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Modern Data Center Network Management is Essential to Digital Transformation

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Table of Contents

Executive Summary

The data center remains a foundational component of mainstream digital infrastructure. To address the demands of today's enterprises, data centers require next-generation network fabrics that leverages modern network management for more reliable and easier operations via network automation and AI-driven insights. Nokia's Data Center Fabric with Event-Driven Automation (EDA) meets this requirement.

Enterprises are Modernizing Data Center Network Fabrics

Despite ongoing hype about enterprises embracing the public cloud, data centers remain integral to today's digital architecture. According to Enterprise Management Associates (EMA) research, 74% of enterprises continue to host applications and data in private and colocation data centers.[1] In fact, 23% use data center exclusively, eschewing the cloud altogether.

IT organizations that currently operate data centers are more likely to invest in new data center network fabrics today to meet emerging technology demands. Furthermore, they are trying to align these network fabrics with containerization and Kubernetes, artificial intelligence initiatives, cloud repatriation, and DevOps and CI/CD practices. Automating these fabrics is essential to modernization. Nearly 40% of IT organizations have identified network automation as a top investment priority.

More than half of companies have a hybrid cloud environment today, which adds network complexity. Network infrastructure teams that support hybrid clouds report less success with network operations. These network teams are trying to improve network observability and are investing in AI and machine-learning (AI/ML)-driven network analytics to automate and streamline operations.

EMA believes that IT organizations must invest in modern data center networking solutions that offer enhanced management and automation to meet the demands of today's infrastructure.

[1] Unless otherwise noted, research data cited in this paper was originally published in the EMA research report "Network Management Megatrends 2024" in May 2024.

Network Engineering Brain Drain Impacts Data Center Modernization

One factor that drives the need for a new approach to data center networking is the IT workforce. Only 9% of IT organizations claim that it is very easy to hire and retain skilled network engineering personnel. More than 41% describe it as outright difficult today, versus only 26% in 2022.

"It seems like a hot job market, and a lot of people have declined our offers because of pay," a network engineer with a Fortune 500 aerospace/defense company recently told EMA. "One guy declined on the day he was supposed to start because he had a better job offer,"

This shortage of networking experts occurs even though on-premises data centers remain extremely important to enterprises. The labor market issue undermines data center operations. Thirty percent of network infrastructure professionals say data center networking is one of the most challenging skills to hire for. Small and midsized enterprises (10,000 or fewer employees) reported the most difficulty with hiring data center networking experts. As enterprises modernize their data center networks, they must adopt solutions that address this labor gap.

Modern, AI-Driven Data Center Network Management Powers Digital Future

EMA recommends that enterprises explore AI-driven network management solutions as a path toward data center network modernization. Many solution providers now offer network management tools powered by AI to streamline and automate data center network operations. In fact, early adopters of these AI solutions reported higher rates of success with network management.

EMA asked respondents to reveal how they think AI/ML technology will enhance network operations. First, 61% of early adopters said it enhances or expands network automation by providing smarter workflows and better analytics around network provisioning, moves/adds/changes, troubleshooting, and capacity management and optimization.

Additionally, 56% told EMA that AI empowers lower-skilled networking personnel to tackle more technical problems. Smarter tools empower these administrators to solve issues on their own, without escalating an incident to a higher-skilled engineer. AI-driven workflows can also empower junior engineers to address strategically important tasks, like provisioning new services.

Finally, 57% of network teams have found that AI insights allow higher-skilled network personnel to work more efficiently. AI-driven tools can gather all data and attach it to a ticket with a natural language summary. This accelerates the work of skilled engineers and speeds their ability to gain insight into a network issue. AI can also present recommended actions that engineers can evaluate and approve, allowing them to spend less time on repetitive tasks.

Automated Network Validation with Digital Twins is Essential

Network operations teams are increasingly focused on improving the reliability of their data center networks. Therefore, it is essential that every configuration change is made with the certainty that it will not disrupt the network. Every change made to a data center network should be validated before and after it is committed. These validations can ensure that a network change will not negatively impact performance, security policy compliance, user experience, or application intent. Given today's shortage of networking personnel, IT organizations require more advanced network validation tools to optimize change management. An emerging class of digital network twin tools are offering solutions for this requirement.

EMA research found that today's network teams are inconsistent with change validation. For instance, only 11% of IT organizations conduct a pre-change validation on all automated network changes, and only 12% conduct a post-change validation on all automated network changes. Organizations that conduct pre- and post-change validations more consistently reported a higher rate of success with network automation efforts.[2]

[2] EMA, "Enterprise Network Automation: Emerging From the Dark Ages and Reaching Toward NetDevOps," March 2024.

Validation is inconsistent in many organizations because they rely on manual processes and ineffective tools. A digital network twin uses simulation and modeling techniques to validate network changes at scale. They can reveal how configuration changes impact overall network state. They can also compare live network configurations to intended configurations to ensure that changes were successful. EMA research established that network teams that use digital twins or network modeling software to conduct these validations enjoy a higher rate of automation success.

Nokia's Data Center Fabric with Event-Driven Automation

The **Nokia Data Center Fabric solution** is designed to serve companies of all sizes and skill levels. The foundation of the solution is Service Router Linux (**SR Linux**), an open, extensible, and resilient network operating system. It uses an unmodified Linux kernel and supports a full data center networking feature set.

SR Linux runs on a full suite of chassis and fixed data center switch hardware that Nokia sells for all deployment scenarios, including leaf, spine, super spine, and management top-of-rack installations, making the Nokia Data Center Fabric capable of supporting a wide variety of network architectures and use cases.

This network platform is further enhanced by Nokia's **Event-Driven Automation (EDA)**, an infrastructure automation platform based on Kubernetes, the widely deployed, cloud native orchestration technology. EDA offers intent-based and declarative network automation that simplifies operations, and a digital network twin capability that validates network changes. EDA supports AI-driven operations via an implementation of queries using natural language. This allows administrators to ask EDA anything in natural language as an interface to the platform. It supports the ability to query functionalities, verify device and network states, troubleshoot issues, fetch configuration examples, and much more. Finally, Nokia offers a multi-vendor solution so that customers can integrate legacy network infrastructure into their management of Nokia's network fabric.

EMA Perspective

Today and in the future, most enterprises will maintain a hybrid cloud architecture, with private and colocation data centers that require modern network fabrics. Given challenges around hiring and retaining engineers with data center fabric expertise, these networks must leverage next-generation tools like AI-driven automation and digital twin technology to drive efficient and effective network operations. EMA recommends that enterprises evaluate the Nokia Data Center Fabric with Event-Driven Automation as a solution for their network modernization initiatives.

About Enterprise Management Associates, Inc.

Founded in 1996, Enterprise Management Associates (EMA) is a leading IT research and consulting firm dedicated to delivering actionable insights across the evolving technology landscape. Through independent research, market analysis, and vendor evaluations, we empower organizations to make well-informed technology decisions. Our team of analysts combines practical experience with a deep understanding of industry best practices and emerging vendor solutions to help clients achieve their strategic objectives. Learn more about EMA research, analysis, and consulting services at **www.enterprisemanagement.com** or follow EMA on **X** or **LinkedIn**.

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