INSIGHTS | **TECH BRIEF**

Take The Next Step With Automated Data Center Solutions

Many organizations are shifting from building traditional centralized data centers to deploying increasingly distributed, edge-cloud-centric "centers of data." This shift necessitates the modernization of legacy network and security infrastructures that have become overly complex, difficult to manage, highly inefficient, and costly. With the massive expansion in the number and diversity of applications and the amount of data generated and transported, enterprise data centers are pushing architectural limits. Traditional scale-up approaches, legacy networking designs, and sprawling security policies cannot keep up, causing performance and scale limitations.

To meet the challenges of the data explosion, the data center must be reimagined and redesigned to handle next-gen requirements. These modern cloud data centers demand agility, elastic scale, seamless integration, inherent security, and simplified management. HPE Aruba Networking's data center solution powers unified, intelligent, and automated software-defined fabrics providing the flexibility, scalability, and resiliency needed to support modern, next-generation edge-to-cloud centers of data.

Data Center Network Architecture Evolution

Before identifying today's fourth generation architecture, let's quickly recap the evolution of data center networking architecture to identify how we arrived to present day, which is characterized by distributed services:

1. **First Generation, 1990s:** L2 flat networks with multiple competing protocols.
2. **Second Generation, 2000s:** TCP/IP protocol dominance leading to L3 switching and 3-tier architectures designed for north-south traffic.
3. **Third Generation, 2010s:** Adoption of spine-leaf fabrics to manage east-west traffic due to virtualization and containerized microservices. While this improved bandwidth, latency, and resiliency, traditional security solutions struggled to keep up with new application architectures. In other words, bolt-on appliances and software agent approaches were unable to keep up.
4. **Fourth Generation, Present Day:** Introduction of a distributed services architecture, integrating stateful services directly into the data center fabric. This architecture supports granular security and visibility, optimized network resources, and reduced complexity and cost.

70%

of enterprises experienced an increase in workload security posture within the data center after deploying CX data center switches.[1]

First introduced in 2021, the HPE Aruba Networking CX 10000 Series Switch exemplifies this approach, offering embedded security and network services at the top-of-rack level, eliminating the need for centralized appliances and reducing traffic backhauling.

Before the introduction of the CX 10000, data center network and security teams had to rely on a mix of L2/3 switches (from vendors like Cisco and Arista with VXLAN) that offered only basic, coarse-grained segmentation. More on the CX 10000 is available later in this tech brief.

Why Digital Transformation Is Incomplete Without a Modern Edge-to-Cloud Data Center Network Fabric

A buzzword since before the pandemic, digital transformation is still in full effect for all medium and large enterprises. Whether it be cybersecurity, networking, data center architecture, or business internet, digital transformation efforts are everywhere. Many of these challenges can be addressed by modern edge-to-cloud data center networks. They include:

- **Data Disarray:** Data is often trapped in silos across organizations, making it difficult to consolidate and leverage effectively. Legacy systems and fragmented models further complicate data utilization.
- **Expanding Data at the Edge:** With the proliferation of IoT devices and edge computing, vast amounts of data are generated at the edge. Traditional data center approaches are inadequate to handle this volume and velocity, necessitating real-time data processing and analysis.
- **Operational Discontinuity:** Ensuring compliance and business agility requires seamless data portability and accessibility across diverse environments, from edge locations to cloud data centers. Modern data centers must support always-on, always-fast data services that are secure, compliant, and readily accessible.

Why the Data Center is Still Relevant in the Cloud and Edge Era

Despite the surge in cloud and edge computing, data centers remain pivotal for several reasons:

- **Data Gravity:** As data accumulates, it attracts more applications and services. This phenomenon, known as data gravity, necessitates robust data center infrastructure to manage and process the growing volumes of data efficiently. Data centers provide the necessary capacity and performance to handle large datasets and complex processing tasks.
- **Latency Sensitivity:** Applications requiring real-time data processing benefit from the low-latency environments that data centers provide. Proximity to data sources ensures faster retrieval and processing, which is crucial for applications such as online gaming, financial transactions, and healthcare diagnostics, where every millisecond counts.
- **Regulatory and Compliance Requirements:** Many industries are subject to stringent regulatory and compliance requirements that mandate data residency and security measures. Data centers offer the controlled environments needed to comply with these regulations, ensuring data is stored and processed within specific geographic boundaries and under strict security protocols.
- **Control and Customization:** Data centers provide enterprises with greater control over their infrastructure, enabling them to customize hardware and software configurations to meet specific business needs. This control allows for optimized performance, enhanced security, and the ability to tailor solutions to unique operational requirements.
- **Hybrid Cloud Support:** Data centers act as a bridge between on-premises infrastructure and public clouds, supporting hybrid cloud strategies. This enables organizations to leverage the scalability and flexibility of the cloud while maintaining control over critical data and applications in their own data centers.

Use Cases of HPE Aruba Networking Data Center Networking Solution

HPE Aruba Networking provides a versatile solution for modern data centers, addressing multiple use cases:

1. **Enhanced Network Automation:** Utilizing software-defined networking (SDN) and automation tools, HPE Aruba Networking simplifies network management by reducing manual intervention and enhancing operational efficiency. Automation enables rapid provisioning of network resources, reducing the time and effort required to deploy new applications and services. This is particularly beneficial in environments that demand quick scaling and frequent changes, such as development and testing environments.
2. **Improved Security Posture:** HPE Aruba Networking integrates advanced security features like micro-segmentation and zero-trust architectures to protect the network against threats. These security measures ensure that sensitive data is safeguarded and that the network remains compliant with regulatory standards. Automated security policies can adapt in real-time to emerging threats, minimizing the risk of data breaches. For example, micro-segmentation can isolate different parts of the network, preventing lateral movement of attackers within the network.
3. **Scalable and Resilient Architecture:** HPE Aruba Networking's solutions support the creation of scalable and resilient network architectures that can adapt to changing business needs. This includes the ability to support rapid deployment of new services and applications across multiple locations. The automated, software-defined fabric allows for dynamic allocation of network resources, maintaining high performance and availability even during peak usage periods.
4. **Streamlined Operations:** HPE Aruba Networking Central provides unified management across data center, cloud, and edge environments, reducing operational complexity. This centralized management platform allows IT teams to monitor and control the entire network from a single interface, streamlining operations and reducing the burden of managing disparate systems.
5. **Edge-to-Cloud Integration:** With the growing importance of edge computing, HPE Aruba Networking's solutions ensure seamless integration between data center and edge environments. This enables organizations to process data closer to where it is generated, reducing latency and improving the performance of edge applications. For instance, manufacturing plants can process data from IoT devices locally, making real-time adjustments to improve efficiency and reduce downtime.

HPE Aruba Networking Products Related to Data Center Networking

HPE Aruba Networking CX 10000

The HPE Aruba Networking CX 10000 Series Switch, with the industry's first hardware-accelerated programmable processor (Pensando P4), addresses the limitations of traditional centralized architectures by distributing intelligent services like micro-segmentation, firewalling, NAT, encryption, and telemetry closer to where applications are running. This approach reduces the need to send traffic back and forth to a centralized point, which is often inefficient and costly.

By integrating these services directly into the network fabric at the top-of-rack level, the CX 10000 enhances performance, scalability, and security. Importantly, it complements existing investments in security appliances, offering a cost-effective way to scale network security without the need for additional expensive hardware.

The HPE Aruba Networking CX 10000 is a high-performance switch that integrates data center networking with security, leveraging Data Processing Units (DPUs) for enhanced performance.

- **High Performance:** The CX 10000 provides the throughput needed for data-intensive applications, ensuring low latency and high-speed data transfer.
- **Integrated Security:** By offloading security functions to the DPU, the CX 10000 enhances data center security without compromising performance. It supports advanced security features such as encryption, firewalling, and intrusion detection.

- **Programmability:** The fully programmable nature of the CX 10000 allows it to adapt to evolving network requirements, providing flexibility for future expansions and upgrades.

HPE Aruba Networking Central

HPE Aruba Networking Central is a cloud-native, AI-powered network management solution that provides unified management and orchestration of network infrastructure. Key features include:

- **Advanced Analytics:** AI-driven insights help IT teams quickly identify and resolve network issues, optimizing performance and reducing downtime. This predictive analytics capability can foresee potential issues before they become critical, allowing proactive management.
- **Unified Management:** Centralized control of wired, wireless, and SD-WAN environments simplifies network operations and ensures consistent policy enforcement across all network segments. This unification reduces the complexity of managing multiple network types and improves operational efficiency.
- **Automated Troubleshooting:** Automated workflows and AI-powered troubleshooting tools reduce the time and effort required to maintain the network. These tools can automatically diagnose and resolve common network problems, freeing up IT staff to focus on strategic initiatives.
- **Scalability:** HPE Aruba Networking Central supports the management of large-scale, distributed networks, making it suitable for enterprises with extensive global operations. It can scale to accommodate growing network demands without sacrificing performance.
- **Integration with Third-Party Tools:** The platform's open APIs allow integration with other IT management and security tools, providing a comprehensive view of the network environment and enhancing overall security posture.

HPE GreenLake for Networking

HPE GreenLake for Networking provides a consumption-based IT model, allowing organizations to scale their network resources dynamically based on demand. Benefits include:

- **Flexible Scaling:** Organizations can quickly adjust network capacity to meet changing business needs without significant upfront investments.
- **Cost Efficiency:** The pay-per-use model aligns costs with actual usage, reducing capital expenditures and improving budget predictability.
- **Simplified Management:** HPE GreenLake includes comprehensive management services, freeing up internal IT resources and ensuring optimal network performance.

Conclusion

As the data center landscape continues to evolve, it is crucial for organizations to adopt innovative networking solutions that can handle the demands of modern, edge-to-cloud environments. HPE Aruba Networking offers a comprehensive suite of products designed to automate and optimize data center networking, ensuring robust performance, enhanced security, and operational efficiency.

Talk to WEI today

For expert guidance on modernizing your data center networking infrastructure, contact WEI's data center networking experts. Our team is dedicated to helping you achieve real business outcomes with tailored, cutting-edge solutions.

Sources:

1. IDC White paper - Meeting the Need for High Performance and Security Through a Modern Datacenter Fabric - https://idcdocserv.com/US50586223

About WEI

WEI is an innovative, full service, customer centric IT solutions provider.

Why WEI? Because we care. We go further.

WEI is an expert in business technology improvement, helping clients optimize their technology environments and work efficiently. WEI works with clients to understand goals, integrate strategy with technology solutions, and leverage their current IT environment into one company-wide model to increase utilization and efficiencies around their unique business processes.