

Implementing Port-Channels in NX-OS



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STP Problem Statement

- ▶ STP prevents loops by blocking alternate paths
 - Builds a loop free tree with Root Bridge at the top
- ▶ Implies that adding more links doesn't add more bandwidth
 - STP uses “active/standby” load balancing
- ▶ With STP, more bandwidth can only come with higher speed links
 - E.g. 1G to 10G to 40G to 100G upgrade path

Active/Active Forwarding w/ Port Channels

- ▶ Port Channels combine multiple physical links together in a bundle
 - E.g. 2 x 10GigE links form a 20GigE logical Port Channel
- ▶ Result is one link from STP's perspective
 - STP sees the logical link in the forwarding state
 - Result is that traffic can load balancing over physical links
- ▶ Also adds resiliency for link failures within the logical link
 - Physical link failures don't cause a L2 or L3 network convergence event

Port Channel Terminology

- ▶ Standardized per 802.3ad - Ethernet Link Aggregation
 - Link Aggregation (LAG), Port Channels, EtherChannels, & NIC Teaming terms used interchangeably
- ▶ Standard defines dynamic negotiation through Link Aggregation Control Protocol (LACP)
 - Replaces Cisco's proprietary Port Aggregation Protocol (PAgP)

Link Aggregation Limitations

- ▷ LAG is point-to-point between two directly connected devices
 - Does not protect against node failure, only link failure
- ▷ LAG only increases the aggregate bandwidth between devices
 - Individual traffic flows limited to the bandwidth of an individual member link
 - Like a highway, adding more lanes does not increase the speed limit

Load Balancing over LAG

- ▶ Load balancing can be based on multiple possible criteria
 - L2 frames – uses src & dst MAC
 - L3 packets – uses src & dst MAC and src & dst IP
 - L4 PDU – uses src & dst MAC, src & dst IP, and src & dst Port
- ▶ Load balancing method is locally significant outbound
 - Hash does not need to match between adjacent switch, server, etc.

NX-OS Port Channel Verifications

▷ Common verifications

- show port-channel summary
- show lacp interface
- show lacp neighbor
- show spanning-tree
- show mac address-table
- show port-channel traffic

Q&A