



An Application-Centric Infrastructure Will Enable Business Agility

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Introduction: The Need for an Application-Centric Infrastructure

The role of the CIO has changed more in the past five years than any other position in the business world. IT success used to be measured on IT metrics such as uptime and performance of the infrastructure. Today, the goals of the IT leader are aligned with the goals of the business (Exhibit 1), causing IT to be redefined on all levels.

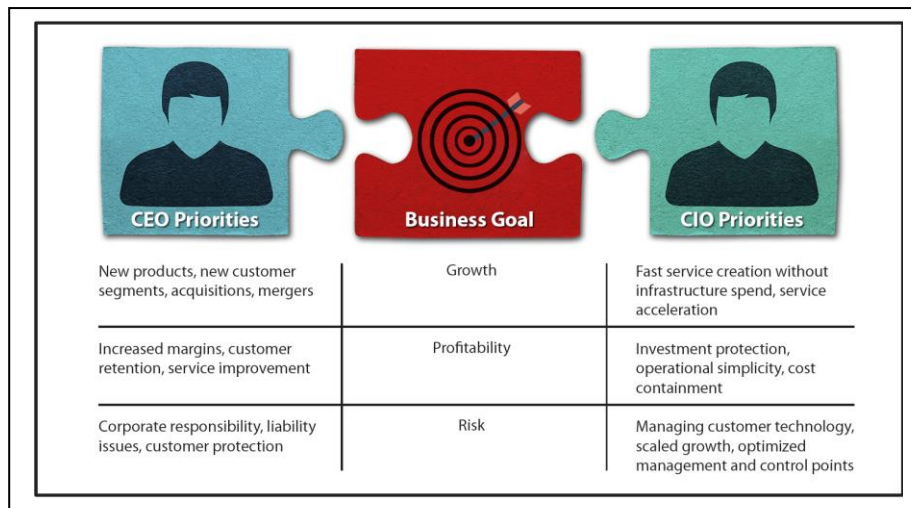
CEOs are tasked with creating an agile business—that is, a company that has the ability to respond to competitive pressures immediately. Business agility requires application agility, which—in turn—requires IT agility. This means the IT department needs to provision applications and services in hours instead of the months it takes today.

Additionally, businesses are shifting from delivering systems of record to delivering systems of engagement. Customers engage directly with the business, and these systems must be responsive as customers and market forces change.

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Exhibit 1: CEO and CIO Priorities Are Now Aligned



Influence and insight through social media

Source: ZK Research, 2014

To meet the demands of the current competitive environment, IT needs to transform and operate faster than ever before. The IT environment has become increasingly more complex, with more and more resources used to maintain the status quo. ZK Research indicates that today, 83% of IT budgets are used to simply “keep the lights on,” up from 74% five years ago. With technology trends such as consumerization and the Internet of Things (IoT) about to explode, the problem will become exacerbated.

The term “Fast IT” has been used to describe an agile IT organization serving the strategic needs of a business with an accelerated application lifecycle. However, implementing the vision of Fast IT is nearly impossible with the way IT operates today.

Traditional IT approaches take a siloed operational view, with no common operational model among the application, network, security and cloud teams. Deploying a new application requires a complex chain of administration as well as review by several different teams, and this common approach fails to realize the vision of Fast IT.

However, an approach that separates application requirements, operations and infrastructure, such as Cisco’s Application Centric Infrastructure (ACI), allows all teams to work together in parallel, which accelerates the path to Fast IT. ACI is a vision, an architecture and a transformative operational model in which IT becomes a fluid, dynamic set of resources where processes can be automated, bringing unprecedented levels of speed and agility to the business. Organizations that embrace ACI can shed many of the legacy challenges in running IT and finally align business goals with the direction of IT.

ACI evolves the IT model from being siloed with manual workflows to being an application-centric model that automates deployment, operations and visibility. The evolution to ACI starts with the network in order to align the network with application agility.

Section II: The Challenges with Running Legacy Networks

The goal of creating greater IT agility has caused technology leaders to bring many new technologies into the business. Distributed applications, virtualization and the cloud have all increased the fluidity of IT, but only at the compute and application

layers. Some businesses have shifted to a DevOps model, but this has yet to address network operations. If businesses are going to achieve the necessary levels of agility, it’s time for the network to evolve.

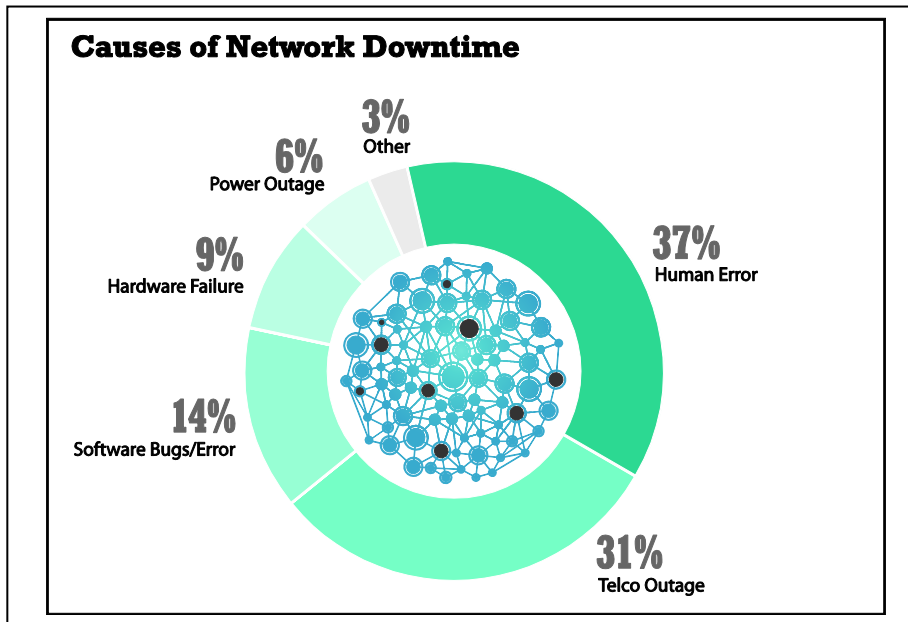
Running the network is a very complex endeavor involving manual processes that are performed box by box. This can be time consuming and tedious, and is one reason that human error is the largest cause of network downtime today (Exhibit 2).

Also, because of the manual nature of configuration and change management, routine maintenance tasks can often take months to complete. This lag between the decision to implement a network service and the completion of the process can impact the business to the point where revenues are lost or opportunities are missed.

Traditional networks were designed in an era when businesses were typically closed entities and corporate information stayed within the confines of the organization. This was sufficient when most companies had neither the desire nor the requirements to share information or even have workers outside the corporate walls. Today, of course, businesses are striving to be more open and collaborative, which means the network also needs to be more open and extensible.

A number of software-defined networking (SDN) technologies, which are primarily based on software-based overlays, have come to market to address some of the agility issues facing infrastructure teams today. While well intentioned, these solutions have solved only a limited set of problems and have created several others. Many SDN solutions rely on imperative control, a model that employs a centralized control plane to manage the network and uses very simple forwarding devices. In this system, a controller can often limit scalability and resiliency. Simultaneously, these systems make it difficult to leverage advanced or innovative features on network or security devices because imperative control protocols, such as OVSDB, expose only a basic feature set such as bridges, ports and tunnels. Finally, today’s SDN overlay technology forces the infrastructure team to separately manage and troubleshoot the physical and virtual network, increasing complexity and moving farther away from the promise of Fast IT.

Exhibit 2: Human Error Is the Largest Cause of Network Downtime



Source: ZK Research, 2014

At the same time, some businesses have shifted to a DevOps model, but this has yet to address network operations. However, many popular DevOps models such as Puppet and CFEngine have shifted away from the imperative control approach and toward one that employs a declarative policy. A declarative policy is one that describes the end state of the system and allows sets of autonomous agents to self-configure to reach that state. This declarative policy-based approach solves many of the issues discovered with overlay SDN technology, and it in fact has served as some of the inspiration for Cisco's ACI solution.

Network transformation is now a requirement in order for IT leaders to move to Fast IT. An application-centric infrastructure can address the network-related issues that prevent organizations from achieving this vision.

Section III: Cisco's Application Centric Infrastructure Enables IT Agility

As its name suggests, Cisco's ACI offers a unified solution across physical and virtual infrastructure to accelerate application deployment without compromising performance, scale, visibility or security. ACI is built around an innovative, declarative policy model that allows users to

naturally describe application requirements and automate their deployment across the network.

Cisco's ACI bridges communications gaps between the application, network and security teams by capturing application requirements in a well-defined policy model expressed in the language of the application administrator. This drives the concrete expression of application requirements across the network infrastructure. ACI's object-oriented approach abstracts the complexity that plagues networks today while enabling accurate, repeatable automation to deploy applications, which is especially powerful for organizations adopting a DevOps structure. DevOps must work together—but to do that, the infrastructure must also work together.

Key characteristics of ACI are:

- The shift from box-centric to application-centric network management with the entire network managed as a single entity
- Automation that is simplified through the application policy model
- Scalability and high performance as well as multi-tenancy done in hardware
- Centralized, holistic visibility of infrastructure with real-time application monitoring to understand performance and health

Perhaps the most important characteristic of Cisco's ACI is its openness. Being open allows the network to expose important information to applications in order to enable business innovation, and provides tighter integration with corporate applications. Open software also provides greater software flexibility for the DevOps teams and for ecosystem partner integration.

ACI is highly flexible and allows tight application integration through northbound APIs built on REST with extensions to Python, Puppet, Chef and CFEngine. This enables DevOps processes and permits integration with any existing data center software platform.

Additionally, the Layer 4–7 device package APIs support the dynamic deployment and insertion of network service chains within the network. These APIs interface with existing data center infrastructure without requiring any modifications. The API is open and flexible, and it supports many ecosystem partners including Citrix, F5 Networks, A10 Networks, Sourcefire and Cisco's Adaptive Security Appliance (ASA).

Recently, Cisco announced a new OpFlex protocol to further advance ACI. OpFlex is designed to support declarative control in the data center. Declarative control systems, such as ACI, have better scale, resiliency and interoperability than classic imperative control systems. The announcement included notable technology leaders: Microsoft, Red Hat, Canonical, F5 and IBM.

The OpFlex protocol offers tight policy integration between devices of any form factor and the ACI infrastructure. This includes virtual switches, physical infrastructure, Layer 4–7 devices and security appliances, and is extensible to storage systems and servers. OpFlex abstracts the policies and relies on intelligent, autonomous devices to interpret them. This gives ecosystem partners room to innovate and expose new features without compromising compatibility.

The benefit of OpFlex is that it's a completely open protocol and any vendor is invited to participate. Cisco has committed to providing an open source agent under a flexible Apache 2.0 license that can be adopted and used by other vendors. It is also proposing OpFlex as a standard to the IETF and will work to drive the standardization process. This commitment to openness has the potential to make OpFlex the de facto standard for declarative control of network systems. Using the Cisco network as a foundation, OpFlex offers a rapid path to broad

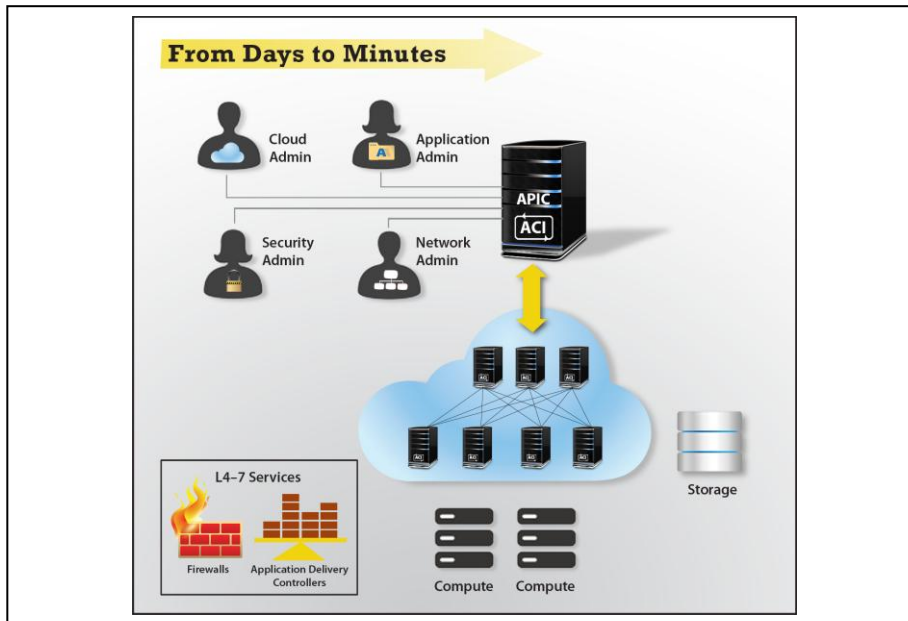
infrastructure interoperability, enabling any device from any vendor to interact with the Cisco APIC—the control point for the data center.

Section IV: The Benefits of an Application-Centric Infrastructure

Organizations that adopt an ACI architecture will have the ability to finally align business agility goals with an agile application deployment and operational model. This will have many benefits to the organization, including the following:

- **Provisioning time of data center resources reduced from days to minutes:** The provisioning of IT resources no longer takes days or even months due to manual processes and IT silos. ACI enables different IT administrators to work as a single team, define policies and then automate the provisioning of IT resources (Exhibit 3).
- **Better alignment of IT and business goals:** The on-demand scale-out and tear-down of ACI leads to more predictable application IT spending that is better aligned with business activity.
- **Ability to deliver on SLAs:** End-to-end visibility and application health scoring can help IT departments monitor and meet service-level agreements.
- **Rapid infrastructure configuration:** The centralized deployment model combined with the DevOps structure accelerates the configuration and maintenance of security and network infrastructure.
- **Application delivery model in line with today's workforce:** ACI's flexibility and agility enable any workload to be delivered anywhere. This means resources can be migrated around the network as the business requirements change.
- **Reduction of errors and overhead:** ACI automates network provisioning and abstracts the complexity of network operations to reduce errors created by manual configuration changes. It can create a path for IT to implement a self-service model for application owners.
- **Reduction of mean time to repair:** Automated remediation promotes optimal network performance for even the most demanding applications 24x7. The visibility across the physical and virtual boundaries can reduce mean time to repair by as much as 80% according to an estimate from ZK Research.

Exhibit 3: Cisco's ACI Delivers Automated, Policy-Driven Infrastructure Provisioning



Source: ZK Research, 2014

- **Improved network security:** The automation of security policy allows the security team to retain tight end-to-end control. Additionally, the automated insertion of virtual security services simplifies application deployment.
- **Prepares the network for the Internet of Everything (IoE):** IoE is on the horizon and will connect orders of magnitude more devices to the network. With existing management models, IT simply can't scale to fully take advantage of IoE. ACI can help solve existing problems today, but then act as a foundation for IoE in the future.

Section V: Conclusion and Recommendations

Having business agility is no longer an option: It's now a necessity for all organizations. Companies that have an agile business will leapfrog the competition; those that do not risk falling behind quickly. However, a business can only be as agile as the infrastructure that supports it. Therefore, delivering IT agility must be at the top of every IT executive's priorities today.

There are many ways to deliver IT agility, but many of the methods—such as software overlay models or integrated, proprietary stacks—introduce new challenges and increase management complexity. Cisco's ACI brings the flexibility of software and

marries it with the performance of hardware, creating a simple, flexible deployment model that is critical to enabling IT agility.

The future of networking with ACI is about providing a network that is deployed, monitored and managed in a way that supports the DevOps paradigm and rapid application change. ACI accomplishes this through the reduction of complexity and a common policy framework that can automate the provisioning of all IT resources. Deploying an application-centric IT management model is key for any business that wants to have a more agile environment. To help IT leaders get started down this path, ZK Research recommends the following:

- **Embrace the concept of open networking.** There are many solutions on the market today that promise to deliver better automation or increase agility. However, those built on closed protocols limit ecosystem choice and will not always deliver the best performance or application support. The network needs to be open in order to communicate effectively with applications.
- **Automate as many processes as possible.** Manual processes create long deployment times and lead to human error. IT leaders should strive to automate as many of the manual, repetitive processes as possible. This will enable IT to

focus on strategic issues and mask the complexity of the infrastructure.

- **Shift to a DevOps management model.** The promise of DevOps has been on the horizon for years, and it promises a more streamlined and coordinated IT structure. However, many companies have resisted moving to this model because the infrastructure could not support the management model. Cisco's ACI is an ideal solution to enable businesses to embrace the DevOps model and bring the promise of Fast IT to fruition.