAN definition) # interface fortyGig 0/33 # description *uplink* # switchport # switchport mode private-vlan trunk # no shutdown # exit # interface vlan 32 (repeat for VLANs 33, 34) # tagged fortyGigE 0/33 # no shutdown	Power Connect (trunk mode automatically tagged) # interface tengigabitethernet 1/0/17 # description *uplink* # switchport mode trunk # switchport trunk allowed vlan 32,33,34 # no shutdown

Brocade	Cisco Nexus
Brocade (trunk mode automatically tagged) #interface extengigabitethernet 0/17 # description *uplink* # switchport # switchport mode trunk # switchport trunk allowed vlan add 32 # switchport trunk allowed vlan add 33 # switchport trunk allowed vlan add 34 # no shutdown	Cisco (trunk mode automatically tagged) # interface ethernet 1/17 # description *uplink* # switchport mode trunk # switchport trunk allowed vlan 32,33,34 # no shutdown

Link Aggregation

To increase the available bandwidth between the Ethernet switch and the data center network, multiple uplink ports can be combined together to act as a single link. The process starts by creating a port channel, and then several uplink ports can be added to that port channel. All of the ports in the channel will act as a single, large link to the network. Link aggregation will also need to be configured at the top of rack switch where these uplink ports are connected.

If multiple uplink ports are connected to the same top of rack switch, the administrator should strongly consider adding all of the ports to a single port channel. Failure to do so could create forwarding loop between the ports which could severely impact the network. There are other methods to avoid loops, such as spanning tree, but those are beyond the scope of this document.

Dell Force10	Dell Power Connect
<pre># interface port-channel 5 # exit # interface TenGigabit 0/33 # Port-channel protocol LACP # Port-channel 5 mode active</pre>	<pre># interface port-channel 5 # exit # interface Gi1/0/17 # channel-group 5 mode active</pre>

Brocade	Cisco Nexus
<pre># interface port-channel 5 # exit # interface extengigabit 0/17 # channel-group 5 mode active type Dell</pre>	<pre># feature lacp # interface port-channel 5 # exit # interface Gigabit 0/17 # channel-group 5</pre>

Configuration Management

At any time during the switch configuration process, the administrator can preview or save the current switch configuration by using the following commands from the privileged command shell. These commands are applicable on all of the switches.

```
# show running-config
```

```
# copy running-config startup-config
```

Conclusion

The previous list of commands does not cover every option available in a Dell modular Ethernet switch. The commands provide a quick basis for comparison of common features shared among all of the switch vendors. After following these guidelines, the server administrator should have a functioning switch in the chassis. Additional security and connectivity features can now be included.