A New Approach to Stacking: Switch Clustering

Session 1001
Switch Clustering

Switch Clustering addresses all the weaknesses of stacking and provides all of its benefits

Agenda

- Introduction to Stacking
- Switch Clustering
- Summary
Stacking

Definition

- **Hardware**—A dedicated high performance bus interconnecting desktop switches in a single wiring closet
- **Software**—A single point of authentication and management of desktop switches (single IP address)
Benefits and Limitations

- Low-entry price and high performance
- Single IP address management
- IP address and port preservation
- Scalable
- Isolated to a single wiring closet
- No support for legacy systems
- Limited number of switches per stack
- No flexibility in stacking design

Stacking

- Popular and effective wiring closet technology but has many limitations
Agenda

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Switch Clustering

• Switch Clustering addresses all the weaknesses of stacking and provides all of its benefits
**Switch Clustering**

**Definition**

- **Hardware**—logical collection of switches independent of hardware interconnect method
- **Software**—a single point of authentication and management with no physical boundary

**Stacking**

![Stacking Diagram]

Wiring Closet #1

- Port Configuration
- VLAN
- Software Upgrade

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Wiring Closet #2

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Switch Clustering

Clustering vs. Stacking

- Extend beyond wiring closet
- Includes legacy systems
- 16 switches per cluster
- Admin chooses cluster members
- Isolated to a single wiring closet
- No support for legacy systems
- Limited number of switches per stack
- No flexibility in stacking design
Switch Clustering Details

- Choice of GigaStack dedicated stacking bus, FEC port groups or normal Fast Ethernet links for interconnection
- Catalyst 3500XL, 2900XL and 1900 can be part of the Switch Cluster
- Management via HTTP, Telnet, SNMP and console connection

The New Catalyst 3500XL Series

- Catalyst 3512 XL
  - 12 10/100 Ports
  - 2 GBIC-Based GE Uplinks
  - Cisco Switch Clustering Support
  - Stackable, One RU
  - Ideal for SMB Aggregation
- Catalyst 3524 XL
  - 24 10/100 Ports
  - 2 GBIC-Based GE Uplinks
  - Cisco Switch Clustering Support
  - Stackable, One RU
  - Ideal for Desktop Connections
- Catalyst 3508G XL
  - 8 GBIC-Based GE Ports
  - Cisco Switch Clustering Support
  - Stackable, One RU
  - Ideal for Stack Matrix Aggregation

The New Catalyst 3500XL Series

- Catalyst 3508G XL
  - 8 GBIC-Based GE Ports
  - Cisco Switch Clustering Support
  - Stackable, One RU
  - Ideal for Stack Matrix Aggregation

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Catalyst 3500 XL Family

- Not replacement for Catalyst 2900 XL
- Three members: 3512 XL, 3524 XL and 3508G XL
- Two software versions: -A, -EN
- Both versions have Command switch software for Switch Clustering

Catalyst 3500 XL Family Technical Highlights

- 5 Gbps forwarding rate
- Fixed configuration
- 4 Mb of flash and 8Mb of DRAM
- 8 K CAM
- 10/100/1000 Mb ports only
Catalyst 3500 XL Family

- Static access, multi-VLAN and dynamic VLAN support on all ports
- All ports support ISL and 802.1Q trunking
- Supports GigaStack, SX and LX/LH GBICs

GigaStack Stacking GBIC
GigaStack GBIC

- Inexpensive GBIC for stacking
- Cable length of up to 1m
- Total cable distance of 9m
  Stack a total of nine units
- Shared repeater bus

GigaStack GBIC

- Hot swappable
- Auto negotiates half or full duplex operation
- Keyed—insert one way only
- Tested in Catalyst 3500 XL and 2900 XL gigabit Ethernet module
Stacking through GigaStack GBICs

- Up to nine switches can be daisy chained through GigaStack GBICs
- Deliver 1Gbps stacking bus to the entire stack
- Support redundant loop back for added fault protection

Star-Wired Matrix with Catalyst 3508G XL

Star-Wired Matrix Stack

Catalyst 3508G XL

Gigabit Ethernet Uplinks

Catalyst 3508G XL

Gigabit Ethernet Uplinks

Catalyst 3500 XL or Catalyst 2900 XL with GE Module
Software Versions

- Cisco IOS version 11.2(8) SA6
- Command switch version and regular version
- Command switch version needs to run on Catalyst 3500 XL or Catalyst 2900XL with 4Mb flash
- Member switch version runs on all Catalyst 2900XL switches

Building a Switch Cluster

- A Switch Cluster consists of a command switch and up to 15 member switches
- Candidate switches are switches that have not joined the Switch Cluster
- There can be multiple clusters per network
Switch Cluster Formation

Step #1

Designate a Command Switch

Candidate Switches

Not Cluster Capable Switch

Switch Cluster Formation

Step #2

CDP Protocol Hello Advertisement

Candidate Switches

CDP Protocol Hello Advertisement

Not Cluster Capable Switch

CDP Protocol Hello Advertisement
Switch Cluster Formation
Step #3

1) Parses through CDP Cache and Identifies Cluster Capable Switches

2) Sends List of Cluster Capable Switches

Switch Cluster Formation
Step #4

Not Cluster Capable Switch

Candidate Switches

CDP Neighbor Cache

Not Cluster Capable Switch

Candidate Switches

CDP Neighbor Cache

CDP Neighbor Cache
Switch Cluster Formation
Step #5

[Diagram of switch cluster formation process]

Switch Cluster Formation
Step #5 (Cont.)

[Diagram showing heartbeat and cluster configuration]
Switch Cluster Formation

Summary

• Designate a Command switch
• CMP hello packets sent
• Parse through CDP neighbor cache
• Network admin selects cluster members
• Switch Cluster formed and heartbeats sent

Command Switch

• Once Switch Cluster is created, all management is via the command switch and is redirected to members
• Command switch becomes the single point of management and authentication for the Switch Cluster
Command Switch Roles

- Discovers candidate switches
- Redirects commands, SNMP and HTTP traffic
- Process TFTP requests for member switches with no IP address
- Sends heartbeat through Switch Cluster

Switch Clustering Technologies Used

- Existing: Cisco IOS, CDP, HTTP server, NAT
- New: CDP protocol “hello”, HTTP redirection, cluster management protocol (CMP)
- Full integration in Cisco IOS
  Cluster commands can be issued via Cisco IOS command line or HTTP interface
Switch Cluster Tools

- Cluster Builder
- Cluster View
- Cluster Manager
Cluster Manager Options

Device Configuration
Port Configuration

Step #1

HTTP Mgmt Packet
Port Configuration
Step #2

1) Proxies HTTP Request from Management Station

2) Proxied HTTP Request with NAT IP Address Sent to Member Switches

Port Configuration
Step #3

Command Executed Locally and HTTP Response Sent
Port Configuration Summary

- Network admin HTTP command sent to command switch
- Command switch proxies and redirects
- Command executed on target switch and reply to command switch
- Command switch proxies and redirects to network admin
Where Can Switch Clusters Be Implemented?

- Multi-story building
- Geographically dispersed campus
- Logically group customers
- Traditional stacking on a per wiring closet basis

Switch Clustering

- Switch Clustering addresses all the weaknesses of stacking and provides all of its benefits
**Agenda**

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**Summary**

- Stacking is a popular and effective wiring closet technology but has many limitations
- Switch Clustering provides all the benefits of stacking and addresses all of its weaknesses
- Consider Switch Clustering as a wiring closet and LAN strategy
Please Complete Your Evaluation Form

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