Cisco Switch Stacks

Overview:

Cisco switch stacks are an affordable alternative to the more expensive Cisco Catalyst 4500 and 6500 modular switching chassis. The cisco switch stack provides single point of management, redundancy and is easily expanded to provide to additional port density.

What is a switch stack?

A switch stack is a group of independent switches connected together via a dedicated cable known as a stack cable acting as a single switch allowing a single point of management for all the switches in the group much like a Cisco 4500 or 6500 switch with multiple switching modules installed.

The switch stack not only provides single point management but can also provide redundancy similar to a Cisco 4500 or 6500 with duel supervisors installed. Each switch stack has one stack master and the remainder of the switches in the stack are referred to as members. During boot time stack elects one of the switches as a master and allowing the priory of the remaining members to be configured as to become the master in case of a failure of the existing master. This election can be forced by configuring the priority of the chosen master as the highest priority.

Stack Master Election:

How is the stack master elected?

The following rules have been defined to determine which switch within a stack is elected as the master. When switches are added or stacks are merged, the stack master will be elected based on these rules, in the order listed:

1. The switch that is currently the stack master
2. The switch with the highest stack member priority value
3. The switch that uses the non-default interface-level configuration
4. The switch with the higher Hardware/Software priority. These switch software versions are listed from highest to lowest priority:
   a. Cryptographic IP services image software
   b. Noncryptographic IP services image software
   c. Cryptographic IP base image software
   d. Noncryptographic IP base image software
5. The switch with the longest system up-time
6. The switch with the lowest MAC address

When is the stack master elected?

- When the whole switch stack is reset[1]
- When the stack master is reset or powered off
- When the stack master is removed from the stack
- When the stack master switch has failed

- The switch stack membership is increased by if you add powered-on standalone switches or switch stacks.

Switch Stack Design:

Cisco's Catalyst 3750 Switch has been developed with the switch stack in mind. A basic stack using this switch would consist of two or more switches connect together with the Stackwise from port A of each switch to port B of the next switch and finally the last switch in the stack would connect from port A of that switch to port B of the first switch. This insures that the loop is complete therefore allowing a failure of one of the member switches without affecting the remaining members much like a failure of a switching module in a Cisco 4500 or 6500.

Switch-A; Stack Member #2
Switch-B; Stack Member #1; Stack Master
Switch-C; Stack Member #3
Switch-D; Stack Member #4

You can add redundancy to the stack by adding an additional uplink to the highest priority member of the stack. By adding the additional uplink you provide the ability to have a failure of the stack master without rendering the stack unreachable.

Hub or Distribution switch

Primary Uplink   Secondary Uplink

Stack Member
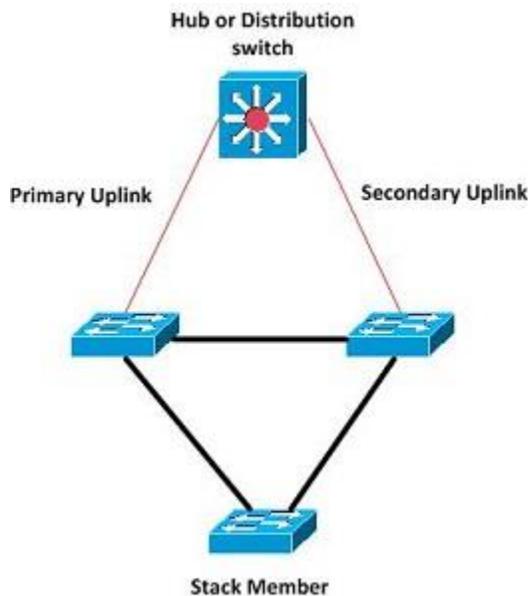
Stack Configuration:

Configuring a new switch stack

1. Decide which switch will be the master
2. Once the master has been chosen, rack and power up the master

3. Check to see the current switch number and priority numbers
    a. The master should be switch number 1 with a priority 15
4. If needed, renumber the stack master
    a. Console into master and enter configuration mode.
    b. Stack master will always have switch number 1 to renumber the switch enter the following command: **switch 2 renumber 1**
5. If needed, reprioritize stack master
    a. Stack master will always have a priority of 15 to change the priority enter the following command: switch 1 priority 15
6. The following steps will have to be completed for each new member in the stack:
    a. Rack the remaining switches, connect power
    b. Do not power up or connect Stackwise cables yet
7. Provision the new switch from the stack master, using the PID, repeat this process for as many members are planned to be added
    a. This will allow you to configure the stack as if the new stack members were connected
    b. Enter the following command: switch 2 provision ws-c3750-48ts
8. With the new member switch off, connect the Stackwise cables to a powered-on stack master
    a. If you are adding more than one member you do not need to create a ring with the stack cables at this time.

    i.

    b. If this is the last switch in the stack to be added, complete the ring by adding the last Stackwise cable back to the master.
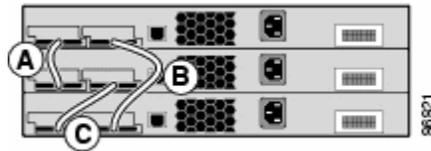
    i.
9. Power on the new switch
10. Watch from the stack master for the new switch to come online, when the member shows ready proceed to the next step.
    a. Command: show switch
    b. Command will need to be repeated to get updates as the member boots

> The switch has joined the stack, and the system is stable.

```
Stack# show switch

                               H/W    Current
Switch#  Role    Mac Address      Priority Version  State
-------------------------------------------------------------
  *1      Master  0018.ba60.de00      15      1      Ready
   2      Member  0018.ba60.ce00      14      1      Ready
   3      Member  0018.ba60.c700      13      1      Ready
   4      Member  0016.47f4.e300      12      0      Ready
   5      Member  0016.9d0c.7500       1      0      Ready
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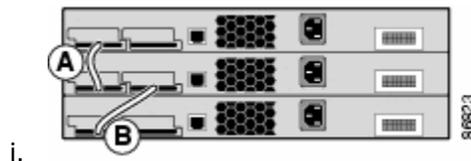
    i.
11. Reprioritize the new member switch; it should come online with the switch number previously assigned and with a priority of 1. To change enter the following command: switch 2 priority 14.
12. Confirm that the switches are numbered and prioritized correctly
13. Enter the following command: show switch.

14. Start the process over for each new member
15. If you have connected the last switch, verify the Stackwise ring configuration is a Full state, this will ensure you have cables correctly connected with the following commands: " show switch stack-ring speed", and "show switch detail"
16. Write your changes to startup config: "copy running-config startup-config"

Adding a new member to an existing switch stack

1. Take inventory, including mac addresses of all switches and PID of new switch: "show inventory"
2. Stack information including current numbers and priorities: "show switch detail "
3. If needed, renumber any existing switches from the stack master
   a. Console into master.
   b. Stack master will always have switch number 1
      i. Command: switch 2 renumber 1
   c. Stack members will increment their switch number from 2 upward
      i. Command: switch 3 renumber 2
4. If needed, reprioritize any existing switches from the stack master
   a. Console into master or ssh to stack management IP address
   b. Stack master will always have a priority of 15
      i. Command: switch 1 priority 15
   c. Stack members will decrement their priority from 14 downward.
      i. Command: switch 2 priority 14
5. Provision the new switch from the stack master, using the PID, repeat this process for as many members are planned to be added
   a. This will allow you to configure the stack as if the new stack members were connected
   b. Command: switch 2 provision ws-c3750-48ts
6. With the new member switch off, connect the Stackwise cables to a powered-on stack master
   a. If you are adding more than one member you do not need to create a ring with the stack cables at this time

      i.

   b. If this is the last switch in the stack to be added, complete the ring by adding the last Stackwise cable back to the master
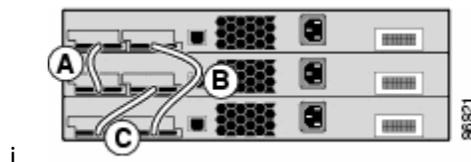
      i.
7. Power on the new switch

8. Watch from the stack master for the new switch to come online, when the member switch shows ready proceed to the next step: "show switch"
9. Command will need to be repeated to get updates as the member boots
10. Reprioritize the new member switch, it should come online with the switch number previously assigned and with a priority of 1: "switch 2 priority 14"
11. Confirm that the switches are numbered and prioritized correctly: "show switch"
12. Verify the Stackwise ring configuration is a Full state, this will ensure you have cables correctly connected using the following commands: "show switch stack-ring speed", and "show switch detail"
13. Write your changes to startup config: "copy running-config startup-config"