



Cisco APIC Enterprise Module Simplifies Network Operations

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Introduction: Network Complexity Limits IT Innovation

The role of the CIO has changed more in the past five years than any other position in the corporate world. IT leaders are now partners with business leaders, and they are tasked with helping companies respond to competitive pressures as quickly as possible. In an effort to improve overall IT agility, compute and application technology has evolved significantly through the use of mobility, virtualization and cloud computing. However, the network itself has yet to evolve, limiting the overall agility of IT today. These technology shifts have transformed almost every part of the enterprise. However, to maximize the potential of these investments, the network must also transform. Today's legacy networks are plagued with the following limitations:

- **The lack of network agility limits IT agility.** Legacy IT environments were highly siloed, with the compute and network layers being managed independently. This model had been sufficient because IT operated on a “best effort” model. However, IT is shifting rapidly to mobile and cloud computing—both of which are network-centric compute models. This means the lack of network agility significantly limits overall IT and business agility.
- **Traditional network management is done “box by box.”** Historically, network managers have had to manage routers, switches and other network devices on a box-by-box basis through a highly manual, repetitive process. This means that even the most basic network changes can take weeks or even months to complete. Additionally, because there are so many types of devices and network operating systems, the syntax required to make a configuration change could be quite different from platform to platform—making the task even more challenging.
- **Human error is the largest cause of network downtime.** Because the process for making configuration changes is highly manual, it can be error prone, particularly when time is of the essence. According to the 2015 ZK Research Network Management Study, human error accounts for 35% of all downtime (Exhibit 1). Eliminating this would significantly improve overall IT operations.
- **The majority of a company's IT budget is used to maintain the status quo.** Currently, 83% of IT budgets is used to simply maintain the current operating environment. This is up from 75% five years ago. If this trend does not change, almost the entire budget will be used to maintain the status quo within a decade, leaving very little budget for strategic initiatives.
- **Lack of automation keeps total cost of ownership (TCO) high.** With respect to the TCO of the network, almost 68% comes from operational costs associated with running the network. These costs are high due to the manual nature of configuring, updating and maintaining network devices. Some organizations have attempted to lower the TCO by purchasing less expensive network devices, but hardware only accounts for less than a third of network TCO. The only way to significantly lower the TCO of the network is to reduce the operational costs associated with running it—and doing so requires more processes to be automated.

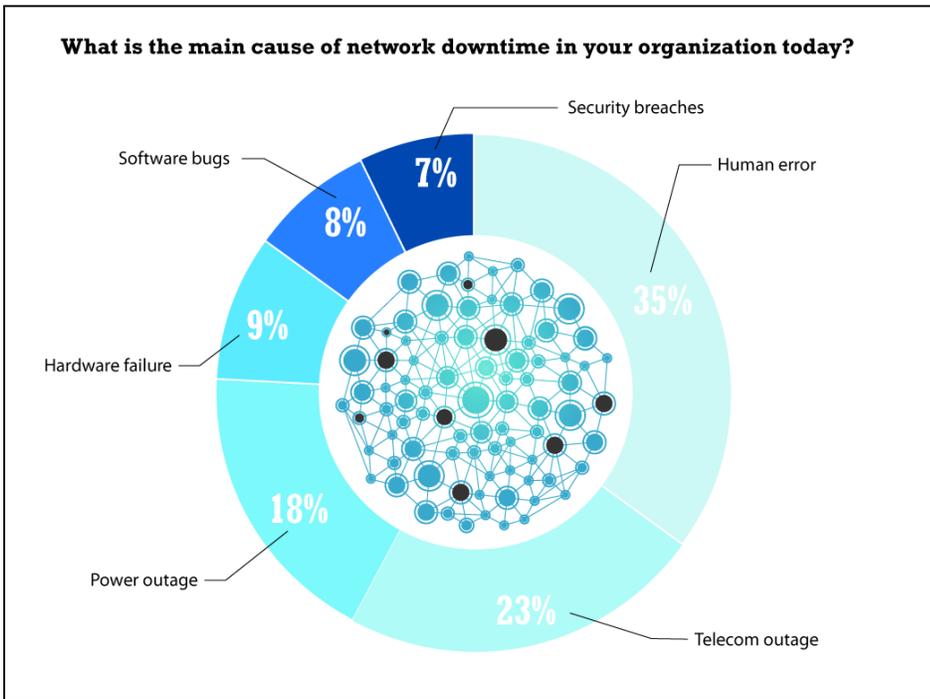
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Exhibit 1: Causes of Network Downtime

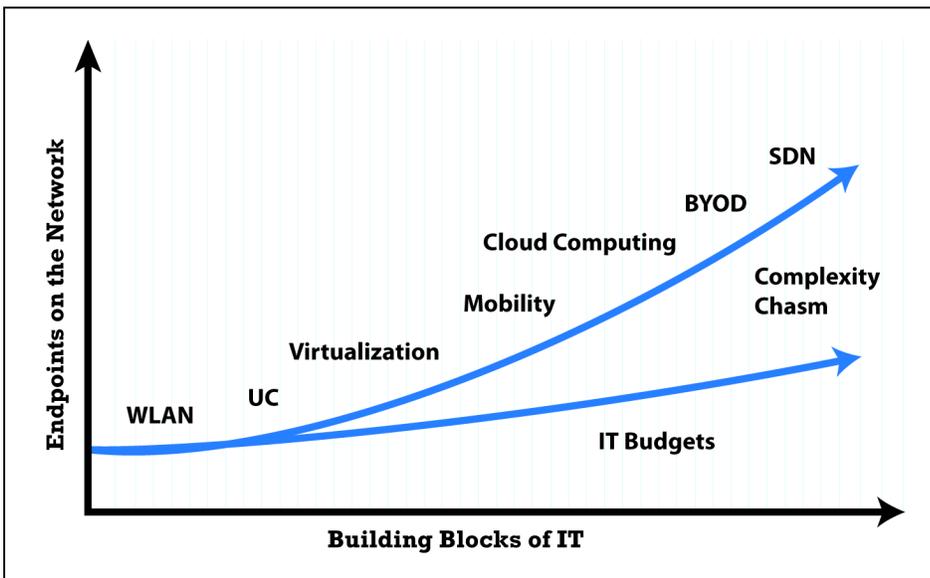


Source: ZK Research 2015 Network Purchase Intention Study

The current state of IT is not scalable because the complexity chasm between the amount of budget required to run IT and the amount that's available

continues to grow (Exhibit 2). In order for IT to adapt to the current business climate, it must move to a faster IT model starting with the network.

Exhibit 2: The Widening IT Complexity Chasm



Source: ZK Research, 2015

Section II: Fast IT Must Become the Norm

The concept of fast IT embodies IT being agile enough to operate at the speed of business. Instead of IT slowing the business down, it becomes a catalyst for change by enabling the business to change faster than ever before. There are three core principles for fast IT: simplicity, openness and innovation. This model is markedly different from the current IT model, which is highly complex and closed. Fast IT will transform the network in the following ways:

- **The network shifts to a software-defined model.** Historically, enterprise networks have been built on devices in which the hardware and software were tightly coupled. One of the key enablers of fast IT is the evolution to software-defined networking (SDN), in which the software and control are abstracted from the underlying hardware. This enables the network to be more open and application aware, and for IT to have centralized control over the end-to-end network.
- **The network becomes simplified.** Evolving to SDN enables much of the underlying complexity of the network to be masked from the IT department. Network operations can work with a simplified, policy-based interface instead of using a complicated command-line interface. This will enable lower-level administrators to make many changes themselves instead of always requiring a high-cost, senior engineer to be involved, allowing senior staff members to focus on strategic initiatives instead of managing day-to-day tasks.
- **Automation replaces manual configuration processes.** With fast IT, the highly manual, repetitive processes are automated, speeding up the rate of change and eliminating human error.
- **Management moves from a box-centric to a network-centric model.** Organizations that shift to a fast IT model will manage the network as a single, holistic entity rather than a collection of boxes that need to be managed independently.
- **Provisioning time is cut by orders of magnitude.** When process automation is combined with the network-centric model, the time it takes to provision the network goes from weeks and months to hours or even minutes in some situations.
- **Closed systems become open and programmable.** Legacy network devices were closed, making it difficult for the network to “talk” to the compute and application infrastructure.

With fast IT, the network is open and programmable, meaning application changes can invoke network changes. For example, when a video conference is initiated, the video application could talk to the network to allocate the appropriate quality-of-service (QoS) level until the session is over.

- **Network data is transformed into business intelligence.** “Big data” and analytics have become a top initiative for business and IT leaders today. Historically, raw network data was used to help understand how the network functioned but had little to do with business performance. With fast IT, network data is transformed into information that can be used to provide business-level intelligence.

Section III: The Cisco APIC Enterprise Module Enables Fast IT

Cisco recently augmented its SDN strategy with the introduction of the Cisco Application Policy Infrastructure Controller (APIC) and the APIC Enterprise Module (APIC-EM). The controllers are purpose built for specific environments of data center and WAN/access but share a common group policy architecture. This enables customers’ business policies to be rendered appropriately in both domains. The APIC-EM adds network abstraction and automation for WAN and access network domains.

Business and application policy changes can be conveyed to the APIC-EM, which then creates and pushes out network configuration changes to all network devices including routers and switches.

Within the WAN and access domains, the APIC-EM enables fast IT through the following:

- **Amplification of network intelligence:** The APIC-EM has northbound RESTful interfaces to integrate with applications. For southbound integration with network devices, Cisco’s strategy is to be agnostic and enable customers a wide range of integration options.
- **Operates on a wide variety of network devices:** The solution works with new installations as well as existing installations that deploy Cisco Catalyst switches, Integrated Services Routers (ISRs), Aggregation Services Routers (ASRs), Cloud Services Routers (CSRs), and wireless LAN controllers and access points (APs).

- **Deployment options:** The APIC-EM can be deployed as an appliance or as a downloadable software application.

Although the APIC-EM can address a wide range of issues, IT leaders should focus on solving highly complex and tedious problems to get a rapid return on investment. Based on these criteria, there are three solutions that organizations can immediately implement to take advantage of the fast IT model:

- **Intelligent WAN (IWAN):** The Cisco IWAN application on APIC-EM is Cisco's software-defined WAN (SD-WAN) offering based on simple and intuitive policy definition of an application's relevance to the business. The IWAN app delivers massively simplified automation and orchestration of Cisco IWAN deployments using a browser-based graphical user interface.

The evolution to an SD-WAN can increase network agility but also save enterprises a significant amount of money, and it should be at the top of every IT leader's priority list. For example, consider a business with 50 WAN locations, each with dual MPLS circuits. Based on ZK Research's 2015 WAN survey, the average cost of an MPLS WAN connection is \$975 per location, whereas the average cost of a business-class Internet connection is \$485. If the

customer chose to use consumer-grade broadband service, the price of the Internet would fall to less than \$100 per month.

Using business-class pricing, Exhibit 3 shows the savings gained by evolving to an IWAN-based SD-WAN, where one MPLS connection would be deployed for mission-critical traffic and the second replaced with an Internet connection for best-effort traffic.

The exhibit shows the difference between a configuration for dual MPLS connections for all 50 branches, and a connection with 25 branches that have dual Internet connections and 25 branches that have one Internet and one MPLS connection. The savings from moving to an SD-WAN is \$8,820 per month, and it would be even higher with an all-Internet WAN.

- **Network Plug and Play (PnP):** Cisco's Network PnP application provides a simple, secure and integrated solution for enterprise network customers to automate new branch or campus rollouts. The solution provides a unified approach to provisioning enterprise networks composed of Cisco routers and switches, as well as automating secure key management using a public key infrastructure (PKI). The PnP app will support all ISRs, Catalyst Switches, and APs in the Cisco enterprise product portfolio.

Exhibit 3: Cisco WAN Hybrid vs. MPLS Deployment

NUMBER OF SITES	AVERAGE MPLS COST/ MONTH	AVERAGE INTERNET COST/ MONTH	
		Monthly	Annual
50	\$975	\$485	
Total Cost per Branch for Dual MPLS for 50 Locations		\$97,500	\$1,170,000
Total Cost for Dual Internet Connections in 25 Locations, and 1 MPLS and 1 Internet Connection in 25 Locations		\$60,750	\$729,000
Total Savings with IWAN		\$36,750	\$441,000
Total Savings per Site		\$735	\$8,820

Source: ZK Research, 2015

- **Path Trace (PT):** PT provides customers with a low-risk, “read only” opportunity to adopt APIC-EM into their production networks. Given two endpoint IP addresses and a 5-tuple description for a flow, APIC-EM can identify the exact path between them. This helps automate an otherwise manual inspection and interrogation process, saving substantial time and money when troubleshooting network issues.

Discovery, Inventory and Topology

The Cisco APIC-EM establishes a network information base (NIB) that provides services and applications with a “single source of truth” for scanned network devices, their connectivity and their current operational state.

Organizations that deploy the Cisco APIC-EM will realize a number of benefits including significant time savings over traditional network management. A Forrester Research study recently compared the time spent on certain tasks by a network manager within the traditional IT model and the fast IT model. The study shows that the current IT model consumes 93% of IT’s time for network operations, leaving only 7% for innovation and new initiatives. With the fast IT model, Cisco estimates a 500%

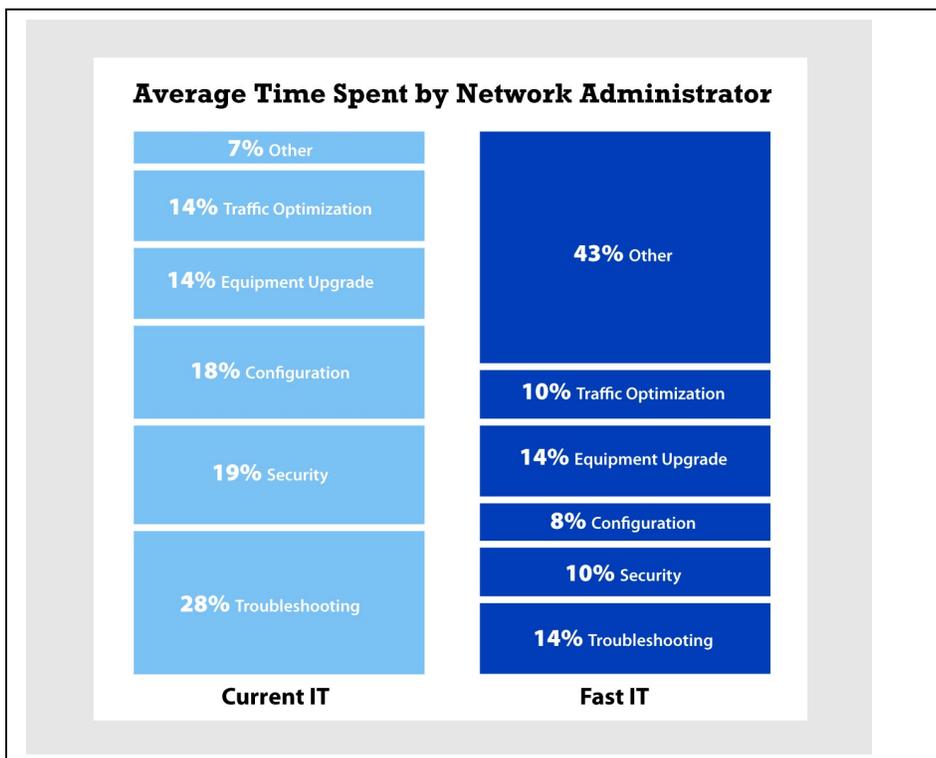
increase in the time available for new initiatives, rising to 43% from just 7% (Exhibit 4).

Also, the APIC-EM enables the automation of network policies. Businesses can use the policy automation capabilities to automate configuration changes, which is a key to moving away from box-by-box feature configuration.

Section IV: Conclusion

Today’s IT leaders need to focus on enabling business innovation through a highly agile technology environment. However, no amount of investment at the compute and application layer can deliver the necessary level of agility until the network itself becomes a highly agile resource. To accomplish this, organizations should rapidly make the shift to a fast IT model, in which provisioning time is reduced through automation, downtime is almost eliminated because of a reduction in human error, and resource utilization is improved. Fast IT will provide companies with the necessary open, flexible foundation to transform the business. The new APIC Enterprise Module can help evolve the network to provide the level of agility, programmability and openness necessary to fulfill the vision of fast IT.

Exhibit 4: Current IT vs. Fast IT



Source: Forrester Research, 2015