



Stacking Dell Networking Switches: N4032, N4032F, N4064, N4064F

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Revisions

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Table of contents

Revisions.....	2
1 Introduction.....	4
1.1 Stacking and management.....	5
1.2 Simplified firmware updates for stack members.....	5
1.3 Dell Networking 8100 Support.....	5
1.4 Stacking and redundancy.....	5
1.5 Nonstop forwarding on the stack.....	6
1.6 Hot add/delete and firmware synchronization.....	6
1.7 Meta-data considerations.....	6
1.8 How a Master is selected.....	7
1.9 How to select a Master during initial stack setup.....	9
2 Stacking scenarios.....	11
2.1.1 QSFP+ quad-breakout cables.....	12
2.2 Creating a Stack.....	13
2.2.1 Command-line interface method.....	14
2.2.2 Web interface method.....	17
2.2.3 Automatic firmware updates for new members joining the stack.....	21
2.3 Adding new member units to a stack.....	23
2.3.1 Command-line interface method.....	23
2.3.2 Web interface method.....	27
2.4 Updating firmware on a stack.....	31
2.4.1 Command-line interface method.....	31
2.4.2 Web interface method.....	33
2.5 Removing member units.....	39
2.5.1 Command-line interface method.....	39
2.5.2 Web interface method.....	45
3 Managing the standby unit.....	55
3.1.1 Command-line interface method.....	55
3.1.2 Web interface method.....	56
4 Appendix A – Commands used in this document.....	59
5 Appendix B - Network switch versions.....	60



1 Introduction

Most Dell switches today include a stacking feature that allows multiple switches to operate as a single unit. These stacks include up to twelve Dell Networking N4032/N4032F/N4064/N4064F switches in any combination, using up to four links between stack members. Any Ethernet port type on the front panel can be used in creating these links, including SFP+, QSFP+, and 10GbaseT.

A single switch in the stack (known as the Master switch) manages all the units in the stack using a single IP address, which allows the user to access every port in the stack from this one address. This IP address is copied from the Master to the Standby when the Standby is created. If for any reason the Master fails, the Standby takes over as Master keeping the IP address of the stack the same. This allows continuous management of the stack.

The *new* Master unit also continues to use the *original Master* unit's MAC addresses, which helps to reduce disruptions to the network. When a failed Master re-joins the stack, it does so as a member (not a Master) unless a new Master has not had time to be elected.

Note: Dell N4032, N4032F, N4064, and N4064F series switches can be mixed in any combination within a stack.

This document provides an easy to use step-by-step guide on how to configure stacking for the Dell N4032 (Figure 1), N4032F (Figure 2), N4064 (Figure 3) and the N4064F (Figure 4).

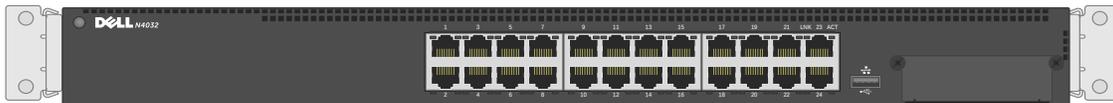


Figure 1 Dell N4032

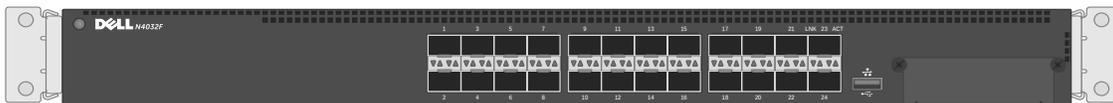


Figure 2 Dell N4032F

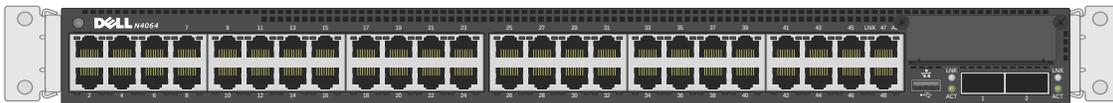


Figure 3 Dell N4064

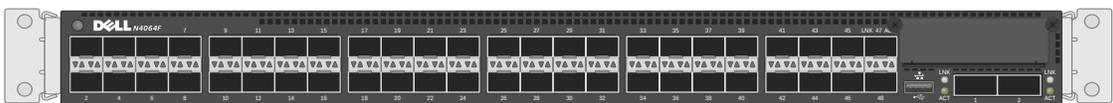


Figure 4 Dell N4064F



1.1 Stacking and management

An important advantage of stacking is that it provides a consolidated interface for management of multiple switches that are linked together. One switch acts as the Master through which the entire stack is managed through various interfaces (Web, CLI, and SNMP). After a stack is deployed in the network, operators can easily add units to the stack as their port requirements increase, with minimal administrative overhead. Additional stack members can immediately use existing configuration information such as routing and switching configurations, VLANs, ACLs, port profiles, and security certificates.

1.2 Simplified firmware updates for stack members

When switches are stacked, only the Master needs to be updated with new firmware. All other members of the stack will receive the firmware from the Master at that same time, reducing effort normally required when updating individual switches. Also, when a switch is added to a stack, if it is running a different version of firmware than the active version on the Master, the backup firmware on the new member is automatically updated to match the Master, the backup version of firmware on the new member is then activated, and the new member is rebooted.

1.3 Dell Networking 8100 Support

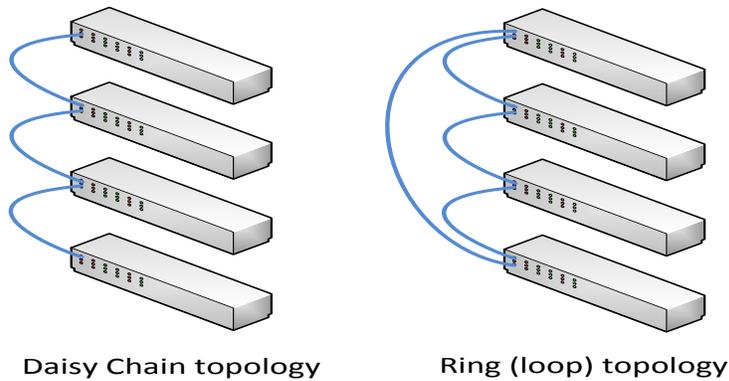
Dell Networking 81xx/81xxF switches can be stacked with Dell Networking N4000 switches, but only if all switches in the stack are running 6.0.0.8 firmware or later, and all switches in the stack are running the same firmware revision. The firmware must be applied to the switches before they are added to the stack. Dell Networking N4000 switches cannot be downgraded to 5.x.x.x releases like the 81xx can. Refer to the N4xxx Release Notes for more information.

1.4 Stacking and redundancy

By connecting a cable from the last switch in a stack back to the first switch, the operator makes sure that a stack has the protection of redundant paths for control and data traffic, including support for Link Aggregation Group (LAGs) configured across multiple switches. This means that any single point of failure (a switch or a stack cable failure) does not affect the overall operation of the remaining stack elements. This type of topology is known as a ring, or loop topology. Without the final cable(s) connecting the two ends of the stack, the topology is a daisy-chain, which can cause multiple masters and ip address conflicts on the network when a middle switch or link goes down. It is therefore recommended to always use a ring topology when stacking.

Note: Ring topologies are highly recommended for resiliency and fault tolerance over the daisy-chain.





1.5 Nonstop forwarding on the stack

The Nonstop Forwarding (NSF) feature allows the forwarding plane of stack units to continue to forward packets while the control and management planes restart as a result of a power failure, hardware failure, or software fault on the stack Master and allows the standby switch to quickly takeover as the Master.

1.6 Hot add/delete and firmware synchronization

Units can be added and removed to and from the stack without cycling the power on the stack. When adding a unit, the Stack Firmware Synchronization feature automatically synchronizes the firmware version with the version running on the stack Master. The synchronization operation may result in either an upgrade or a downgrade of firmware on the mismatched stack member. In addition, the running-config on the member is updated to match the Master switch. The startup-configurations on the standby and member switches are not updated to match the Master switch. The hardware configuration of every switch is updated to match the Master switch (unit number, slot configuration, stack member number, and so on).

Note: Auto-downgrade of a stack is enabled by default. To avoid accidentally downgrading a stack, be sure to disable auto-downgrade (CLI command: **no boot auto-copy-sw allow-downgrade**)

1.7 Metadata considerations

When creating a stack, the configuration information is metadata that is part of the hardware configuration applied at boot time before the switch firmware is started (and before the startup configuration is read). The stack information shown in the startup and running configurations is simply copies of the stack configuration for the user's knowledge. The actual stack information used by the switch *is not* that which is stored in the startup configuration.

A *stack member* configuration is always present on stacking capable switches, so there always is a line in the configuration that says *stack* and a second line that says *member* even if there are no devices stacked. Since these are stack-capable devices, an un-stacked device is still considered a stack of one. Here is an example configuration of a device that is *not* stacked.

```

console#show run

!Current Configuration:
!System Description "N4064F, 6.0.1.3, Linux 2.6.32.9"
!System Software Version 6.0.1.3
!Cut-through mode is configured as disabled
!
configure
slot 1/0 5      ! N4064F
slot 1/1 8      ! Dell 10GBase-T Card
stack
member 1 4      ! N4064F
exit
interface out-of-band
ip address 172.25.194.24 255.255.0.0 172.25.194.254
exit
interface vlan 1
exit
username "admin" password dec68e453164a2 privilege 15 encrypted
line telnet
enable authentication enableList
exit
snmp-server engineid local 800002a203001ec9ddad5b
exit

```

Notice there is only *one* member line in the configuration. If there were multiple members in the stack then there would be multiple member lines in the configuration, such as:

```

stack
member 1 1      ! N4064F
member 2 2      ! N4064F
member 3 3      ! N4032F

```

Note: A single stack member configuration is always present on stack-capable switches even if they are not part of an actual stack. The single switch is considered a *stack of one*.

1.8 How a Master is selected

A Master is elected or re-elected based on the following considerations, in order:

1. The switch is currently the Master.
2. The switch has the higher MAC address.
3. A unit is selected as standby by the administrator, and a fail over action is manually initiated or occurs due to a Master unit failure.



Note: The terms Master and Manager/Management Unit are often used interchangeably in regards to stacking.

In most cases, a switch that is added to an existing stack becomes a stack member, and not the Management Unit. When a switch is added to the stack, one of the following scenarios takes place regarding the management status of the new switch:

- If the switch has the Management Unit function enabled but another Master unit is already active, then the switch changes its configured Management Unit value to disabled.
- If the Management Unit function is unassigned and there is another Management Unit in the system, then the switch changes its configured Management Unit value to disabled.
- If the Management Unit function is enabled or unassigned and there is no other Management Unit in the system, then the switch becomes Management Unit.
- If the Management Unit function is disabled, the unit remains a non-Management Unit.
- If the entire stack is powered OFF and ON again, the unit that was the Management Unit before the reboot remains the Management Unit after the stack resumes operation.

A Unit number for the switch can be manually set. To avoid unit-number conflicts, one of the following scenarios takes place when adding a new member to the stack:

- If the switch has a unit number that is already in use, then the unit added to the stack changes its configured unit number to the lowest unassigned unit number.
- If the switch added does not have an assigned unit number, then the switch sets its configured unit number to the lowest unassigned unit number.
- If the unit number is configured and there are no other devices using the unit number, then the switch starts using the configured unit number.
- If the switch detects that the maximum number of units already exist in the stack making it unable to assign a unit number, then the switch sets its unit number to unassigned and does not participate in the stack.

After the stack is created, the `show switch` command displays the roles of each switch.

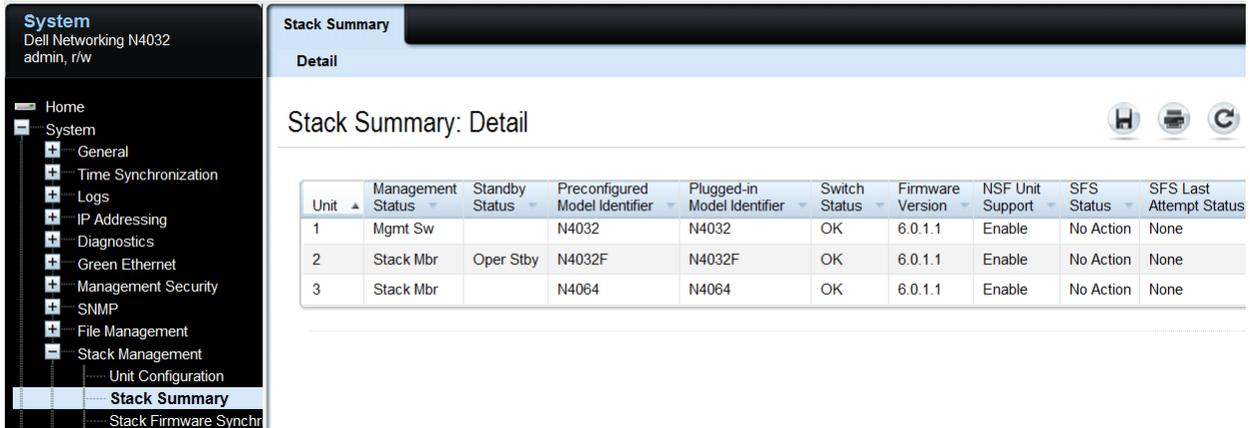
```
console#show switch
```

SW	Management Status	Standby Status	Preconfig Model ID	Plugged-in Model ID	Switch Status	Code Version
1	Mgmt Sw		N4032	N4032	OK	6.0.1.3
2	Stack Mbr	Oper Stby	N4032F	N4032F	OK	6.0.1.3



Note that in this example Switch 1 is the Master (Mgmt Sw) and Switch 2 is the Standby (Oper Stby) ready to take over as Master in the event the Master fails.

To find the same information from the Web UI go to System > Stack Management > Stack Summary.



1.9 How to select a Master during initial stack setup

After creating a stack it is easy to go into the settings on the Master and select any of the members to take its place as Master. The former Master becomes a regular stack member automatically.

To select a particular physical unit to be Master during initial setup, simply boot it up *completely* before powering on any of the other switches. All subsequent members added to the stack will join as regular stack members.

When simultaneously booting two or more switches to initially create a stack, the Master is chosen based on the highest MAC address. To find the MAC address of an individual switch prior to creating a stack, type `show system` from a CLI prompt:

```

console#show system
System Description: Dell Ethernet Switch
System Up Time: 0 days, 00h:12m:53s
Burned In MAC Address: D067.E594.1475 ←
    
```

Or from the Web UI, go to the System > General > System Information page:



System
Dell Networking N4032
admin, r/w

- Home
- System
 - General
 - System Information**
 - Global Configuration
 - Health
 - Unit Power Usage Histogram
 - CLI Banner
 - SDM Template Preferences
 - System Resources
 - Auto-Install Configuration
 - IP Address Conflict Detection
 - Reset
 - Time Synchronization
 - Logs
 - IP Addressing

System Information | Telnet

System Information: Detail

System Information	
System Name	<input type="text"/> (0 to 255 characters)
System Contact	<input type="text"/> (0 to 255 characters)
System Location	<input type="text"/> (0 to 255 characters)
System Object ID	1.3.6.1.4.1.674.10895.3042
MAC Address	D067.E594.1475
System Uptime	0 days, 0 hours, 37 mins 45 secs



2 Stacking scenarios

The following sections present examples in a variety of areas concerning stacking the Dell N4000 switches and provides step-by-step guidance using the CLI and Web UI, with screen shots as a visual guide. Consult the table of contents above for a list of examples covered in this document.

Each scenario in this document assumes that all Dell switches are using the same firmware revision. It is also recommended that all devices are using the latest firmware version.

Note: Upgrade the firmware to the latest revision on the units before stacking them.

Unless mentioned otherwise, all scenarios below assume the switches are using the static ports that are hard-wired into the switches, and that no modules are installed providing additional ports. However, ports from an installed expansion module are supported and may be used for stacking. The following expansion modules are supported for stacking in Dell N4000 switches:

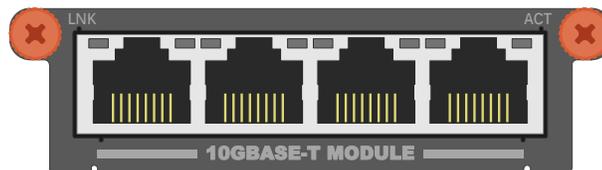


Figure 5 10Gbase-T four-port expansion module for the Dell Networking N4xxx and N4xxxF

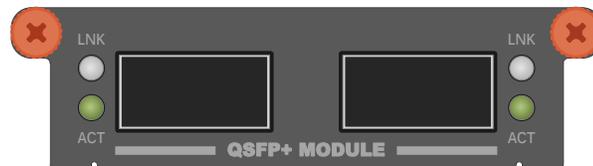


Figure 6 40G QSFP+ two-port expansion module for the Dell Networking N4xxx and N4xxxF

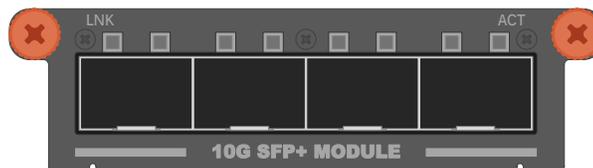


Figure 7 10G SFP+ four-port expansion modules for the Dell Networking N4xxx and N4xxxF

With an expansion module installed, the command `show switch stack-ports` shows the link status, link speed, and stack mode for each port in the module.

2.1.1 QSFP+ quad-breakout cables

QSFP+ quad-breakout cables may also be used for stacking. This allows a 40G QSFP+ port to connect to four 10G SFP+ ports on the adjacent switch. When a breakout cable is used, the connections are considered to be four links taking up four ports.

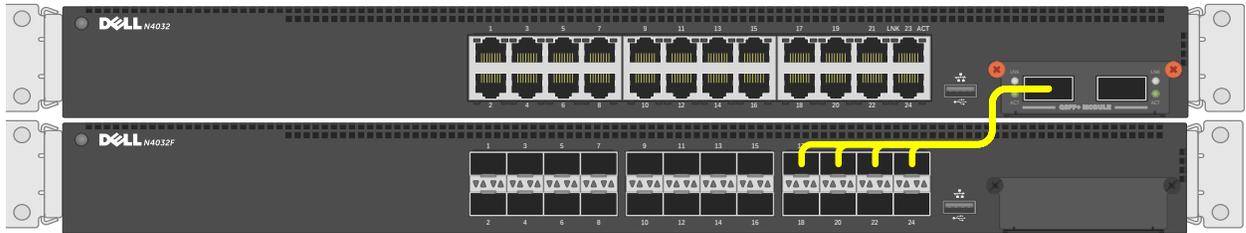


Figure 8 QSFP+ quad-breakout cable may be used for stacking

To use a QSFP+ quad-breakout cable to stack two peers, the QSFP+ port must be set to port mode 4x10G and reloaded before setting it to stack mode (described in the next section). From the interface configuration CLI prompt, use the **hardware profile portmode 4x10g** command to set the port to this mode. The command is:

```
console(config-if-Fo1/0/1)#hardware profile portmode 4x10g
```

This command will not take effect until the switch is rebooted.

When the portmode changes on a port, so do the interface names. For example, a QSFP+ port may be named *Fo1/0/1* when in 40G mode but takes on a new identity as *Te1/1/1 through Te1/0/4* when changed to 10G mode. Therefore, if it is desired to use the QSFP+ quad-breakout cable, be sure to set the port mode to 4x10G and reload the switch *before* setting the ports to stack mode since configuration settings on one port mode does not translate to the other portmode.

Also, when in port mode 4x10G it is required that all four of the breakout ports be moved from Ethernet mode to Stack mode to use them for stacking.

2.2 Creating a Stack

Examples below provide steps on how to create a stack. Graphics shown in this section only depict some of the possibilities of how to cable together members of a stack.

Note: While the cable pictures below come before the configuration steps, it is important not to cable the stack until instructed to do so.

Cabling is one of the last steps and comes after configuring all switches used in the stack; however, it is necessary to know exactly each port that is going to be cabled to configure each switch correctly.

The Dell N4000 series switches can be stacked up to twelve high, supporting up to 672x10G ports when two 40G ports on each unit are configured as stacking ports. The stack can contain any combination of Dell N4000 and Dell N4000F switches.

Switches can be stacked using anywhere from one to eight Ethernet ports on the front panel, which includes 40Gb QSFP+ ports, 10Gb SFP+ fiber ports, and 10Gb baseT copper ports. Each of these default to Ethernet mode and must be reconfigured as stacking ports in order to stack.

This scenario shows steps to create a stack. Figure 9 shows one example of connectivity between stack members.

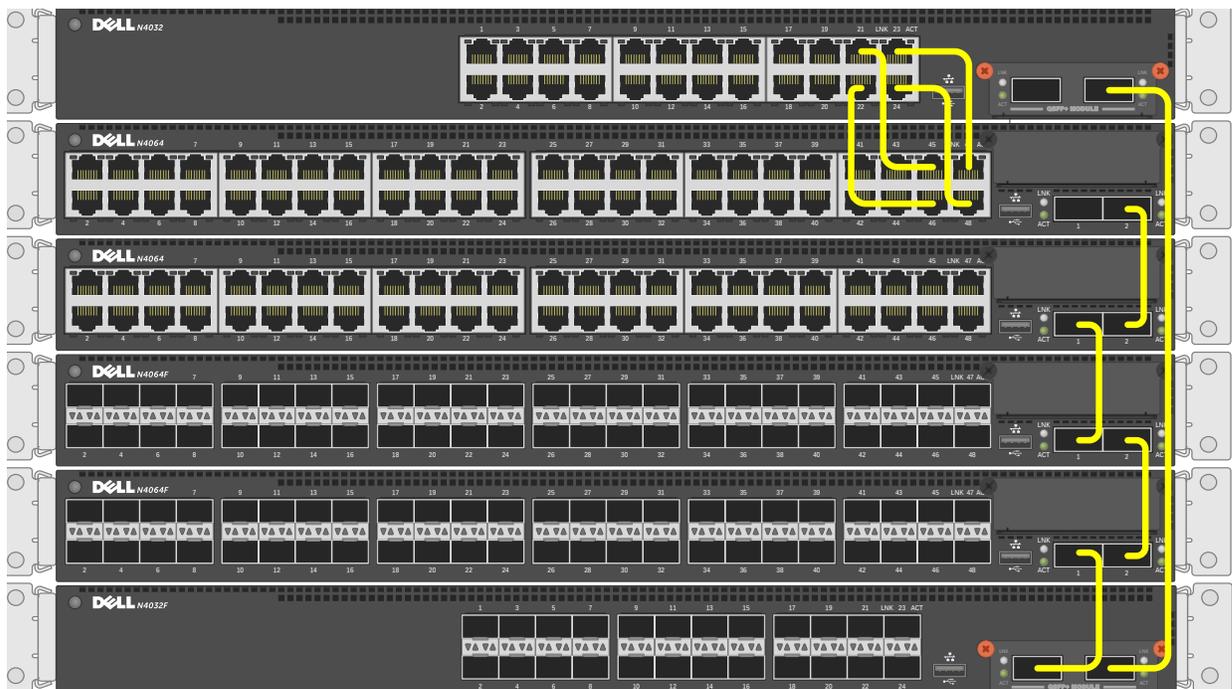


Figure 9 Stacking Dell N4000 series switches using 40G and 10G stack links

Notice the top two switches are stacked together using four cables plugged into 10G ports. For each remaining switch in the stack, one cable from a 40G stacking port on a switch is connected to a 40G



stacking port on the next switch. This process is repeated until all of the devices are connected. To complete the ring topology for the stack, one stacking port on the last switch is connected to a stacking port on the first switch. See the [Ring vs. daisy-chain topology](#) section for more information on ring topologies.

Things to consider when cabling a stack together:

- Only use interfaces with the same bandwidth to stack between members. It is not supported to mix 40G QSFP+ ports with 10G SFP+ or 10Gbase-T ports on a switch when stacking. It is okay however to use one interface type between two stack members, then a different interface type between two other stacking members as shown in Figure 9.
- A QSFP+ port is counted as one port when stacking. Therefore if stacking only two switches together, all QSFP+ ports (including those on an expansion module) can be used to stack between them when in 40G port mode.
- Up to eight ports may be used on any switch for stacking purposes.

Connecting additional cables in parallel increases the stacking bandwidth. Up to eight ports can be connected in parallel when only stacking two switches. When stacking three or more switches, up to 4 cables can be connected in parallel between members. It is recommended to have the same bandwidth between the stack members. It is also recommended to connect the stack in a ring topology for resiliency. Figure 10 shows an example of connecting four stack ports between each stacking peer.

Note: In a stack of three or more switches, Dell strongly recommends connecting the stack in a ring topology so that each switch is connected to two other switches.

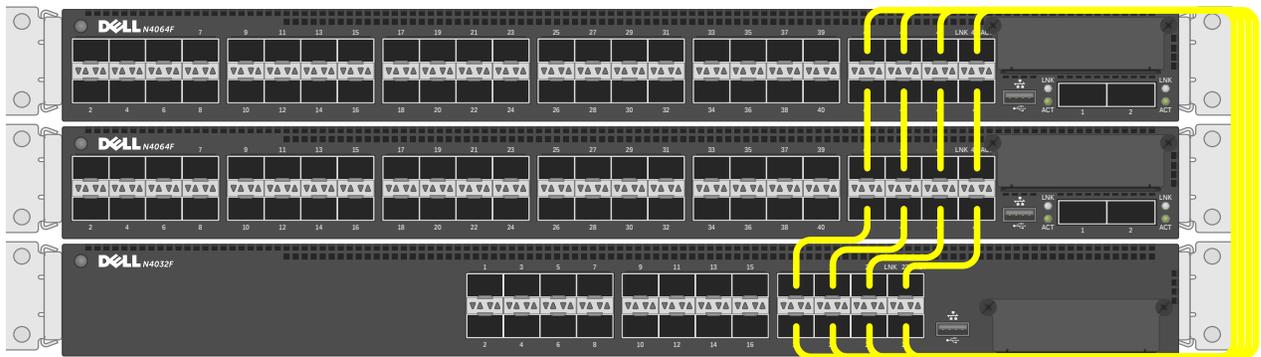


Figure 10 Stacking Dell N4000/N4000F series switches using multiple stack links

2.2.1 Command-line interface method

Make sure all switches are at the same firmware version prior to configuring the stack, or use the Stack Firmware Synchronization (`boot auto-copy-fw`) feature to synchronize all firmware during the stack setup process to that of the Master. The `boot auto-copy-fw` command is explained below in this example.



Connect power to all switches to be stacked. Performing the command `show switch stack-ports` will provide information on the unit number for the switch, which is used in the stacking commands. It also shows Interfaces of the switch that may be used for stacking and whether they are in Ethernet or Stacking mode.

```
console#show switch stack-ports
```

Interface	Configured Stack Mode	Running Stack Mode	Link Status	Link Speed (Gb/s)
Te1/0/1	Ethernet	Ethernet	Link Down	Unknown
Te1/0/2	Ethernet	Ethernet	Link Down	Unknown
Te1/0/3	Ethernet	Ethernet	Link Down	Unknown
.
Te1/0/22	Ethernet	Ethernet	Link Down	Unknown
Te1/0/23	Ethernet	Ethernet	Link Down	Unknown
Te1/0/24	Ethernet	Ethernet	Link Down	Unknown
Fo1/1/1	Ethernet	Ethernet	Link Down	40
Fo1/1/2	Ethernet	Ethernet	Link Down	40
Te1/1/1	Ethernet	Ethernet	Detach	10
Te1/1/2	Ethernet	Ethernet	Detach	10
Te1/1/3	Ethernet	Ethernet	Detach	10
Te1/1/4	Ethernet	Ethernet	Detach	10
Te1/1/5	Ethernet	Ethernet	Detach	10
Te1/1/6	Ethernet	Ethernet	Detach	10
Te1/1/7	Ethernet	Ethernet	Detach	10
Te1/1/8	Ethernet	Ethernet	Detach	10

The example above shows a Dell N4032F with a QSFP+ two-port expansion module installed. The two 40G QSFP+ ports are represented by interfaces *F01/1/1* and *F01/1/2*. We will use these two interfaces for stacking in the example below.

Notice that Configured Stack Mode and the Running Stack Mode are currently both Ethernet. Perform the following commands to convert each desired port to Stack mode.

```
console#config
console(config)#stack
console(config-stack)#stack-port fortygigabitethernet 1/1/1 stack
console(config-stack)#stack-port fortygigabitethernet 1/1/2 stack
console(config-stack)#show switch stack-ports
```

Interface	Configured Stack Mode	Running Stack Mode	Link Status	Link Speed (Gb/s)
Te1/0/1	Ethernet	Ethernet	Link Down	Unknown
Te1/0/2	Ethernet	Ethernet	Link Down	Unknown



Te1/0/3	Ethernet	Ethernet	Link Down	Unknown
	.			
	.			
Te1/0/23	Ethernet	Ethernet	Link Down	Unknown
Te1/0/24	Ethernet	Ethernet	Link Down	Unknown
Fo1/1/1	Stack	Ethernet	Link Down	40
Fo1/1/2	Stack	Ethernet	Link Down	40

The Configured Stack Mode is now *Stack*, but the Running Stack Mode is still *Ethernet*. The Running Mode changes to Stack upon reloading the switch, as instructed below.

Save the configuration to the Startup-Configuration.

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

```
This operation may take a few minutes.
Management interfaces will not be available during this time.
```

```
Are you sure you want to save? (y/n) y
```

Configuration Saved!

Follow these steps to complete the process:

1. Apply the same method to the remaining switches. Do not forget to configure the stacking ports on the last and first switch to create a ring topology if desired.
2. Once the switches have been configured, *remove power from all switches*.
3. While powered off, *bundle all of the switches together using the stack ports that were configured*.
4. Select the switch to be the Master switch and power up that switch only allowing a few minutes to boot up completely.
5. Verify the switch is up by logging into the CLI.
6. Once the Master is up, power up the second switch in line.
7. Allow the second switch 30 seconds to boot up, then power up the third switch.
8. Continue to power up each switch allowing 30 seconds between powering switches. This allows each adjacent switch to be active before the next one. Failure to wait may result in another switch becoming the Master.

All subsequent switches will enter the stack as Member Units. Stack Member units serial ports and management IP addresses are not accessible for managing those devices. Only the Master's management ports can be used to monitor and configure ports in the stack.



2.2.1.1 Validation

After the entire stack is created, it can be validated with the `show switch` command from the Master switch:

```
console#show switch
```

SW	Management Status	Standby Status	Preconfig Model ID	Plugged-in Model ID	Switch Status	Code Version
1	Mgmt Sw		N4064F	N4064F	OK	6.0.1.1
2	Stack Mbr	Oper Stby	N4064	N4064	OK	6.0.1.1
3	Stack Mbr		N4032	N4032	OK	6.0.1.1

The `show switch stack-ports` command can also be used to see all of the ports that have been added to the stack as well as which ones are being used for stacking. To view only ports that are configured for stacking, use the command `show switch stack-ports | include Stack`.

Figure 11 shows the Stack LED that is located on the back panel of every Dell N4000 series switch.

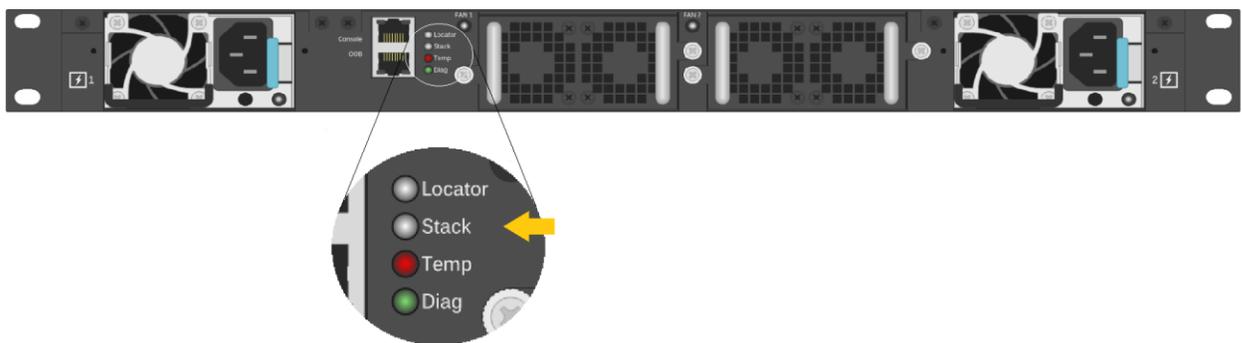


Figure 11 Stacking LED for the Dell N4000/N4000F series switch

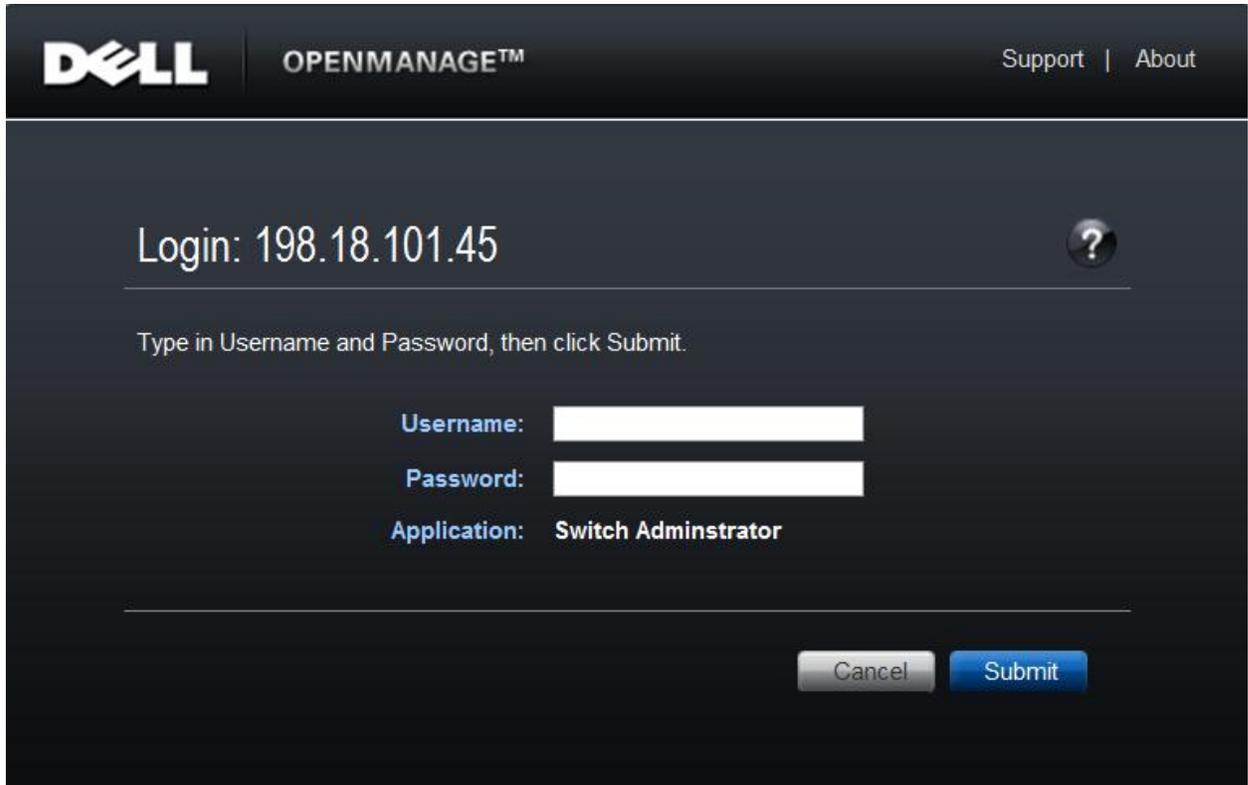
When the switch is the Master of a stack, the LED glows solid blue. If it is a stack member only, it glows a solid amber. When in stand-alone mode, the LED is off.

Note: Each stack members' role (including the Master and Standby) can be defined any time after the initial stack is created.

2.2.2 Web interface method

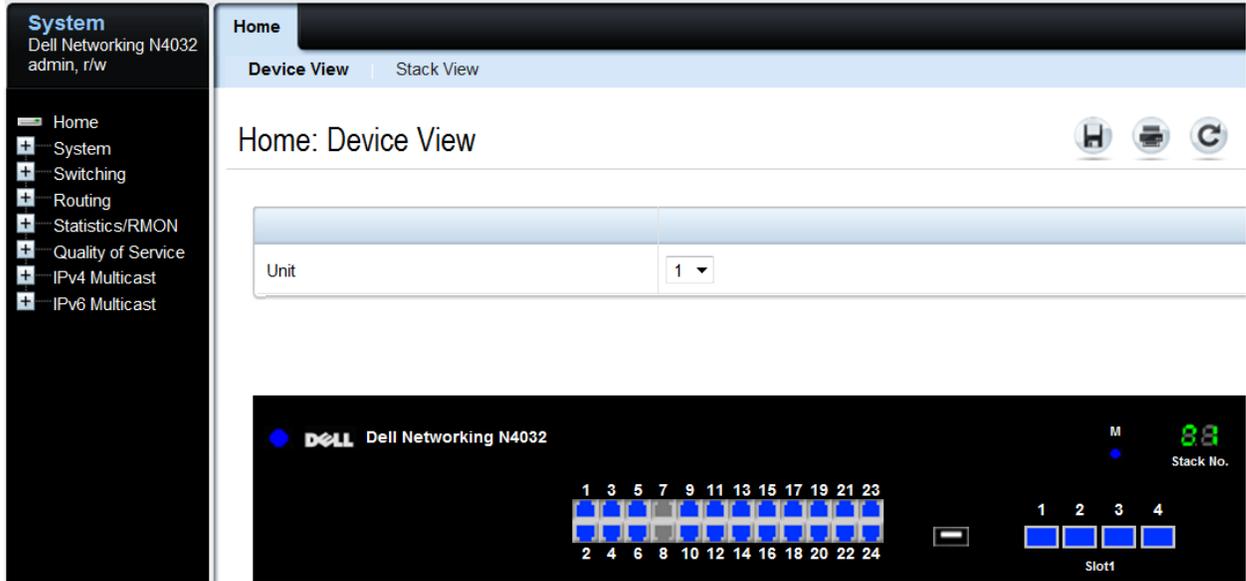
Make sure all switches are at the same firmware version prior to configuring the stack, or use the Stack Firmware Synchronization (`boot auto-copy-fw`) feature to synchronize all firmware during the stack setup process to that of the Master. The `boot auto-copy-fw` command is explained below in this example.

Select a switch to be Master of the stack and for managing all ports and member units with the stack. Login to the Web UI for this switch by entering the IP address of the switch into a supported Web browser. A username and password is required and should be setup beforehand on each switch. See the switch User Guide for more information regarding username, password, and Web access.



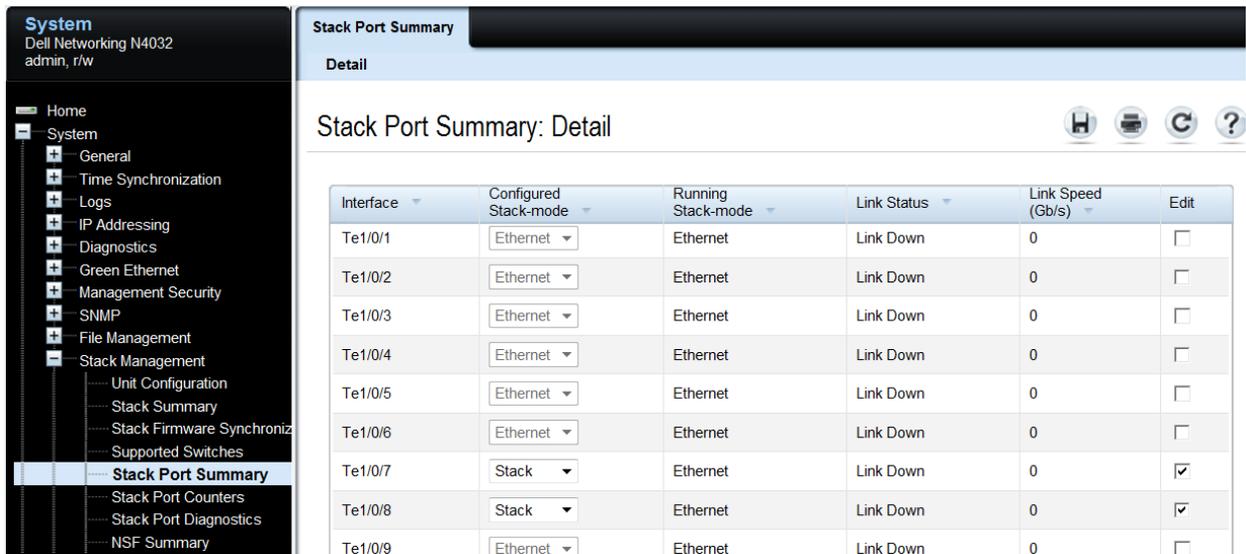
The screenshot shows the Dell OpenManage login page. At the top left is the Dell logo, followed by 'OPENMANAGE™'. On the top right are links for 'Support' and 'About'. The main content area has a dark background. It features a 'Login: 198.18.101.45' label with a help icon (a question mark in a circle) to its right. Below this is the instruction 'Type in Username and Password, then click Submit.' There are three input fields: 'Username:' with an empty white box, 'Password:' with an empty white box, and 'Application:' with the text 'Switch Administrator' next to it. At the bottom right are two buttons: a grey 'Cancel' button and a blue 'Submit' button.

After login, the first screen to appear is the Home screen, which shows the current stacking member number. Before stacking, the single member has the Stack number of 1 (one).



Click System > Stack Management > Stack Port Summary to bring up the next page used to select the ports for stacking. For this example ports Te1/0/7 and Te1/0/8 are used.

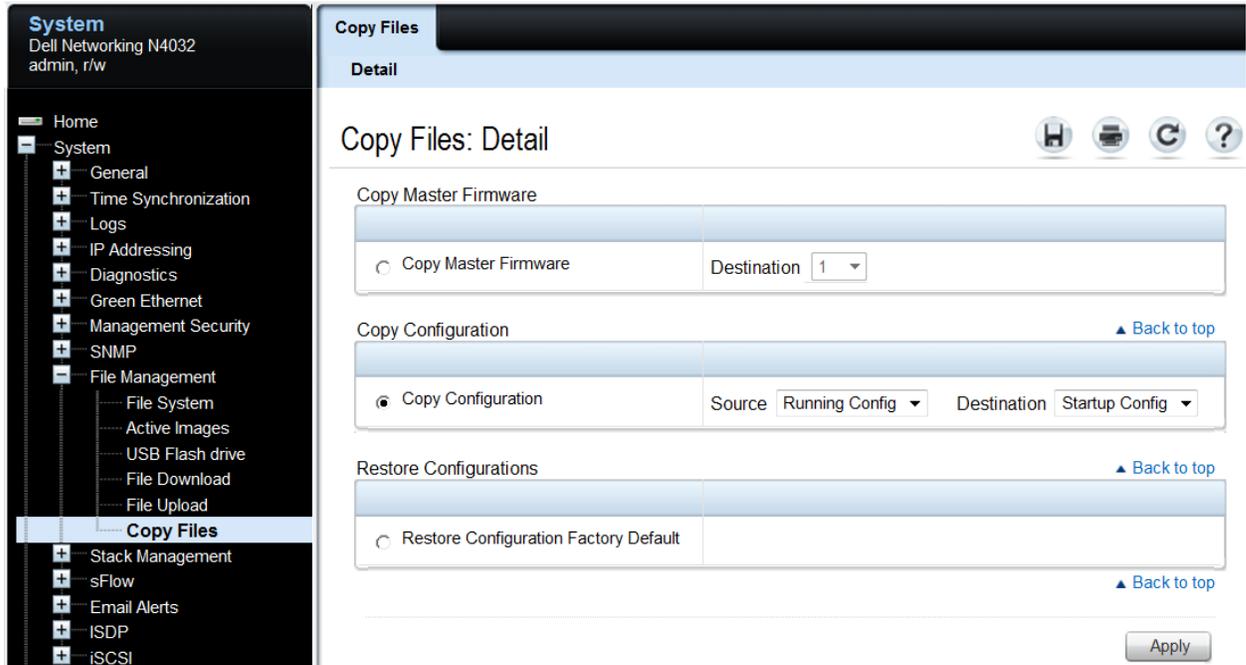
Selecting the Edit check box activates the drop-down menu in the Configured Stack-mode column. Use this menu to change port modes from Ethernet to Stack.



Click Apply. This will set the Configured Stack Mode to *Stack*, but the Running Stack Mode remains *Ethernet* until the switch is reloaded as instructed below.



Save the configuration to the Startup-Configuration on the System > File Management > Copy Files page.



Perform the same steps for the remaining switches. Don't forget to configure stacking ports on the last and first switch to create a more resilient ring topology if desired. Once every switch has been configured, remove power from all switches.

While powered off, cable all of the switches together using the stack ports that were configured. Select the switch that is desired to be the Master switch and power up that switch only, allowing it few minutes to boot up completely. Verify the switch is up by logging into the CLI.

Once the Master is up, power up the next switch in line. Allow the second switch 30 seconds to boot up, then power up the third switch. Continue to power up each switch allowing 30 seconds between powering switches. This allows each adjacent switch to be active before the next one. Failure to wait may result in another switch becoming the Master. All subsequent switches enter the stack as Member Units.

Stack Member units serial ports and management IP addresses are not accessible for managing those devices. Only the Master's management ports can be used to monitor and configure ports in the stack.

2.2.2.1 Validation

After the entire stack is created, it can be validated from the Master switch Web UI by going to System > Stack Management > Stack Summary.

System
Dell Networking N4032
admin, r/w

Stack Summary
Detail

Stack Summary: Detail

Unit	Management Status	Standby Status	Preconfigured Model Identifier	Plugged-in Model Identifier	Switch Status	Firmware Version	NSF Unit Support	SFS Status	SFS Last Attempt Status
1	Mgmt Sw		N4032	N4032	OK	6.0.1.1	Enable	No Action	None
2	Stack Mbr	Oper Stby	N4032F	N4032F	OK	6.0.1.1	Enable	No Action	None
3	Stack Mbr		N4064	N4064	OK	6.0.1.1	Enable	No Action	None

The following figure shows shows the Stack LED that is located on the back panel of every Dell N4000 series switch.

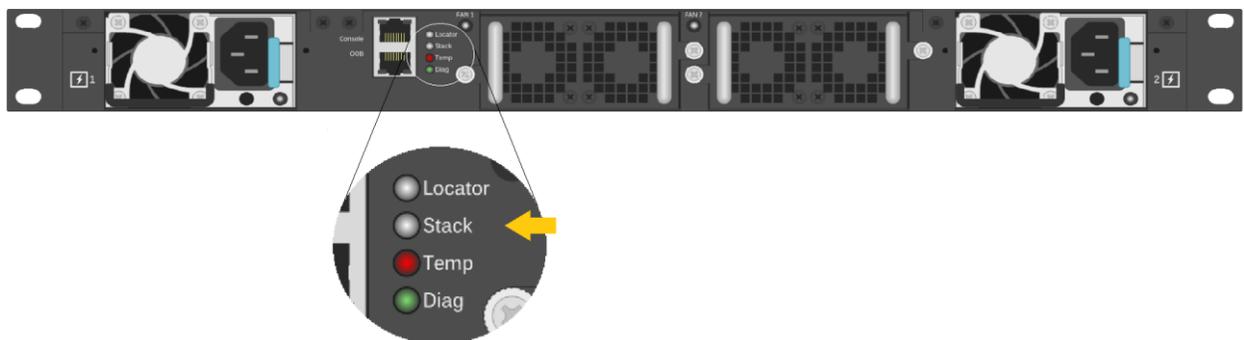


Figure 12 Stacking LED for the Dell N4000/N4000F series switch

When the switch is the Master of a stack, the LED glows solid blue. If it is a stack member only, it glows solid amber. When in stand-alone mode, the LED is off.

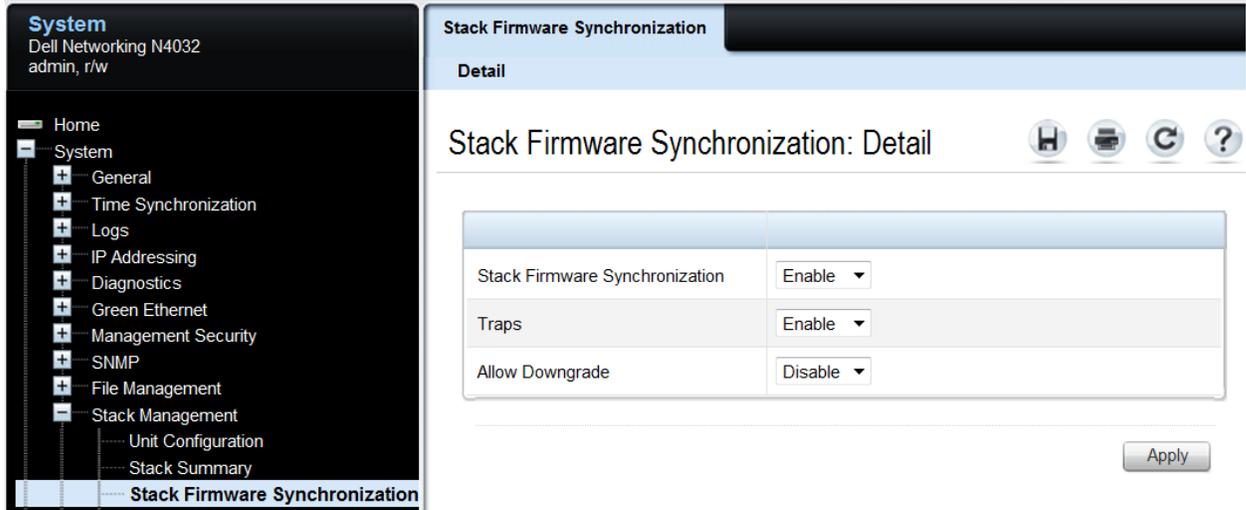
Note: Each stack members' role (including the Master and Standby) can be defined at any time after the initial stack is created.

2.2.3 Automatic firmware updates for new members joining the stack

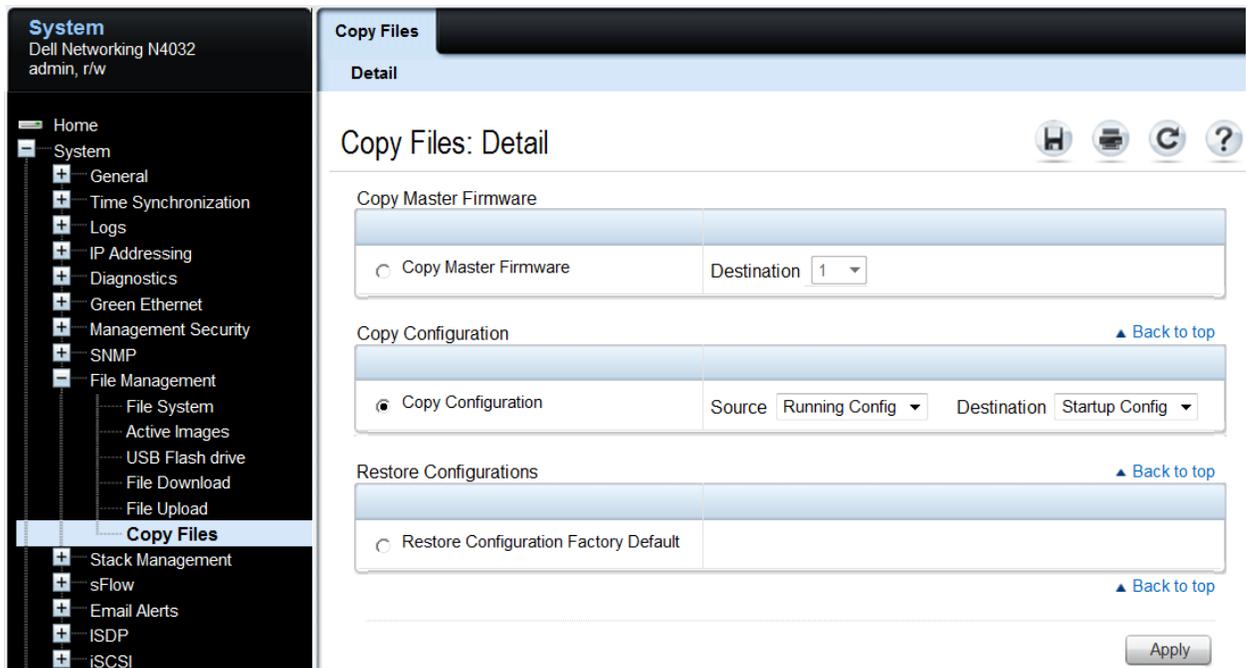
For member units to work properly within a stack, they need to have the same firmware as the Master. Perform a manual update of the firmware on a new member to synchronize the firmware prior to cabling it into the stack. Or, another way to accomplish this is to configure the Master switch to use *Stack Firmware Synchronization*, which automatically upgrades firmware on new members as they join the



stack. In the event the new stack member unit being added has a newer firmware version, a downgrade is also allowed. To prevent the downgrade of the new stack member unit's firmware, disable the *Allow-Downgrade* option on the Master. This allows all new member units to synchronize with the Master *only* if the firmware revision of the new members is older than that of the Master. Use the System > Stack Management > Stack Firmware Synchronization page to view and set these features.



Save the configuration to the Startup-Configuration on the System > File Management > Copy Files page.



2.3 Adding new member units to a stack

It is important that all stack member units run the same version of firmware. Make sure to either upgrade firmware on the new units to be added to match the firmware on the Master, or use the automatic firmware update method found in section *Automatic firmware updates for new members joining the stack*.

The example below shows how to add a stack member to an existing stack. Before cabling a new switch into the stack, perform the commands below to setup the switch ports to be stacked. Once configured, continue to follow the instructions for cabling to complete the task. If multiple new members are to be added, complete the installation of one switch before going to the next. Complete these steps again for each switch to be added.

This example allows adding new members without preconfiguring the existing stack, though the new members themselves will need to be configured. To preconfigure a stack before connecting the new stack member, consult the *User Guide* under *Preconfiguring a Stack Member*.

2.3.1 Command-line interface method

Run the commands below on the switch to be added using either the console port or a telnet session.

```
console#show switch stack-ports
```

Interface	Configured Stack Mode	Running Stack Mode	Link Status	Link Speed (Gb/s)
Te1/0/1	Ethernet	Ethernet	Link Down	Unknown
Te1/0/2	Ethernet	Ethernet	Link Down	Unknown
Te1/0/3	Ethernet	Ethernet	Link Down	Unknown
.
Te1/0/22	Ethernet	Ethernet	Link Down	Unknown
Te1/0/23	Ethernet	Ethernet	Link Down	Unknown
Te1/0/24	Ethernet	Ethernet	Link Down	Unknown
Fo1/1/1	Ethernet	Ethernet	Link Down	40
Fo1/1/2	Ethernet	Ethernet	Link Down	40
Te1/1/1	Ethernet	Ethernet	Detach	10
Te1/1/2	Ethernet	Ethernet	Detach	10
Te1/1/3	Ethernet	Ethernet	Detach	10
Te1/1/4	Ethernet	Ethernet	Detach	10
Te1/1/5	Ethernet	Ethernet	Detach	10
Te1/1/6	Ethernet	Ethernet	Detach	10
Te1/1/7	Ethernet	Ethernet	Detach	10
Te1/1/8	Ethernet	Ethernet	Detach	10

Notice the two 40G QSFP+ ports represented by interfaces *F01/1/1* and *F01/1/2*. These two interfaces will be used for stacking in the example below, though any of the interfaces listed may be used. Perform the following commands to convert each desired port to Stack mode.



```

console#config
console (config) #stack
console (config-stack) #stack-port fortygigabitethernet 1/1/1 stack
console (config-stack) #stack-port fortygigabitethernet 1/1/2 stack

console (config-stack) #show switch stack-ports | include Stack
      Stack      Stack      Link      Link
Fo1/1/1  Stack    Ethernet  Link Down  40
Fo1/1/2  Stack    Ethernet  Link Down  40

```

The Configured Stack Mode is now *Stack*, but the Running Stack Mode is still *Ethernet*. The Running Mode changes to Stack upon reloading the switch, as instructed below.

Save the configuration to the Startup-Configuration.

```

console#copy running-config startup-config

This operation may take a few minutes.
Management interfaces will not be available during this time.

Are you sure you want to save? (y/n) y

Configuration Saved!

```

Remove power from the switch.

Note: Hot insertion of units into the stack is not supported. Do not connect a new member to the stack while the new unit is powered up.

Follow the steps in the following section to properly add the stacking cables and complete the process.

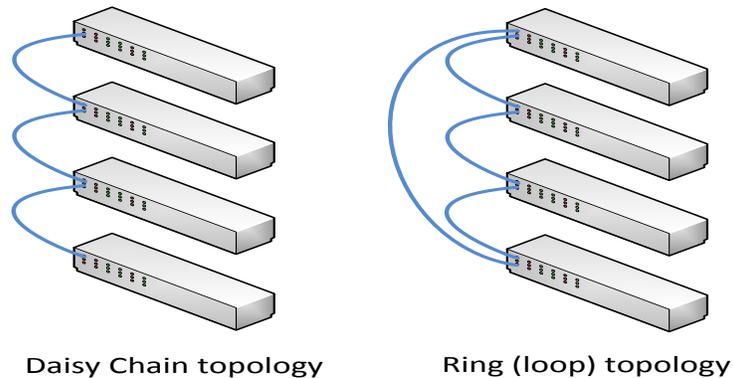
2.3.1.1 Ring vs. daisy-chain topology

If the original stack is cabled in a *ring topology*, a stacking port on the last switch is connected to a stacking port on the first switch. The entire stack continues to work correctly through the process of adding a new switch regardless of where the new switch is cabled within the stack. This is due to the built-in resiliency of the ring topology that allows all switches to remain in communication with each other in the event a single link or switch is lost or removed. For this reason, the ring topology is highly recommended.

When adding a switch to a *daisy-chain topology* stack, add it to one end of the stack and not in the middle. Adding to the middle requires breaking the daisy-chained stack which will cause the stack to split, creating a new Master on the group of switches that lost contact with the original Master. This would result in two stacks. Adding a new switch to the either end of the daisy-chain allows all other members to stay in constant communication and in turn allow the stack to stay intact during the process.



Note: Ring topologies are highly recommended for resiliency and fault tolerance over the daisy-chain.



On a *daisy-chain* stack:

1. Configure the existing stack with new stack ports to be used to connect to the new switch.
2. Cable the new switch to one of the end units of the existing stack.
3. Power up the new switch. The switch will be added to the stack.

Note: While there are fewer steps in a daisy-chain topology, the ring topology is highly recommended for its resiliency and fault tolerance over the daisy-chain.

On a *ring topology* stack:

1. Plug new cables into *half* of the stack ports configured on the new switch to be added.
2. Unplug the stacking cables from any existing member going to another existing member in the stack. Only unplug the cables from one end, leaving them plugged into the other member.
3. **Note:** Only half of the stack cables in this member will be unplugged. The cables going in the other direction to a third existing member will not be removed.
4. Plug the other end of the new cables of the switch being added into the stack ports that were unplugged in step 2.
5. Plug the remaining cable ends (removed in step 2) into the remaining stack ports configured on the new switch unit.
6. Power up the new switch. The switch will be added to the stack. Allow a few minutes for the new switch to boot up completely.

2.3.1.2 Validation

After the entire stack is created, it can be validated with the `show switch` command from the Master switch:

```
console#show switch  
  
Management Standby Preconfig Plugged-in Switch Code
```

SW	Status	Status	Model ID	Model ID	Status	Version
1	Mgmt Sw		N4064F	N4064F	OK	6.0.1.3
2	Stack Mbr	Oper Stby	N4064	N4064	OK	6.0.1.3
3	Stack Mbr		N4032	N4032	OK	6.0.1.3
4	Stack Mbr		N4032	N4032	OK	6.0.1.3



The example above shows a new stack member (N4032) was added. The `show switch stack-ports` command can also be used to see all of the ports that have been added to the stack as well as which ones are being used for stacking.

If a switch (SW) number is configured prior to adding it to the stack and there are no other devices using that number, then the switch continues to use the same number. Otherwise, the switch sets its number to the lowest unassigned number upon joining the stack.

Note: Once added to a stack, a switch's out-of-band IP address and console port are no longer accessible. Use the IP address and console port of the Master unit for management access, since the stack now acts as a single large switch.

Repeat the above steps to add more new members to the stack.



2.3.2 Web interface method

The example below shows how to add a stack member to an existing stack using the Web user interface. Before cabling an additional member to a stack, perform the steps below to setup the switch to join the stack. Once configured, continue to follow the instructions for cabling to complete the task. This works best when adding one stack member at a time. If multiple new members are to be added, follow these directions and complete the install of one before going to the next. Complete these steps again for each remaining switch to be added.

Selecting System > Stack Management > Stack Summary shows the current configuration before adding a new member.

The screenshot shows the Dell OpenManage Switch Administrator web interface. The main content area is titled "Stack Summary: Detail" and contains a table with the following data:

Unit	Management Status	Standby Status	Preconfigured Model Identifier	Plugged-in Model Identifier	Switch Status	Firmware Version	NSF Unit Support	SFS Status	SFS Last Attempt Status
1	Mgmt Sw		N4032	N4032	OK	6.0.1.1	Enable	No Action	None
2	Stack Mbr	Oper Stby	N4032F	N4032F	OK	6.0.1.1	Enable	No Action	None

Note: The example given below allows a new member to be added without preconfiguring the existing stack, though each new member itself needs to be configured. To preconfigure a stack before connecting the new stack member, consult the *User Guide* under *Preconfiguring a Stack Member*.

On the first new member switch to be added to the stack, select System > Stack Management > Stack Port Summary from the main navigation menu. In this example, two 40G QSFP+ interfaces F01/0/1 and F01/0/2 will be used for stacking, though any of the interfaces shown may be used.

Be sure to configure enough stack ports to connect to two other switches if using a ring topology stack, to allow connections to switches in both directions.

Interface	Configured Stack-mode	Running Stack-mode	Link Status	Link Speed (Gb/s)	Edit
Fo1/1/1	Stack	Ethernet	Detach	0	<input checked="" type="checkbox"/>
Fo1/1/2	Stack	Ethernet	Detach	0	<input checked="" type="checkbox"/>
Te1/0/1	Ethernet	Ethernet	Link Down	0	<input type="checkbox"/>
Te1/0/10	Ethernet	Ethernet	Link Down	0	<input type="checkbox"/>
Te1/0/11	Ethernet	Ethernet	Link Down	0	<input type="checkbox"/>
Te1/0/12	Ethernet	Ethernet	Link Down	0	<input type="checkbox"/>
Te1/0/13	Ethernet	Ethernet	Link Down	0	<input type="checkbox"/>

In the *Edit* column, select the check box to allow editing on the ports to be used for stacking. Then use the drop-down menu in the *Configured Stack-mode* column to put each port in stack mode. The Configured Stack Mode is now *Stack*, but the Running Stack-mode does not show *Stack* until the switch is reloaded, as instructed below.

Save the configuration to the Startup-Configuration using the System > File Management > Copy Files page.

Copy Files: Detail

Copy Master Firmware

Copy Master Firmware Destination: 1

Copy Configuration [▲ Back to top](#)

Copy Configuration Source: Running Config Destination: Startup Config

Restore Configurations [▲ Back to top](#)

Restore Configuration Factory Default [▲ Back to top](#)

After saving the configuration, remove power from the switch.



Note: Hot insertion of units into the stack is not supported. Do not connect a new member to the stack while the new unit is powered up.

Follow the steps in the following section to properly add the stacking cables and complete the process.

2.3.2.1 Ring vs. daisy-chain topology

If the original stack is cabled in a *ring topology*, where a stacking port on the last switch is connected to a stacking port on the first switch, the entire stack continues to work correctly through the process of adding a new switch regardless of where the new switch is cabled within the stack. This is due to the built-in resiliency of the ring topology that allows all switches to remain in communication with each other in the event a single link or switch is lost or removed.

When adding a switch to a *daisy-chain topology* stack, add it to one end of the stack and not in the middle. Adding to the middle requires breaking the daisy-chained stack, which causes the stack to split, creating a new Master on the group of switches that lost contact with the original Master. This would result in two stacks. Adding a new switch to the either end of the daisy-chain allows all other members to stay in constant communication and in turn allow the stack to stay intact during the process.

On a *daisy-chain* stack:

1. Configure the existing stack with new stack ports to be used to connect to the new switch.
2. Cable the new switch into the existing stack.
3. Power up the new switch. The switch will be added to the stack.

On a *ring topology* stack:

4. Plug new cables into some (usually half) of the stack ports configured on the new switch to be added. Half of the ports will be used unless both 10G and 40G ports are to be used in stacking this switch.
5. Unplug the stacking cables from any existing member going to another existing member in the stack. Only unplug the cables from one end, leaving them plugged into the other member.

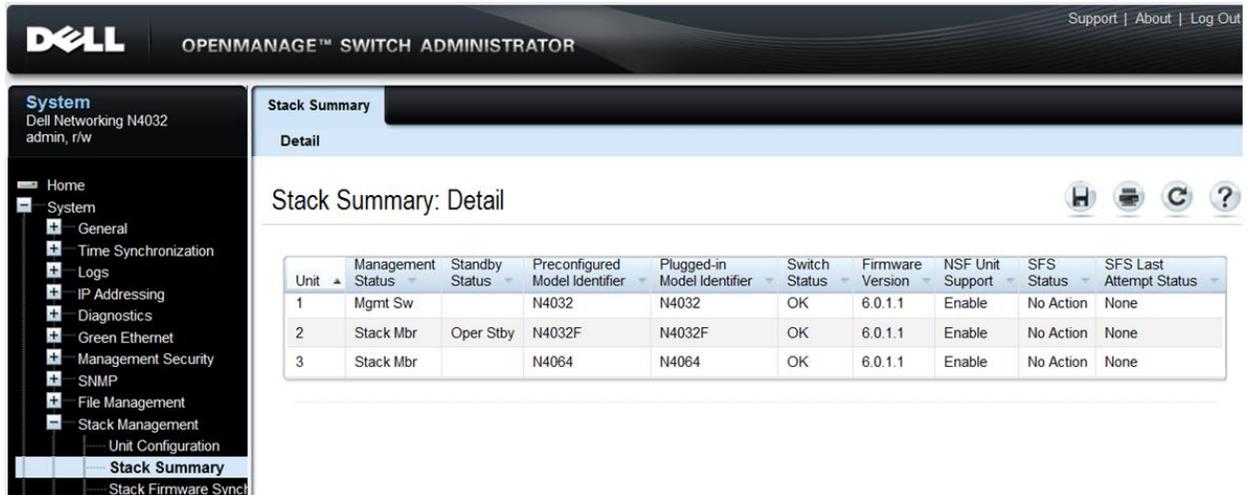
Note: Only half of the stack cables in this member will be unplugged. The cables going in the other direction to a third existing member will not be removed.

6. Plug the other end of the new cables of the switch being added into the stack ports that were unplugged in step 2.
7. Plug the remaining cable ends (removed in step 2) into the remaining stack ports configured on the new switch unit.
8. Power up the new switch. The switch will be added to the stack.

Allow a few minutes for the new switch to boot up completely.

2.3.2.2 Validation

After the entire stack is created, validate the configuration by selecting System > Stack Management > Stack Summary from the main navigation menu:



The example above shows a new stack member (Unit 3) was added.

If a switch (SW) number is configured prior to adding it to the stack and there are no other devices using that number, then the switch continues to use the same number. Otherwise, the switch sets its number to the lowest unassigned number upon joining the stack.

Note: Once added to a stack, a switch's out-of-band IP address and console port are no longer accessible to the user. Use the IP address and console port of the Master unit for management access, since the stack now acts as a single large switch.

Repeat the above steps to add more new members to the stack.



2.4 Updating firmware on a stack

Note: Make sure to check the Release Notes and any special instructions that may have come with new firmware updates. It is important to follow instructions found in those documents if they deviate from this white paper.

Steps for upgrading the firmware on a stack of switches are similar to upgrading the firmware on a single switch. Whether downloading a new image to the Master by using the System > File Management > File Download page in the Web UI, or the `copy` command in the CLI, the downloaded image is distributed to all member units of the stack. The instructions below guide the user through these steps.

2.4.1 Command-line interface method

To find the firmware versions the stack members are using, enter the following.

```
console#show version
```

Image Descriptions

```
active :
backup :
```

Images currently available on Flash

unit	active	backup	current-active	next-active
1	6.0.0.8	6.0.0.1	6.0.0.8	6.0.0.8
2	6.0.0.8	6.0.0.1	6.0.0.8	6.0.0.8
3	6.0.0.8	6.0.0.1	6.0.0.8	6.0.0.8
4	6.0.0.8	6.0.0.1	6.0.0.8	6.0.0.8

Each member of the stack is updated with the latest firmware simply by updating the Master switch. The commands below demonstrate how to copy the firmware file down to the Master using a TFTP server. The stack needs access to the TFTP server on the network and the firmware file needs to be present in the download folder of the TFTP server. Perform the following command from the CLI interface. Press “y” when prompted.

```
console#copy tftp://10.10.1.10/N4000v6.0.1.3.stk backup
```

```
Transfer Mode..... TFTP
Server IP Address..... 10.10.1.10
Source File Path..... ./
Source Filename..... N4000v6.0.1.3.stk
Data Type..... Code
Destination Filename..... backup
```

Management access will be blocked for the duration of the transfer
Are you sure you want to start? (y/n) y



```
TFTP code transfer starting
12487236 bytes transferred...
File contents are valid. Copying file to flash...
```

```
Attempting to send the STK file to other units in the stack...
```

```
File transfer operation completed successfully.
```

Note: This procedure may take a few minutes longer than updating a single, non-stacked switch.

Perform another `show version` command to see the new firmware has been downloaded to all members of the stack. Notice the firmware was only copied into the *backup* image for each member.

```
console#show version
```

```
Image Descriptions
```

```
active :
backup :
```

```
Images currently available on Flash
```

unit	active	backup	current-active	next-active
1	6.0.0.8	6.0.1.3	6.0.0.8	6.0.0.8
2	6.0.0.8	6.0.1.3	6.0.0.8	6.0.0.8
3	6.0.0.8	6.0.1.3	6.0.0.8	6.0.0.8
4	6.0.0.8	6.0.1.3	6.0.0.8	6.0.0.8

The next step is to activate the image that contains the new firmware by using the `boot system backup` command.

```
console#boot system backup
Activating image backup ..
```

```
console#show version
```

```
Image Descriptions
```

```
active :
backup :
```

```
Images currently available on Flash
```

unit	active	backup	current-active	next-active
1	6.0.0.8	6.0.1.3	6.0.0.8	6.0.1.3
2	6.0.0.8	6.0.1.3	6.0.0.8	6.0.1.3



3	6.0.0.8	6.0.1.3	6.0.0.8	6.0.1.3
4	6.0.0.8	6.0.1.3	6.0.0.8	6.0.1.3

Notice the next-active column now shows the same version as the backup column. Next, type the reload command to complete the update. All switches in the stack reloads.

```
console#reload

Are you sure you want to reload the stack? (y/n) y

Connection to host lost.
```

The "Connection to host lost" message appears only if performing the reload from a telnet session. It will not appear if performing the command from a console session.

Updating and rebooting the stack takes a few minutes longer than a single switch. After reload, the firmware upgrade is complete. To validate, login to the stack Master and perform a show version command. For the example given the following is displayed.

```
console#show version

Image Descriptions

active :
backup :

Images currently available on Flash
```

unit	active	backup	current-active	next-active
1	6.0.1.3	6.0.0.8	6.0.1.3	6.0.1.3
2	6.0.1.3	6.0.0.8	6.0.1.3	6.0.1.3
3	6.0.1.3	6.0.0.8	6.0.1.3	6.0.1.3
4	6.0.1.3	6.0.0.8	6.0.1.3	6.0.1.3

Notice as the backup becomes active, the active becomes the backup.

2.4.2 Web interface method

To find the firmware versions the stack members are using, select System > File Management > Active Images.

Look in the "Current Active Image Version" column to find which version is enabled.

Note: All switches in the stack should be at the same firmware version.



Unit No.	Active Image Version	Backup Image Version	Current Active Image Version	Next Active Image
1	6.0.1.1	6.0.0.0	6.0.1.1	active
2	6.0.1.1	6.0.0.0	6.0.1.1	active
3	6.0.1.1	6.0.0.0	6.0.1.1	active

Each member of the stack will be updated with the latest firmware simply by updating the Master switch. The screenshots below demonstrate how to copy the firmware to the Master using a TFTP server. The stack needs access to a TFTP server on the network and the firmware file needs to be present in the download folder of the TFTP server.

From the System > File Management > File Download page, select the appropriate settings. The most common settings are shown here.

File Type

File Type:

Transfer Mode:

Download [▲ Back to top](#)

Server Address: (Hostname or IP address)

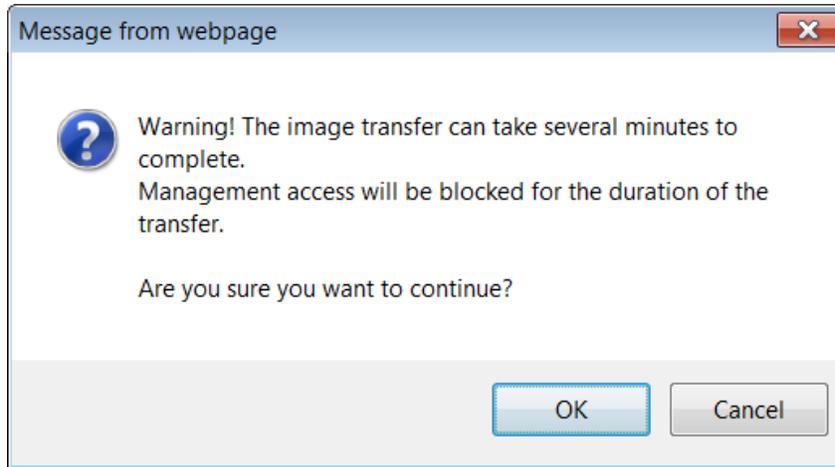
Source File Name: (1 to 32 characters)

Transfer File Path: (0 to 160 characters)

Image to download:

Click Apply. A warning will appear.

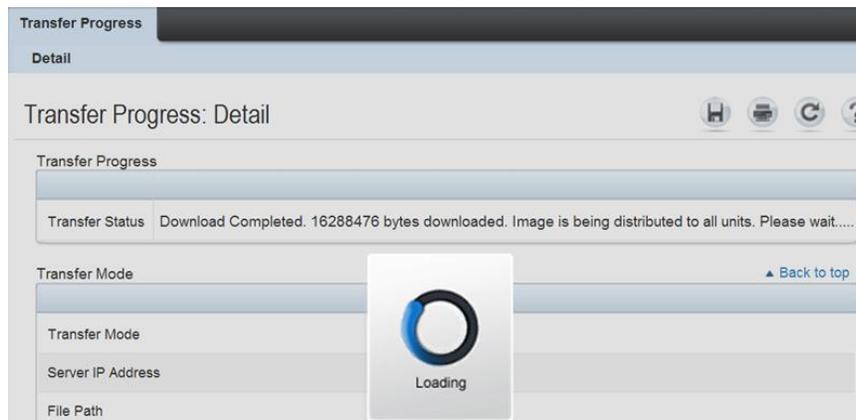




Click OK.

Note: Be patient as this procedure may take several minutes longer than updating a single, non-stacked switch.

The following screen appears for several minutes while the firmware is being downloaded to the Master and distributed to all members of the stack.



Once the file has been distributed to the entire stack, the following dialog box appears.



File Transfer operation is complete. Please check Transfer Status for details.

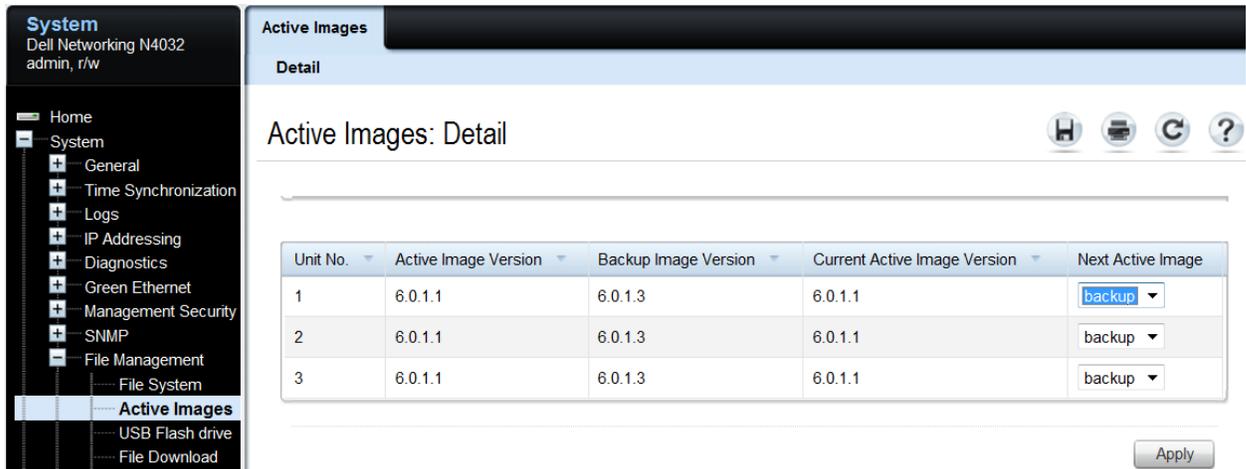
Close

Click Close.

Go back to the *Active Images* screen to confirm that the new firmware was downloaded to all members of the stack. Notice the firmware was only copied into the *backup* image for each member.

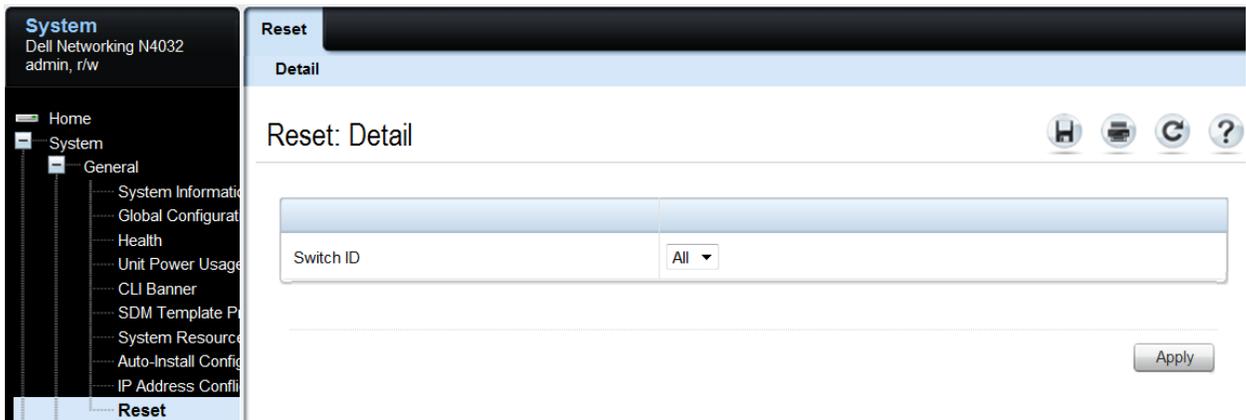
Unit No.	Active Image Version	Backup Image Version	Current Active Image Version	Next Active Image
1	6.0.1.1	6.0.1.3	6.0.1.1	active
2	6.0.1.1	6.0.1.3	6.0.1.1	active
3	6.0.1.1	6.0.1.3	6.0.1.1	active

The next step is to activate the image that contains the new firmware using the drop-down menus in the Next Active Image column. In this example the *backup* image is selected for each unit.

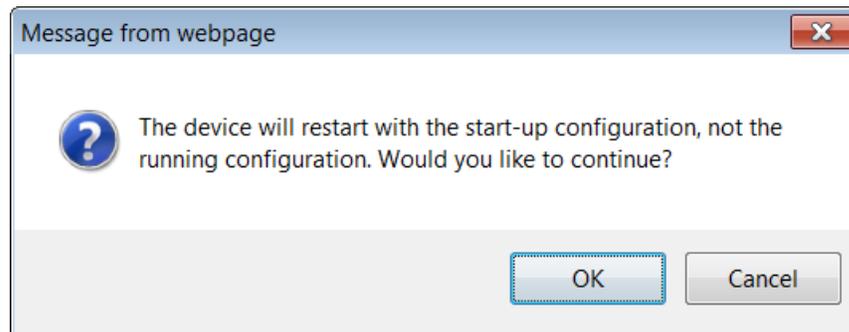


After selecting backup for each unit, click Apply.

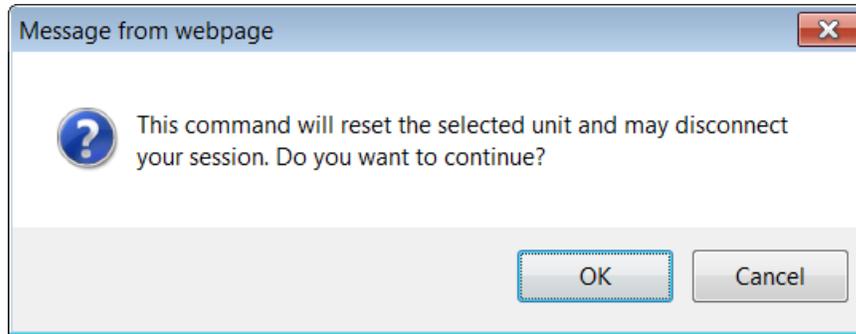
Go to the System > General > Reset page to reload the switch.



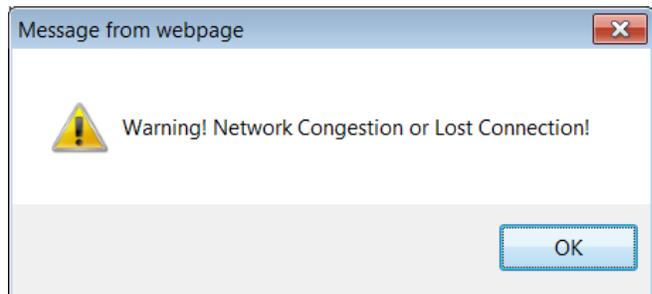
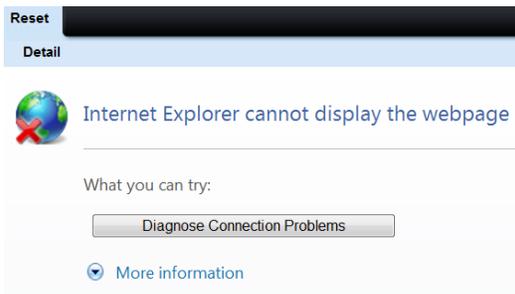
Click Apply to reload all switches in the stack. If the following screen appears, click OK.



Click OK again if this screen appears.



If either of the following screens appear, they are simply notifying the user that the network has been lost. This is only temporarily while the stack reloads.



Click OK if prompted with the above screen. Rebooting the stack may take a few minutes longer than a single switch. After reload, the firmware upgrade is complete. To validate each switch, login again to the Web UI of the stack Master, and then go to System > File Management > Active Images.

Unit No.	Active Image Version	Backup Image Version	Current Active Image Version	Next Active Image
1	6.0.1.3	6.0.1.1	6.0.1.3	active
2	6.0.1.3	6.0.1.1	6.0.1.3	active
3	6.0.1.3	6.0.1.1	6.0.1.3	active

Notice that as the backup versions become active, the previous active versions now become the backup. This allows the administrator to toggle back to the previous image if needed for troubleshooting. Going back to the previous version is rarely ever used and must be done with extreme caution if the newer firmware has been running a long time with several configuration changes since the initial upgrade. Newer firmware can have dozens of valuable bug fixes that will not be there on the older firmware.



2.5 Removing member units

This section provides guidance on how to remove member units from a stack while minimizing traffic flow interruptions within the stack. Removing any member of a *ring topology* stack does not require a reload of any member unit in the stack.

If a unit in the stack fails, the Master unit removes the failed unit from the stack and no changes or configuration are applied to the other stack members; however, the dynamic protocols will try to re-converge as the topology could change because of the failed unit. When there are no connected ports on the failed unit, the stack will be intact without changes. The example below demonstrates how to manually remove a single member while keeping the stack intact.

Run the show switch command to see the current Stack configuration. For this example Unit 2 will be removed.

```
console#show switch
```

SW	Management Status	Standby Status	Preconfig Model ID	Plugged-in Model ID	Switch Status	Code Version
1	Mgmt Sw		N4032	N4032	OK	6.0.1.3
2	Stack Mbr	Oper Stby	N4032F	N4032F	OK	6.0.1.3
3	Stack Mbr		N4064	N4064	OK	6.0.1.3

2.5.1 Command-line interface method

Since any interface on these switches can be used for stacking, make sure to verify exactly which ports are being used for stacking so they are un-cabled and re-routed last. This information is found with the following command.

```
console#show switch stack-ports | include Stack
```

Interface	Stack Mode	Stack Mode	Status	Speed (Gb/s)	Status
Te1/0/7	Stack	Stack	Link Up	10	Enabled
Te1/0/8	Stack	Stack	Link Up	10	Enabled
Te2/1/1	Stack	Stack	Link Up	10	Enabled
Te2/1/2	Stack	Stack	Link Up	10	Enabled
Te3/0/7	Stack	Stack	Link Up	10	Enabled
Te3/0/8	Stack	Stack	Link Up	10	Enabled

Note: Be sure to capitalize *Stack* since the command is case sensitive.

Only interfaces in Stack mode are displayed. The logical stack unit number is represented in each interface name. The first number in the interface name is the logical stack unit. For example, interface **Te2/1/1** is in logical unit number 2.

A blinking LED light can be generated on the *back* of each Dell N4xxx to locate each physical unit. This blinking LED is useful when identifying physical units and ports for running diags, sniffing, mirroring ports, and other basic troubleshooting. It is also helpful when adding, removing, replacing or tracing cables



associated with these interfaces. Use the `locate switch` command to blink the blue “Locator” LED on the switch unit you are trying to locate.

```
console#locate switch 2
```

The blue LED locator light on switch 2 blinks for 20 seconds. The length of time the LED continues to blink can be changed using the `locate time <ssss>` command, where *ssss* is the time in seconds for the LED to blink.

2.5.1.1 Removing the physical switch unit from the stack

Before removing a physical unit from a stack, prepare ports on the other stack member units to receive the cables and traffic that is redirected to them from the member unit being removed. Consider all LAGs, VLANs, STP, ACLs, security, and so on, that needs to be configured on the new ports to accept cables, establish links, and begin to forward traffic.

Note: It is highly recommended not to continue until these things have been considered and proper preparations are made.

Note: Do not remove or re-route stacking cables until prompted in the last step below.

Do not remove or re-route *stacking* cables until prompted. Disconnect all other links on the member to be removed and re-route the traffic that was going through this unit so it now goes through the ports that were prepared on the remaining stack unit members.



Caution: In the next step, make sure to keep track of all ports being used for stacking that will be temporarily unplugged. They need to be re-cabled in the following step.

Only after re-routing the traffic through the remaining stack units, remove the stacking cables from the switch to be removed. The switch being removed does not need to be powered off. Keeping the switches power on automatically brings it to a stand-alone state as the stack cables are removed. In the example below (Figure 13), the red cable is removed along with the switch.

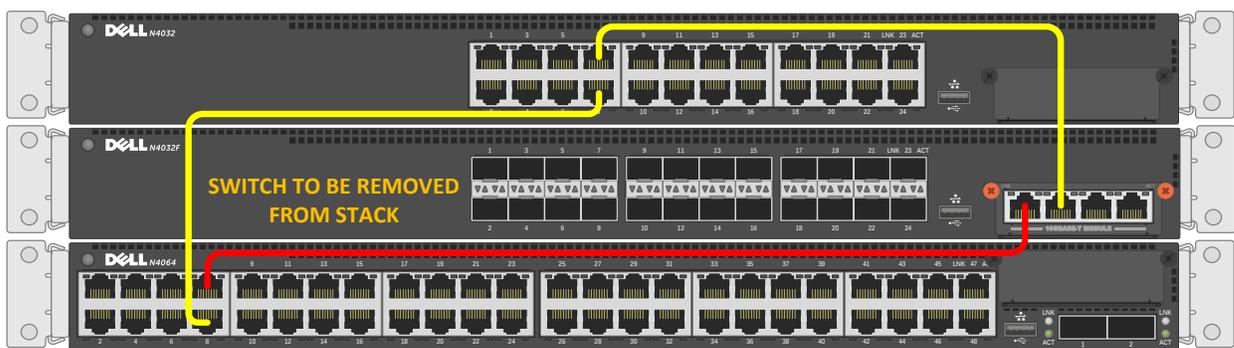


Figure 13 Cabling of three stacked units



Use the freed cables or new cables to connect the two switches together that were previously adjacent to the switch being removed. Since there are multiple interface and cable types supported for stacking, a different set of cables may be required to make this connection.

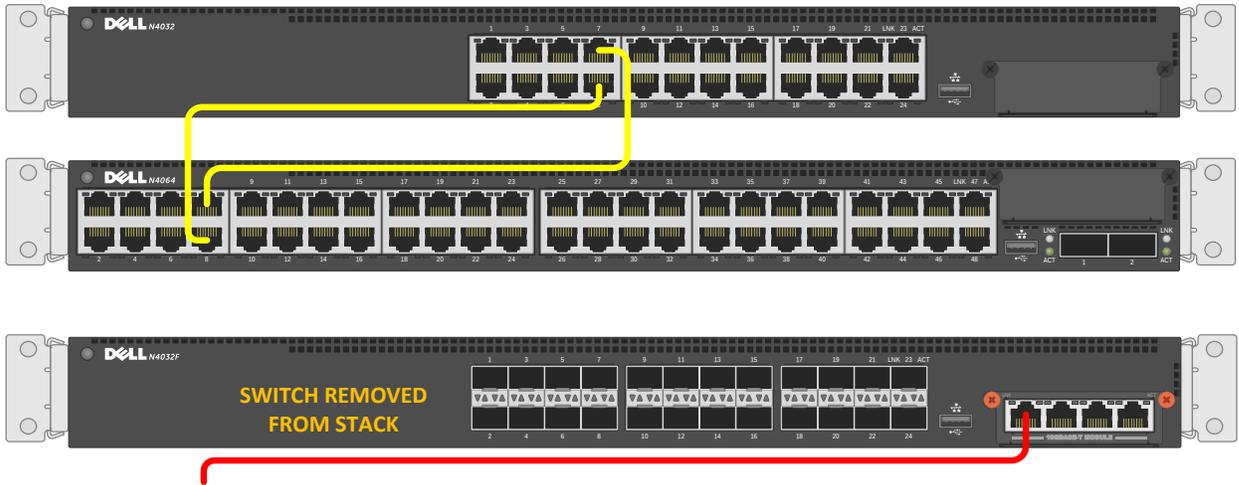


Figure 14 Removal of a stack unit

Removal of a stack unit results in one or more freed cables. In this example, a single cable (red) that was used to link Unit 2 to Unit 3 has been freed up. The other cable that was going from Unit 1 to Unit 2, is now used to connect Unit 1 to Unit 3, using the same stack ports that were used initially to once again complete the ring topology. Move this cable to complete the stack unit removal process.

2.5.1.2 Validation

To validate the stack unit has been removed and that the remaining stack members are still intact, type the `show switch` command.

```
console#show switch
```

SW	Management Status	Standby Status	Preconfig Model ID	Plugged-in Model ID	Switch Status	Code Version
1	Mgmt Sw		N4032	N4032	OK	6.0.1.3
2	Unassigned		N4032F		Not Present	0.0.0.0
3	Stack Mbr	Oper Stby	N4064	N4064	OK	6.0.1.3



2.5.1.3 Removing units from the stack configuration

Once a unit has been physically removed, it may be desired to remove it from the configuration as well, if there are no plans on restoring it later. For the above example Unit 2 was removed; however, the `show switch` command continues to show the removed switch in the configuration.

Issuing a `no member` command in *Stack Configuration* mode deletes the removed switch from the configured stack information.

```
console(config)#stack
console(config-stack)#no member 2
console(config-stack)#show switch
```

SW	Management Status	Standby Status	Preconfig Model ID	Plugged-in Model ID	Switch Status	Code Version
1	Mgmt Sw		N4032	N4032	OK	6.0.1.3
3	Stack Mbr	Oper Stby	N4064	N4064	OK	6.0.1.3

Notice that Unit 2 is no longer present in the configuration. A backup of the configuration (copy running-config startup-config) is required to make the change persist after a reload.

2.5.1.4 Renumbering stack units

It may be desired to renumber switches in the stack. While this feature may be used at any time, it is most commonly used after a switch has been removed and the remaining unit numbers are no longer consecutive. While inconsecutive numbers or numbers out of order do not impact traffic in any way, keeping an order can help quickly identify individual units and ports.

A switch may be any number between 1 and 6 as long as it is not already taken by another switch. If it is desired to renumber the switch units to show consecutively numbered units (e.g. units 1-2-3, instead of 1-2-4), it will require a brief reset of the stack and clear the configuration of the interfaces on the switch receiving the new number. Type the command `show switch` to see the current order of the units before renumbering.

```
console#show switch
```

SW	Management Status	Standby Status	Preconfig Model ID	Plugged-in Model ID	Switch Status	Code Version
1	Mgmt Sw		N4032	N4032	OK	6.0.1.3
3	Stack Mbr	Oper Stby	N4064	N4064	OK	6.0.1.3



Caution: Renumbering stack units may hinder management scripts and monitoring software that collects data based on particular port traffic. Use renumbering with caution when monitoring ports and be aware that scripts and monitoring parameters may need to be modified.

Type the switch renumber command to change the number of the switch.

```
console(config)#switch 3 renumber 2
The switch will be reset to perform unit renumbering
and the configuration of switch interfaces will be cleared.
Are you sure you want to renumber? (y/n)y
```

Allow a few minutes for the switch to renumber, then enter the following.

```
console#show switch
```

SW	Management Status	Standby Status	Preconfig Model ID	Plugged-in Model ID	Switch Status	Code Version
1	Mgmt Sw		N4032	N4032	OK	6.0.1.3
2	Stack Mbr	Oper Stby	N4064	N4064	OK	6.0.1.3
3	Unassigned		N4064		Not Present	0.0.0.0

The switch that was Unit #3 is now Unit #2. Unit #3 is no longer present. To remove it from the list, perform the no member command in Stack Configuration Mode.

```
console(config)#stack
console(config-stack)#no member 3
console(config-stack)#show switch
```

SW	Management Status	Standby Status	Preconfig Model ID	Plugged-in Model ID	Switch Status	Code Version
1	Mgmt Sw		N4032	N4032	OK	6.0.1.3
2	Stack Mbr	Oper Stby	N4064	N4064	OK	6.0.1.3

2.5.1.5 Config Mismatch

A “Config Mismatch” in the Switch Status column indicates inconsistent entries in the “Preconfigured Model Identifier” and “Plugged-in Model Identifier” columns. This usually occurs after a renumbering of units when the stack consists of multiple models, but can also occur after a new unit is added to the stack when the stack has been preconfigured and expects a different switch model. The command below shows a Config Mismatch with a preconfigured model of N4032F and a plugged-in model of N4032 for Unit 3.

```
console#show switch
```

SW	Management Status	Standby Status	Preconfig Model ID	Plugged-in Model ID	Switch Status	Code Version
2	Stack Mbr	Oper Stby	N4032F	N4032F	OK	6.0.1.3
3	Stack Mbr		N4032F	N4032	Cfg Mismatch	6.0.1.3
4	Mgmt Sw		N4064	N4064	OK	6.0.1.3



The plugged-in model will always be the actual model that is inserted as the stack unit. The preconfigured model must be changed to show the same. To sync the two, the Unit must be temporarily removed from the stack then added back. For this example, use the following steps to sync Unit 3.

Note: This example is for a Ring topology only and will not work on a Daisy Chain topology.

1. Save the configuration of the stack by using the "write" command.
2. Leaving all data cables plugged in, unplug the mismatched stack member's power cord.
3. From the command line type the following:

```
console#show switch
```

SW	Management Status	Standby Status	Preconfig Model ID	Plugged-in Model ID	Switch Status	Code Version
2	Stack Mbr	Oper Stby	N4032F	N4032F	OK	6.0.1.3
3	Unassigned		N4032F		Not Present	0.0.0.0
4	Mgmt Sw		N4064	N4064	OK	6.0.1.3

```
console#config
```

```
console(config)#stack
```

```
console(config-stack)#show supported switchtype
```

```
SID Switch Model ID
```

```
-----
```

```
1 N4032
```

← note that N4032 is a "1"

```
2 N4032F
```

```
3 N4064
```

```
4 N4064F
```

```
console(config-stack)#no member 3
```

```
console(config-stack)#member 3 1
```

← use the "1" here to indicate an N4032

```
console(config-stack)#exit
```

```
console(config)#exit
```

```
console#write
```

This operation may take few minutes.

Management interfaces will not be available during this time.

Are you sure you want to save? (y/n) y

Configuration Saved!

```
console#show switch
```

SW	Management Status	Standby Status	Preconfig Model ID	Plugged-in Model ID	Switch Status	Code Version
2	Stack Mbr	Oper Stby	N4032F	N4032F	OK	6.0.1.3
3	Unassigned		N4032		Not Present	0.0.0.0
4	Mgmt Sw		N4064	N4064	OK	6.0.1.3

4. Notice the Preconfig Model ID has changed from N4032F to N4032.



5. Apply power back to the mismatched stack member.

Allow the member a few minutes to load and join back into the stack. Run `show switch` again to validate the configurations are in sync.

```
console#show switch
```

SW	Management Status	Standby Status	Preconfig Model ID	Plugged-in Model ID	Switch Status	Code Version
2	Stack Mbr	Oper Stby	N4032F	N4032F	OK	6.0.1.3
3	Stack Mbr		N4032	N4032	OK	6.0.1.3
4	Mgmt Sw		N4064	N4064	OK	6.0.1.3

2.5.1.6 Configuring a removed unit to be stand-alone

After removing a unit from a stack, the unit converts back to its original configuration that it had prior to adding it to the stack, retaining the IP address, VLAN, LAG, and other settings. This allows immediate access to the stand-alone through the out-of-band port if previously configured.

Note: A duplicate address could occur on the network if another device was assigned the IP address of the device while it was a stack member. If this occurs simply detach the device from the network and change the IP address through the console port.

Meta-data will remain on the switch until cleared or changes are made to the *stack* settings, but will not affect functions of the switch. For example, a stand-alone switch is assigned to be unit #1. Upon joining the stack it was assigned to be unit #3. When it is removed from the stack it will retain the assignment of unit #3 until changed by the administrator. For instructions on how to make this change, see [Renumbering stack on 42](#).

2.5.2 Web interface method

Since any interface on the N4000 series switches can be used for stacking, make sure to verify exactly which ports are being used for stacking so they are un-cabled and re-routed last, after the normal traffic-passing cables have been re-routed. This information is found at System > Stack Management > Stack Port Summary.



The screenshot shows the Dell Networking N4032 switch configuration interface. The left sidebar contains a navigation menu with the following items: Home, System, General, Time Synchronization, Logs, IP Addressing, Diagnostics, Green Ethernet, Management Security, SNMP, File Management, Stack Management, Unit Configuration, Stack Summary, Stack Firmware Synchron, and Supported Switches. The main content area is titled "Stack Port Summary: Detail" and contains a table with the following data:

Interface	Configured Stack-mode	Running Stack-mode	Link Status	Link Speed (Gb/s)	Edit
Te1/0/7	Stack	Stack	Link Up	10	<input type="checkbox"/>
Te1/0/8	Stack	Stack	Link Up	10	<input type="checkbox"/>
Te2/1/1	Stack	Stack	Link Up	10	<input type="checkbox"/>
Te2/1/2	Stack	Stack	Link Up	10	<input type="checkbox"/>
Te3/0/7	Stack	Stack	Link Up	10	<input type="checkbox"/>
Te3/0/8	Stack	Stack	Link Up	10	<input type="checkbox"/>
Te1/0/1	Ethernet	Ethernet	Link Down	0	<input type="checkbox"/>

Note: Clicking the *Configured Stack-mode* column header brings all Stack ports to the top of the list.

Look for interfaces shown to be in Stack mode. The logical stack unit number is represented in each interface name. The first number in the interface name is the logical stack unit. For example, interface **Te2/1/1** is in logical unit number 2.

A blinking LED light is generated on the *back* of each Dell N4xxx to locate each physical unit. This blinking LED is useful when identifying physical units and ports for running diags, sniffing, mirroring ports, and other basic troubleshooting. It is also helpful when needing to add, remove, replace or trace cables associated with these interfaces. Use the `locate switch` CLI command to blink the blue "Locator" LED on the switch unit you are trying to locate.

```
console#locate switch 2
```

The LED locator light on switch 2 blinks for 20 seconds. The length of time the LED continues to blink can be changed using the `locate time <ssss>` command, where `ssss` is the time in seconds for the LED to blink.

2.5.2.1 Removing the physical switch unit from the stack

Before removing a physical unit from a stack, prepare the ports on the other stack member units to receive the cables and traffic that will be redirected to them from the member unit being removed. Consider all LAGs, VLANs, STP, ACLs, security, and so on, that needs to be configured on the new ports in order to accept cables, establish links, and begin to forward traffic.

Note: It is highly recommended not to continue until these things have been considered and proper preparations are made.



Note: Do not remove or re-route stacking cables until prompted in the last step below.

Do not remove or re-route *stacking* cables until prompted. Disconnect all other links on the member to be removed and re-route the traffic that was going through this unit so it now goes through the ports that were prepared on the remaining stack unit members.



Caution: In the next step, be sure to keep track of all ports being used for stacking that will be temporarily unplugged. They need to be re-cabled in the following step.

Only after re-routing the traffic through the remaining stack units, remove the stacking cables from the switch to be removed. The switch being removed does not need to be powered off. Keeping the switches powered on automatically brings it to a stand-alone state as the stack cables are removed. In the example below, the red cable will be removed from the configuration along with the switch.

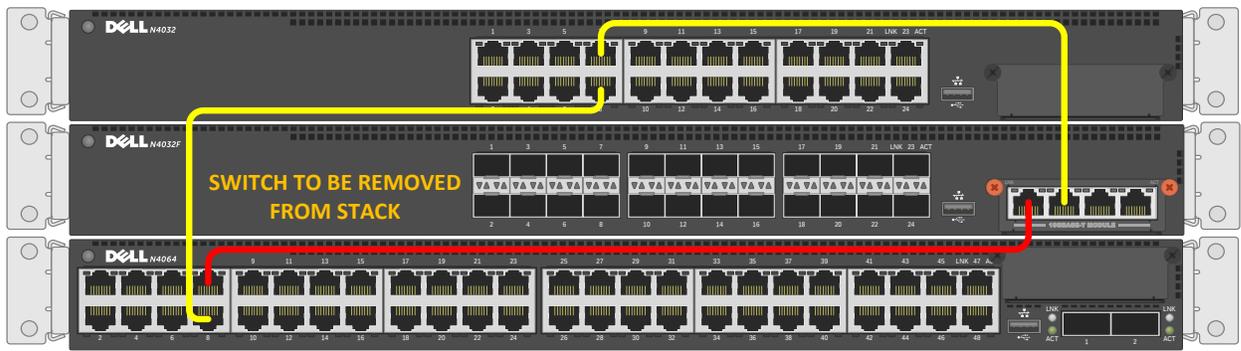


Figure 15 Cabling of three stacked units.

Use the freed cables or new cables to connect the two switches together that were previously adjacent to the switch being removed. Since there are multiple interface and cable types supported for stacking, a different set of cables may be required to make this connection.



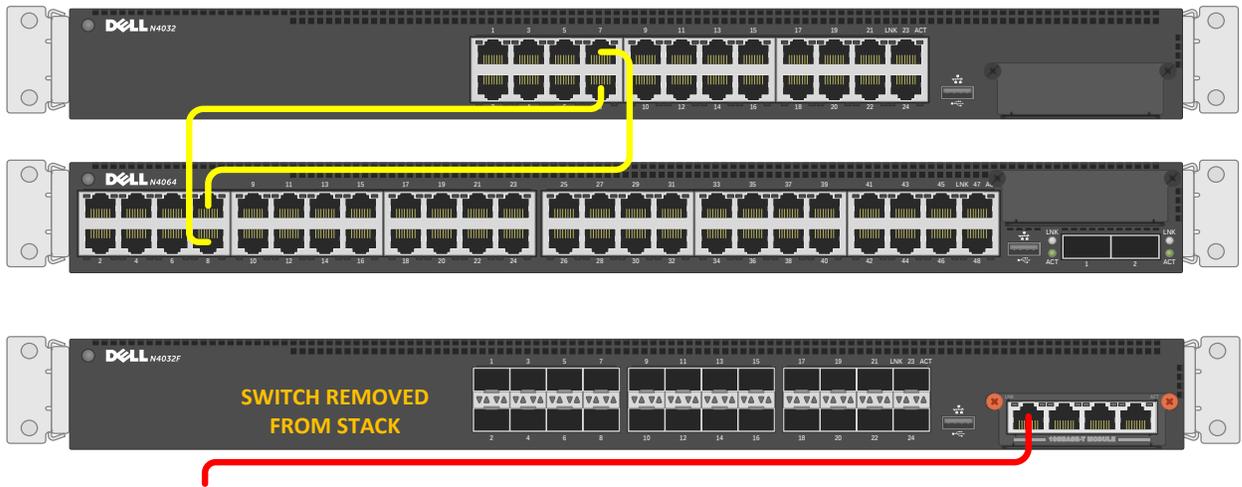


Figure 16 Removal of a stack unit

Removal of a stack unit results in one or more freed cables. In this example, a single cable (red) that was used to link Unit 2 to Unit 3 has been freed up. The other cable that was going from Unit 1 to Unit 2, is now used to connect Unit 1 to Unit 3, using the same stack ports that were used initially to once again complete the ring topology. Move this cable to complete the stack unit removal process.

2.5.2.2 Validation

To validate the stack unit was removed and that the remaining stack members are still intact, go to System > Stack Management > Stack Summary.

Unit	Management Status	Standby Status	Preconfigured Model Identifier	Plugged-in Model Identifier	Switch Status	Firmware Version	NSF Unit Support	SFS Status	SFS Last Attempt Status
1	Mgmt Sw		N4032	N4032	OK	6.0.1.3	Enable	No Action	None
2	Unassigned		N4032F		Not present	0.0.0.0	Enable	No Action	None
3	Stack Mbr	Oper Stby	N4064	N4064	OK	6.0.1.3	Enable	No Action	None

2.5.2.3 Removing units from the stack configuration

Once a unit has been physically removed, it may be desired to remove it from the configuration as well, if there are no plans on restoring it later. For the above example Unit 2 was removed; however, the Stack Summary screen continues to show the removed switch in the configuration.



To remove the switch from the configuration, go to the System > Stack Management > Unit Configuration screen. Select the Switch ID of the switch to be removed, and then check the *Remove Switch* check box at the bottom of the bottom of the screen.

The screenshot displays the Dell OpenManage Switch Administrator interface. The top header shows the Dell logo and 'OPENMANAGE™ SWITCH ADMINISTRATOR'. The left sidebar contains a navigation menu with categories like System, Stack Management, and Unit Configuration. The main content area is titled 'Unit Configuration: Detail' and shows a table of configuration parameters for a switch. The 'Remove' section at the bottom has a checked checkbox for 'Remove Switch'. An 'Apply' button is located at the bottom right of the configuration area.

Unit Configuration	
Switch ID	2 Change Switch ID to <input type="text"/> (1 to 12)
Management Status	Unassigned
Configure as Standby	<input type="checkbox"/>
Preconfigured Model Identifier	N4032F
Plugged-in Model Identifier	
Switch Status	Not present
Switch Description	N4032F
Detected Code Version	0.0.0.0
Detected Code in Flash	0.0.0.0
Up Time	0 days, 0 hours, 0 minutes, 0 secs

Remove	
Remove Switch	<input checked="" type="checkbox"/>

Clicking *Apply* deletes the removed switch from the stack configuration on the running-configuration. Go back to the Stack Summary screen to verify the switch was removed.

A backup of the configuration (copying the *running-configuration* to the *startup-configuration*) in System > File Management > Copy Files is required to make the change persist after a reload.



2.5.2.4 Renumbering stack units

It may be desired to renumber switches in the stack. While this feature may be used at any time, it is most commonly preferred after a switch has been removed and the remaining unit numbers are no longer consecutive. While inconsecutive numbers or numbers out of order do not impact traffic in any way, keeping an order can help quickly identify individual units and ports.

A switch may be any number between 1 and 6 as long as it is not already taken by another switch. If it is desired to renumber the switch units to show consecutively numbered units (e.g. units 1-2-3, instead of 1-2-4), it will require a brief reset of the stack and clear the configuration of the interfaces on the switch receiving the new number. View the System > Stack Management > Stack Summary to see the current numbering of each unit.

Unit	Management Status	Standby Status	Preconfigured Model Identifier	Plugged-in Model Identifier	Switch Status	Firmware Version	NSF Unit Support	SFS Status	SFS Last Attempt Status
1	Mgmt Sw		N4032	N4032	OK	6.0.1.3	Enable	No Action	None
3	Stack Mbr	Oper Stby	N4064	N4064	OK	6.0.1.3	Enable	No Action	None





Caution: Renumbering stack units may hinder management scripts and monitoring software that collect data based on particular port traffic. Use renumbering with caution when monitoring ports and be aware that scripts and monitoring parameters may need to be modified.

In this example there are two stack members numbered 1 and 3. To change Unit 3 to Unit 2, go to System > Stack Management > Unit Configuration and select the Switch ID to change. Enter the new Switch ID into the *Change Switch ID to* field and click Apply.

Unit Configuration: Detail

Unit Configuration

Switch ID	3 Change Switch ID to 2 (1 to 12)
Management Status	Stack Unit
Configure as Standby	<input type="checkbox"/>
Preconfigured Model Identifier	N4064
Plugged-in Model Identifier	N4064
Switch Status	OK
Switch Description	N4064
Detected Code Version	6.0.1.3
Detected Code in Flash	6.0.1.3
Up Time	0 days, 21 hours, 7 minutes, 24 secs

Remove [Back to top](#)

Remove Switch	<input type="checkbox"/>
---------------	--------------------------

[Back to top](#)

Apply

Click OK on the next screen. Allow a few minutes for the switch to renumber, then verify the new ID from the System > Stack Management > Stack Summary screen.

Stack Summary: Detail

Unit	Management Status	Standby Status	Preconfigured Model Identifier	Plugged-in Model Identifier	Switch Status	Firmware Version	NSF Unit Support	SFS Status	SFS Last Attempt Status
1	Mgmt Sw		N4032	N4032	OK	6.0.1.3	Enable	No Action	None
2	Stack Mbr	Oper Stby	N4064	N4064	OK	6.0.1.3	Enable	No Action	None
3	Unassigned		N4064		Not present	0.0.0.0	Enable	No Action	None



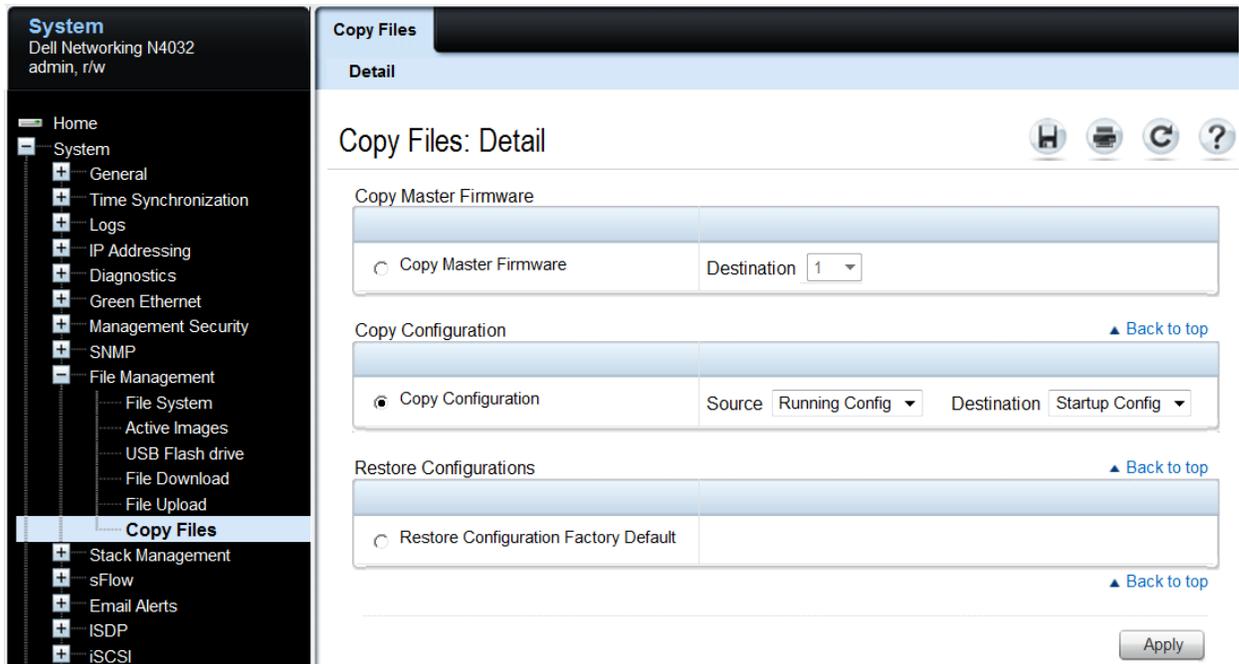
The switch that was Unit 3 is now Unit 2 and Unit 3 is no longer present. To remove it from the list, select it on the System > Stack Management > Unit Configuration screen, and then select the *Remove Switch* check box at the bottom.

The screenshot shows the Dell Networking N4032 web interface. The left sidebar is expanded to 'Unit Configuration'. The main content area is titled 'Unit Configuration: Detail' and shows a table with the following data:

Unit Configuration	
Switch ID	3 Change Switch ID to <input type="text"/> (1 to 12)
Management Status	Unassigned
Configure as Standby	<input type="checkbox"/>
Preconfigured Model Identifier	N4064
Plugged-in Model Identifier	
Switch Status	Not present
Switch Description	N4064
Detected Code Version	0.0.0.0
Detected Code in Flash	0.0.0.0
Up Time	0 days, 0 hours, 0 minutes, 0 secs

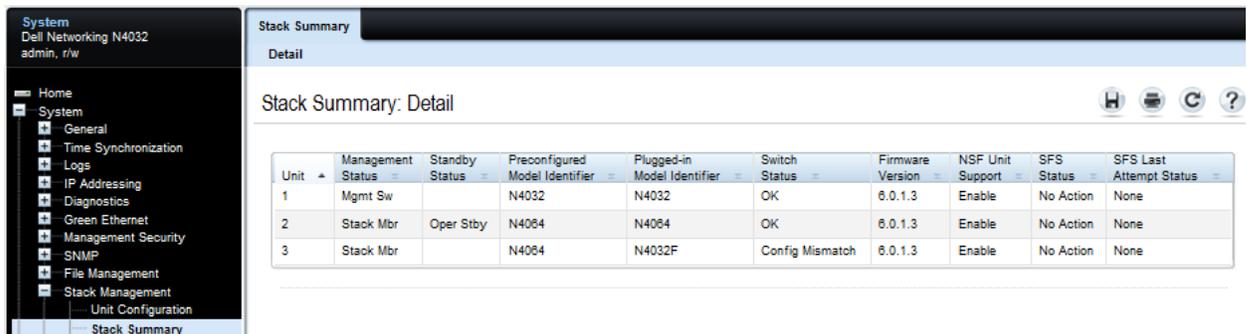
Below the table is a 'Remove' section with a 'Remove Switch' checkbox checked. An 'Apply' button is located at the bottom right of the page.

Clicking *Apply* deletes the removed switch from the stack configuration on the running-configuration. Go back to the Stack Summary screen to verify the switch was removed. A backup of the configuration (copying the *running-configuration* to the *startup-configuration*) in System > File Management > Copy Files is required to make the change persist after a reload.



2.5.2.5 Config Mismatch

When a “Config Mismatch” occurs in the Switch Status column, it indicates inconsistent entries in the “Preconfigured Model Identifier” and “Plugged-in Model Identifier” columns. This usually occurs after a renumbering of units when the stack consists of multiple models, but can also occur after a new unit is added to the stack when the stack has been preconfigured to expect a different switch model. In the picture below, these columns show a preconfigured model of N4064 and a plugged-in model of N4032F.



The plugged in model will always be the actual model that is physically a member of the stack. The preconfigured model must be changed to show the same. To sync the two, the Unit must temporarily be removed using the “Remove” tool in System > Stack Management > Unit Configuration > Detail tab, then added back using the “Add” tool in System > Stack Management > Unit Configuration > Add tab.



2.5.2.6 Configuring a removed unit to be stand-alone

After removing a unit from a stack, the unit converts back to its original configuration that it had prior to adding it to the stack, retaining the IP address, VLAN, LAG, and other settings, allowing the user to immediately access the stand-alone through the out-of-band port if previously configured.

Note: A duplicate address could occur on the network if another device was assigned the IP address of the device while it was a stack member. If this occurs simply detach the device from the network and change the IP address through the console port.

Meta-data remains on the switch until cleared or changes are made to the *stack* settings, but will not affect functions of the switch. For example, a stand-alone switch is assigned to be unit 1. Upon joining the stack it was assigned to be unit 3. When it is removed from the stack it will retain the assignment of unit 3 until changed by the administrator. For instructions on how to make this change, see [Renumbering stack](#) on [page 42](#).

3 Managing the standby unit

If the Master unit fails or is taken offline, a Standby unit automatically takes place as Master. During this time there is no more than a 50 ms interruption in unicast connectivity.

The commands below are used to manage your Standby unit.

3.1.1 Command-line interface method

To find out which unit is currently in Standby status, run the `show switch` command.

```
console#show switch
```

SW	Management Status	Standby Status	Preconfig Model ID	Plugged-in Model ID	Switch Status	Code Version
1	Mgmt Sw		N4032	N4032	OK	6.0.1.3
2	Stack Mbr	Oper Stby	N4064	N4064	OK	6.0.1.3
3	Stack Mbr		N4032F	N4032F	OK	6.0.1.3

The *Standby Status* column shows which unit is in Standby mode. There are two standby modes: *Oper Stby* and *Cfg Stby*. *Oper Stby* is selected automatically by the Master during stack creation. If the administrator decides to select a different unit to be Standby, then it is labeled *Cfg Stby*. Both Standby modes work identically.

In this example, unit 2 is the stack standby for the Master unit. To change the standby to a different unit, use the `standby x` command. Verify the change with the `show switch` command.

```
console(config-stack)#standby 3
```

```
console#show switch
```

SW	Management Status	Standby Status	Preconfig Model ID	Plugged-in Model ID	Switch Status	Code Version
1	Mgmt Sw		N4032	N4032	OK	6.0.1.3
2	Stack Mbr		N4064	N4064	OK	6.0.1.3
3	Stack Mbr	Oper Stby	N4032F	N4032F	OK	6.0.1.3

This method cannot be used to assign the current Stack Master to the Standby role and results in an error. In the event there is a need to change the role of the Master or make the Standby the Master, use the `initiate failover` command from the Command Line Interface. This command results in a warm restart of the stack Master, triggering the Standby unit to take over as a new Master switch.



```
console(config)#stack
console(config-stack)#initiate failover
```

The system has unsaved changes.
Would you like to save them now? (y/n) **y**

Configuration Saved! Management unit will be reloaded.
Are you sure you want to failover to the backup unit? (y/n) **y**

If using the CLI through the console port, the session will no longer be valid. The console port on the new Master switch will now be activated for management. The IP and MAC addresses of the stack will remain the same with the new Master. If using a telnet session, log in using the same IP address as before.

3.1.2 Web interface method

In case the Master unit fails, a Standby unit is automatically configured to take place as Master. To find out which unit is currently in Standby status, go to the System > Stack Management > Stack Summary screen. The *Standby Status* column shows which unit is in Standby mode. There are two standby modes: *Oper Stby* and *Cfg Stby*. *Oper Stby* is selected automatically by the Master during stack creation. If the administrator decides to select a different unit to be Standby, then it is labeled *Cfg Stby*. Both Standby modes work identically.

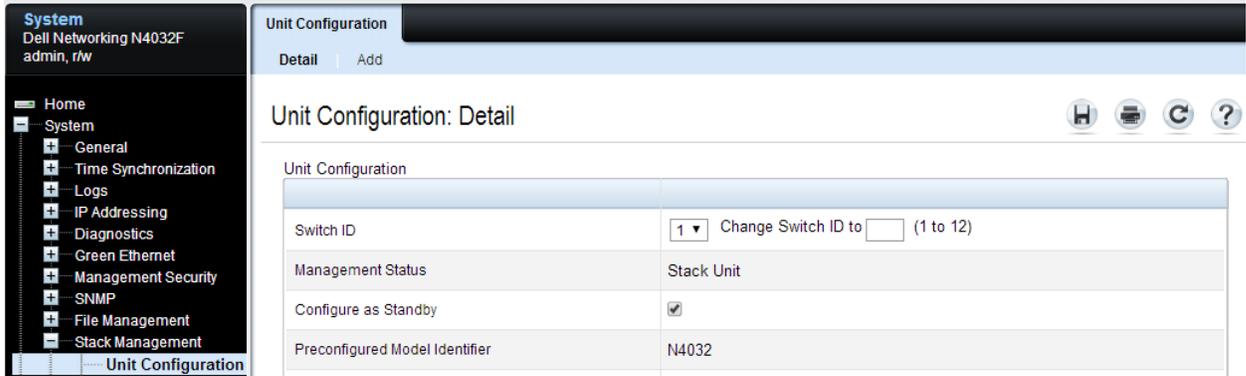
As shown in the below example, Unit 3 is the Master and Unit 2 is the Standby.

The screenshot shows the 'Stack Summary: Detail' page in the Dell Networking N4032F web interface. The page title is 'Stack Summary: Detail' and it includes a 'Detail' tab. A table displays the status of three units in the stack.

Unit	Management Status	Standby Status	Preconfigured Model Identifier	Plugged-in Model Identifier	Switch Status	Firmware Version	NSF Unit Support	SFS Status	SFS Last Attempt Status
1	Stack Mbr		N4032	N4032	OK	6.0.1.3	Enable	No Action	None
2	Stack Mbr	Oper Stby	N4064	N4064	OK	6.0.1.3	Enable	No Action	None
3	Mgmt Sw		N4032F	N4032F	OK	6.0.1.3	Enable	No Action	None

To change the standby to a different unit, go to the System > Stack Management > Unit Configuration screen.

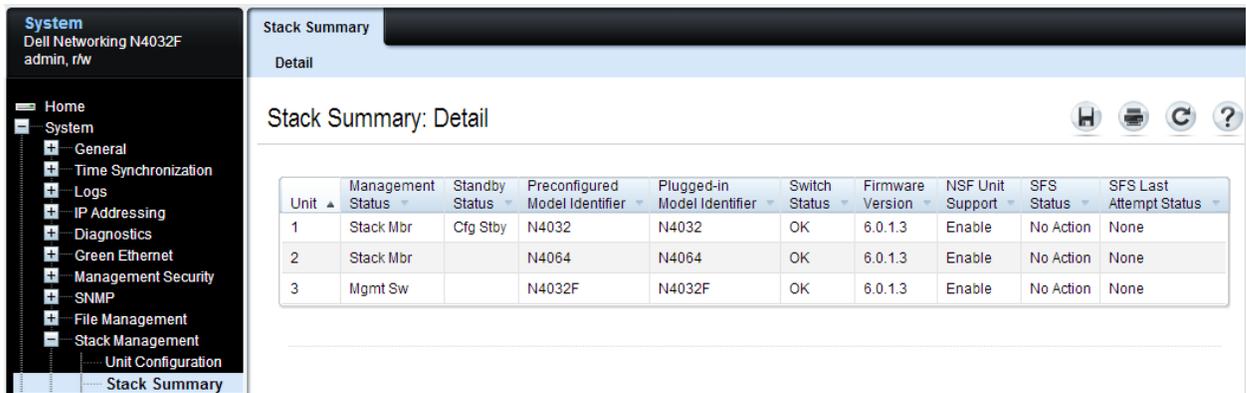




Select the *Switch ID* to be assigned as the Standby. Check the “Configure as Standby” checkbox.

Note: Assigning the current Stack Master to the Standby role is not allowed using this method and results in an error. Instead, use the *initiate failover* method described below.

Click Apply. Copying the running-configuration to the startup-configuration is not required. This setting will be persistent after a reload. Verify the new Standby switch from the Stack Summary screen.



If there is a need to change the role of the Master or make the Standby the Master, use the *initiate failover* command from the Command Line Interface. This command results in a warm restart of the stack Master, triggering the Standby unit to take over as a new Master switch.

```
console(config)#stack
```

```
console(config-stack)#initiate failover
```

```
The system has unsaved changes.
Would you like to save them now? (y/n) y
```

```
Configuration Saved! Management unit will be reloaded.
Are you sure you want to failover to the backup unit? (y/n) y
```

```
Connection to host lost. ← This message is seen in telnet sessions.
```



If using the CLI through the console port, the session will no longer be valid. The console port on the new Master switch will now be activated for management. The IP and MAC addresses of the stack remains the same with the new Master. If using a telnet session, log in using the same IP address as before.



4 Appendix A – Commands used in this document

All CLI commands used in this document, along with a brief description, are listed below in order of appearance. Some commands are used multiple times in the document.

Command	Definition
show run	Shows running configuration
show switch	Shows all stack members and roles
show system	Shows MAC address
hardware profile portmode 4x10g (from config-if)	Changes a QSFP+ port to 4x10G
show switch stack-ports	Shows available ports for stacking
boot auto-copy-sw (from config#)	Allows for automatic firmware updates
show switch stack-ports include Stack	Shows only ports in stack mode
stack (from config#)	Stack configuration mode
stack-port fortygigabitether 1/1/1 stack (from config-stack#)	Turns on stacking on a port
copy running-config startup-config	Backs up the running configuration
show version m	Shows firmware and CPU versions on units
copy tftp://10.10.1.10/N4000v6.0.1.3.stk backup	Example of firmware download using tftp
boot system backup	Activates the backup image to be active
reload	Reloads the stack
locate switch 2	Blinks the locate LED on rear of switch
no member 5 (from config-stack#)	Removes a unit from the stack config
switch 4 renumber 3 (from config#)	Renumbers a unit in the stack
standby 3 (from config-stack#)	Changes the standby to another unit
initiate failover (from config-stack#)	Causes Master to failover to the standby
member 3 1 (from config-stack#)	Preconfigures a unit to be added later



5 Appendix B - Network switch versions

Version information for the network switches used in creating this document are as follows:

Network switch	Dell N4000
Software version	6.0.0.8, 6.0.1.1, 6.0.1.3

About Dell

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