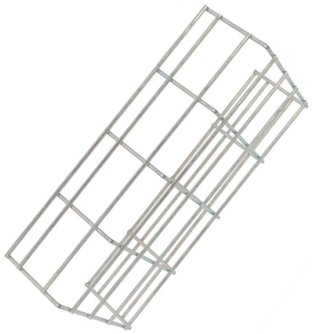
Layer 3 aggregation switch as the core



Overview

What Is an Aggregation Switch and How to Choose? The three layers of a traditional three-layer network design are the core layer, aggregation layer, and access layer.

Key Takeaways

A Layer 3 aggregation switch can serve as the core in mid-sized or less complex networks, providing routing, high throughput, and scalability, though it may not match the performance of dedicated core switches in large enterprise environments.

Overview

Traditionally, enterprise networks follow a three-tier hierarchical model: access, aggregation (distribution), and core layers. The core layer is designed for ultra-high-speed backbone connectivity, low latency, and maximum throughput, aggregating traffic from distribution switches and ensuring uninterrupted routing across the network. Aggregation switches, positioned between access and core layers, consolidate traffic from multiple access switches and can operate at Layer 2 or Layer 3, supporting routing, VLANs, QoS, and link aggregation.

Layer 3 Aggregation as CoreModern Layer 3 aggregation switches often include advanced routing capabilities, making them suitable for collapsed core architectures in smaller or mid-sized networks. They can handle inter-VLAN routing, static and dynamic routing protocols, and traffic aggregation without requiring a separate core switch. This approach simplifies network design, reduces hardware costs, and can still provide high availability if redundancy features like link aggregation, VRRP, or HSRP are implemented.

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Advantages

Cost Efficiency: Eliminates the need for a dedicated core switch in smaller networks. Simplified Management: Fewer devices to configure and maintain. Layer 3 Routing: Supports inter-VLAN routing and dynamic routing protocols.

Scalability: Can aggregate multiple access switches and support high port density.

Limitations

Performance Ceiling: May not match the throughput and low latency of high-end core switches in large enterprise or data center environments. Redundancy Considerations: Requires careful design to avoid single points of failure. Future Growth: Networks expecting rapid expansion may eventually need a dedicated core layer for optimal performance.

Best Practices

Assess Network Size and Traffic: Use Layer 3 aggregation as core primarily in mid-sized or campus networks with moderate traffic. Implement Redundancy: Deploy dual aggregation switches with link aggregation or routing redundancy protocols. Monitor Performance: Ensure the switch can handle peak traffic without becoming a bottleneck.

Plan for Expansion: Consider modular switches or stacking options to accommodate future growth.

Conclusion

Using a Layer 3 aggregation switch as the core is a practical solution for networks that do not require the extreme performance of dedicated core switches. It provides routing, aggregation, and scalability while reducing complexity and cost. However, for large-scale enterprise or high-traffic data centers, a dedicated core switch remains the preferred choice to ensure maximum throughput, ultra-low latency, and robust redundancy.

Article Content

Core, Aggregation, or Access Switches? Choose the

Discover the crucial differences between core, aggregation, and access switches. Find out which type can best transform your network''s

What Is an Aggregation Switch and How to Choose?

What Is an Aggregation Switch and How to Choose? The three layers of a traditional three-layer network design are the core layer, aggregation layer, and access layer. Together, these

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Access, Distribution, and Core Layers Explained

A distribution switch provides an aggregation point for access switches. If the core switches exist, the distribution switches connect the access

What Is a Core Switch? Network Backbone Architecture Guide

A core switch is a high-capacity, high-performance Layer 3 switch positioned at the physical backbone of an enterprise network. Engineered to aggregate massive volumes of data from

6 New Layer 3 Aggregation & Core Switches Powered By SONiC

Asterfusion introduced five Layer 3 aggregation and core switches powered by their cutting-edge SONiC-based Enterprise operating system in 2025. These aggregation switches

Access vs. Distribution vs. Core Switch Comparison Guide

Each layer is served by specialized switches, with the access switch connecting end-user devices, the distribution switch aggregating traffic and enforcing policies, and the core switch acting as the high

3-Layer Enterprise Switching Architecture: Core vs Access

Explore enterprise switching architecture and see how core, aggregation, and access layers integrate with PoE, oversubscription, and design examples.

Two-tier and three-tier switch architectures

Core-layer switches make up the top layer or core of the network. The aggregation or distribution switches are the intermediary layer between the core and access layers. The lowest tier is the

Data Center Multi-Tier Model Design

Data Center Core Layer The data center core layer provides a fabric for high-speed packet switching between multiple aggregation modules. This layer serves as the gateway to the campus core where

Datacenter Core and Aggregation Design

This design employs a pair of redundant Cisco Nexus 7010 switches on the aggregation and core layers. Virtual device contexts (VDCs) of the Nexus 7000 switches are utilized in the design

What is Switch Aggregation, Its Role and Selection Advice

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4. Functional management: Unlike core switches, aggregation switches can be either Layer 2 or Layer 3 switches. When a Layer 2 switch is used as the aggregation switch, routing and

Three-tier switch networks: LANCOM Systems GmbH

Efficiently plan and implement 3-tier switch architectures with core, aggregation, and access switches from LANCOM!

Deployment Differences Between Two-Layer and Three-Layer

The aggregation layer is between the core and access layers and connects to both layers. Aggregation switches aggregate traffic from access switches, process the traffic, and provide uplinks to the core

Data Center Network Switch Design

This Article Applies to: All Omada switches. Design: In a large network, we will have different types of switches involved and they play different roles when it comes to the functions. So,

LANCOM Techpaper Hierarchische Switch-Infrastrukturen

Aggregation Switches Die als Aggregation Layer benannte Schicht bezeichnet die Hierarchieebene, welche die Uplinks der darunterliegenden Access-Ebene zusammenfasst (aggregiert). Im Uplink,

NS-S5760C Switches | Custom-Brand L3 Aggregation with 10G SFP+

Edge-to-core traffic is exploding Wi-Fi 6/6E backhaul, UHD video, zero-trust segmentation, and telemetry all converge at the aggregation layer. The NS-S5760C Switches from

Designing Datacenter Overview

Overview of DC design Core layer : high speed packet switching for flow going in and out of the DC Aggregation layer: Service and module integration, layer 2 domain definition, STP processing, FHRP

Access, Distribution, and Core Layers Explained

This tutorial provides an overview of the access, distribution, and core layers and explains two-tier and three-tier campus LAN designs.

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