Demystifying LAG, MLAG, Stacking and Where They Fit in Real-World Network Designs

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In enterprise networking, you'll often hear terms like **LAG**, **MLAG**, **MC-LAG**, and **stacking** thrown around. They sound similar, but they're not the same thing and understanding the differences is key to designing resilient, high-performance networks.

Drawing from practical field experience and vendor-agnostic best practices, here's a breakdown of what they mean, how they work, and where they shine in industries like hospitality, logistics, healthcare, and education.

LAG – Link Aggregation Group

At its simplest, LAG takes multiple physical network links and bundles them into a single logical connection.

This provides:

- **Redundancy** : If one cable or port fails, traffic continues over the remaining links.
- **Increased capacity** : Traffic is distributed across multiple links.
- **Spanning Tree efficiency** : Avoids blocking one of the parallel links, as both (or more) are actively used.

The bundling is coordinated by **LACP (Link Aggregation Control Protocol)**, defined in IEEE 802.1AX. This ensures both ends agree which links are in the bundle and how traffic will be distributed.

Design tip: LAG is common between access and distribution switches, or between switches and servers. In hospitality networks, for example, LAG is often used to ensure the core network can handle peak check-in/check-out loads without bottlenecks.

MLAG – Multi-Chassis Link Aggregation

MLAG (or MC-LAG - different name, same concept) allows a LAG to span **two physical switches**, presenting them as a single logical switch to connected devices. The connected device forms a single LACP bundle, but each link can go to a different chassis.

This gives:

- **Chassis-level redundancy** : Survives an entire switch failure.
- **Seamless failover** : Links remain active if one chassis goes down.
- **Active-active utilisation** : Unlike traditional stacking, both switches forward traffic simultaneously.

The two switches share a **peer link** to exchange control and state information. This link is critical if it fails, "split-brain" conditions can occur, where both switches think they're primary, leading to loops or traffic disruption.

Design tip: In hospital networks, MLAG can keep medical imaging systems and nurse call platforms online even during switch maintenance or a hardware failure. In logistics warehouses, it ensures autonomous mobile robots (AMRs) maintain their Wi-Fi controller uplinks without interruption.

Stacking and Virtual Chassis

Stacking and virtual chassis group multiple physical switches into one logical switch, controlled through a single management plane.

Unlike MLAG:

- All members are tightly integrated, often via dedicated high-speed backplane or stacking cables.
- Management is simplified with a single configuration and IP.
- The system behaves like a chassis switch with removable line cards.

Design tip: In schools, stacking simplifies edge switch management in large campus deployments, IT teams can treat several closet switches as one, streamlining VLAN changes and firmware updates.

Where Each Fits in Real-World Designs

- **Hospitality:** LAG uplinks from core to distribution, MLAG between core switches for resilience, stacking for ease of management in guest-room floors.
- **Logistics & Warehousing:** MLAG for redundant uplinks to Wi-Fi controllers and IoT platforms, LAG for high-throughput links to surveillance storage, stacking for edge switches serving handheld scanners.
- **Hospitals:** MLAG for redundant EMR system uplinks, stacking in edge closets to minimise management overhead, LAG for PACS and imaging systems.
- **Schools & Universities:** Stacking for simplified network changes across large campuses, MLAG at the core for always-on connectivity between buildings, LAG to aggregate high-traffic lab environments.

Final Thoughts

Whether it’s LAG, MLAG, or stacking, the right choice comes down to:

- **Resiliency requirements**
- **Management simplicity**
- **Physical and budget constraints**
- **Vendor capabilities**

In all industries, the key is balancing redundancy, performance, and operational efficiency. Understand the differences, design to your specific needs, and you’ll build networks that not only survive failures but keep delivering the performance users expect.

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