Which technology to use for the Data Center Switch: MLAG, Stacking, LACP.

Depending on the setup needed a configuration can be made using MLAG, Stacking or LACP. In this document we will set apart the three different ways and mention the pros and cons between the different technologies.

Link aggregation and stacking are common approaches to bundle multiple network connections into one logical link. Compared to conventional connections, these methods are best described as scalable solutions that can provide higher availability, higher reliability and higher bandwidth.

MLAG (Multi-chassis Link Aggregation Group): a non-standard protocol, that implements link aggregation among multiple devices. The devices at both ends of the MLAG send MLAG negotiation packets through the peer-link. The main purpose of MLAG is to deliver system-level redundancy in the event one of the chassis fails.

Stacking: a technology that enables multiple stacking-capable switches to function as a single logical switch. Stack link is connected by stacking cables to form a stack that connects all the switches in a specific topology. The stacking topology also defines the resiliency of the stacked solution. Stacking saves users from managing multiple devices simultaneously, especially in medium data centers or IT rooms. Users can add or remove switches in the stack unit as required without affecting the whole network performance. And If a link fails in the stack, other stackable switches will continue to work, which makes switch stacking a scalable and flexible solution for many network applications.

LACP (Link Aggregation Control Protocol): a subcomponent of IEEE 802.3ad standard, provides a method to control the bundling of several physical ports together to form a single logical channel. LACP allows a network device to negotiate an automatic bundling of links by sending LACP packets to the peer. As a result, links that LACP are enabled can increase its logical bandwidth and network reliability without changing any network infrastructure. LACP is a protocol for auto-configuring and maintaining LAG.

Comparing:

MLAG vs. Stacking: Which one to use depends on the environment and setup the network is used for.

Reliability:

MLAG: MLAG has higher reliability because its control plane is independent, which isolates the fault domain. Each switch operates with an independent control plane. Consequently, the failure of one switch does not impact the functionality of the other, effectively isolating fault domains and enhancing overall network reliability.

Stacking: Stacking has average reliability as its control plane is centralized, which may lead to faults spreading across member devices. Centralized control plane shared by all switches, with the master switch managing the stack. Failure of the master switch can affect the entire system despite backup switches.

Scalability:

MLAG: MLAG has strong scalability as it is not limited by the capacity of a single device. MLAG can upgrade one switch at a time without affecting service. Besides, it could expand port capacity beyond the limitation that you could with stacking - simply by adding another switch East or West by creating another MLAG to another switch.

Stacking: Stacking has moderate scalability as its control plane capacity is limited by the main device. Limited to number of switches that can be added to the stack or bond. Not able to add more bandwidth to stacking (but you can for bonding).

Impact on business:

MLAG: During upgrades, there is minimal interruption to the business. During expansions, the existing network architecture remains unchanged, and there is no impact on existing operations. Lower upgrade complexity, allowing independent upgrades of each device, reducing complexity and risk.

Stacking: During upgrades, there is an interruption of approximately 20 seconds to 1 minute to the business. During expansions with three or more devices, it is necessary to modify the existing network architecture or restart devices, which affects existing operations. Higher upgrade complexity, needing synchronized upgrades of all member devices, with longer operation times and higher risks.

Network design:

MLAG: MLAG has a more complex design with a logical dual-node setup. Logically still two separate devices, requiring more planning and management.

Stacking: Stacking has a simpler design with a logical single-node setup. Appearing as a single device, easier to manage and design.

Configuration:

MLAG: MLAG has a more complex configuration with independent configurations for multiple devices.

Stacking: Stacking has a simpler design with a logical single-node setup.

MLAG vs. LACP: Which one to use depends on the environment and setup the network is used for. There are some similarities between the two.

Similarities:

MLAG and LACP are very similar and accomplish the same goal. They are link aggregation methods of aggregating multiple network connections in parallel to increase throughput and provide redundancy in case one of the links fails.

Differences:

LACP provides enhanced functionality for link aggregation groups (LAGs) by automating configuration and maintenance. LACP-enabled ports automatically form trunk groups without manual configuration. When a member link stops sending LACPDUs, it is removed from the LAG to minimize packet loss. If both devices support LACP, it is recommended over static LAG, but LAG configuration is still required on each device.

LACP can be implemented between different multi -vendor switches.

MLAG varies by vendor, all of which are proprietary, In most cases, switches are limited to the same series of product lines.

Stacking vs. LACP: Which one to use depends on the environment and setup the network is used for. What are some differences between the two.

LACP cannot bundle links across multiple switches. It can only bundle links within a single ethernet switch for increased bandwidth and redundancy. The primary purpose is to improve link-level reliability. To establish an aggregated connection between switches A, B, and C, you must enable LACP on specific ports on each switch and make physical connections.

Stacking technology allows for bundling multiple switches to act as a single logical switch, to increase equipment-level reliability. Those switches are directly connected by stacking cable for stack link.