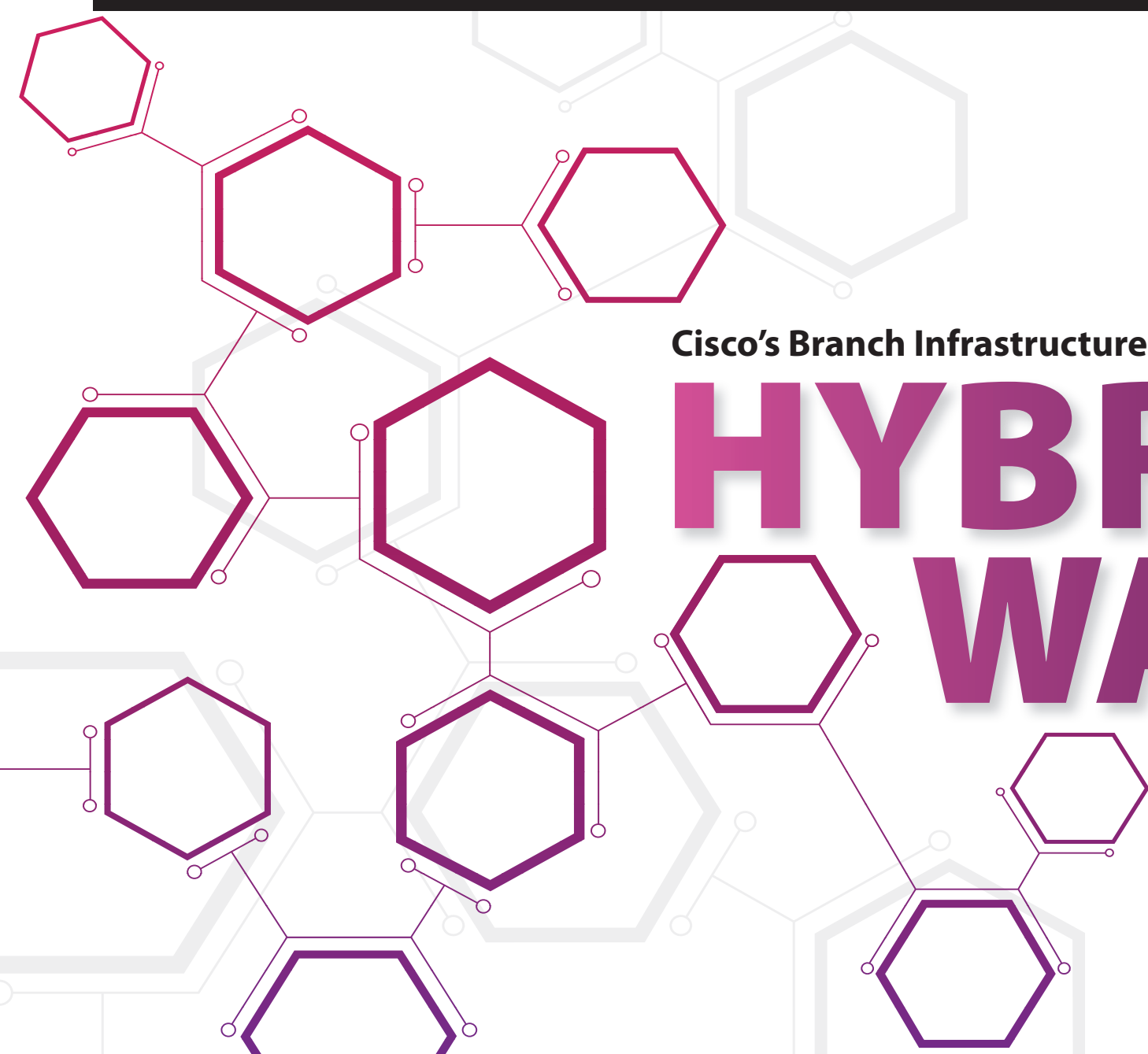


Cisco's Branch Infrastructure Powers the

# HYBRID WAN



**ABOUT THE AUTHOR**

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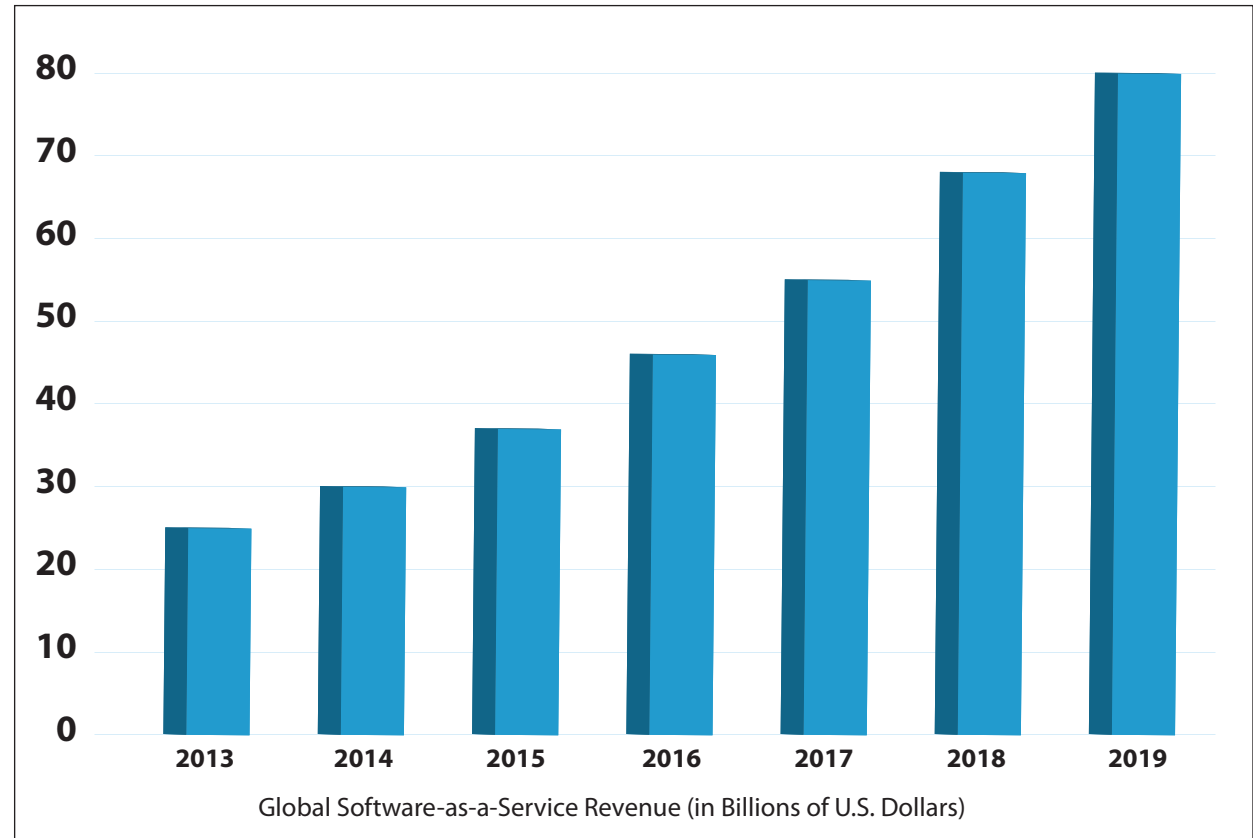
**Introduction: The Time for the Hybrid WAN**

IT has gone through a significant evolution over the past decade. Virtualization has changed the entire face of the data center, the network edge has become predominantly wireless and consumer devices reign supreme. However, one of the few areas of IT that has yet to evolve is the corporate wide area network (WAN). Managing the WAN is something network managers have always struggled with because WAN speeds are typically an order of magnitude, or more, slower than local area networks (LANs).

Historically, while not ideal, WANs met the needs of the enterprise as many mission-critical applications were deployed locally, and WAN-based applications were best effort in nature. Today, the model has changed. Companies are adopting network-centric compute models such as cloud ([Exhibit 1](#)), mobile computing and the Internet of Things (IoT), which raises the value and importance of the corporate WAN. In addition, the significant rise in video, VoIP and virtual desktop traffic drives the need to evolve.

As application performance becomes more dependent on the network, application delivery requires IT to be more network centric. For this to happen, the network must shift from a tactical resource to a strategic asset that will play a key role in IT success. However, for the WAN to achieve this level of strategic importance, it must evolve into a hybrid WAN. A hybrid WAN can be thought of as a wide area network that leverages the flexibility and agility of Internet

**Exhibit 1: Global Software-as-a-Service Forecast**



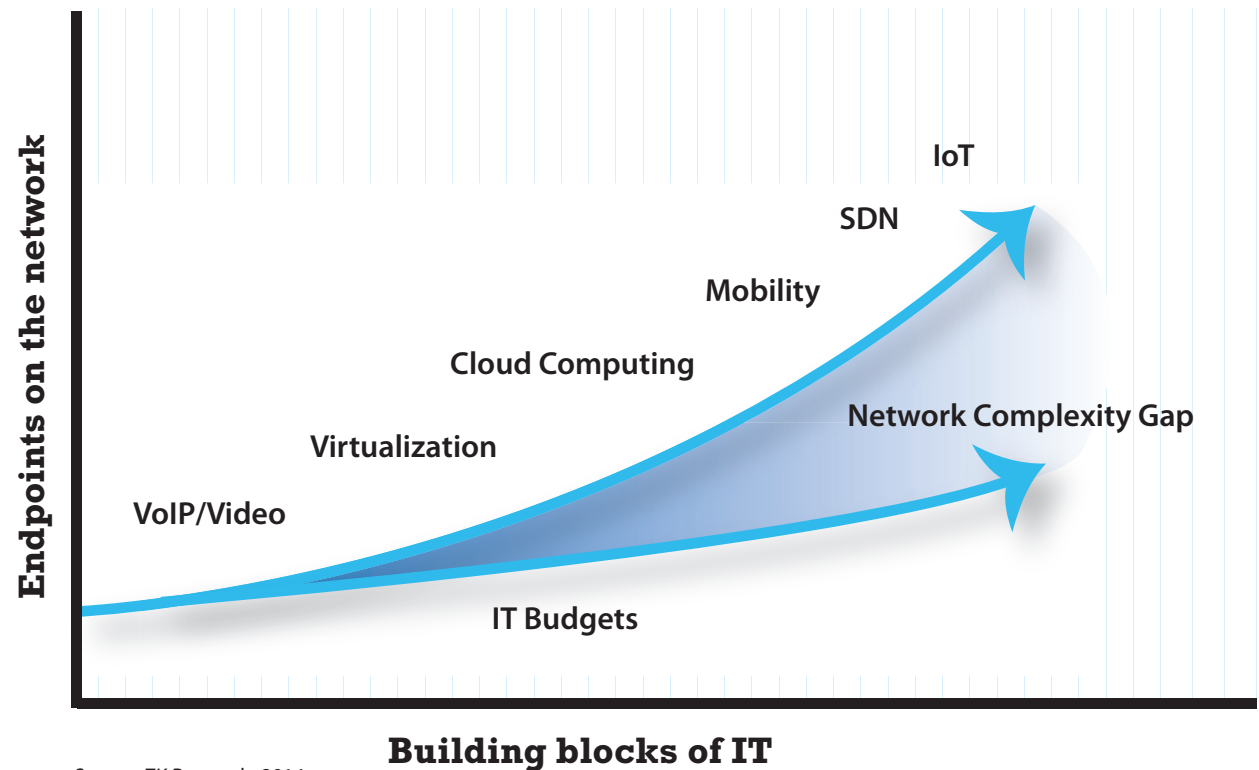
Source: ZK Research, 2014

connections and combines it with the security and control of private network connections. A hybrid WAN is ideally suited to meet the needs of current compute models such as mobility, cloud and the Internet of Things.

## Section II: Limitations of Legacy WANs

The current WAN architecture was implemented a decade or so ago for delivery of client/server computing and best-effort Internet traffic. Cloud and mobile computing are the fastest growing application segments today and drive significantly different traffic patterns than the

### Exhibit 2: The Widening Network Complexity Gap



Source: ZK Research, 2014

legacy (LAN-based client/server) compute model. WANs have the following limitations:

> **Inefficient use of network bandwidth:** Business WANs are typically designed with a hub-and-spoke architecture. Each branch is connected only to the central hub for connectivity. All traffic is sent over the WAN, through a central location and then to its destination, whether it's the Internet or another branch location. This trombone effect is highly inefficient because all traffic must pass through a single choke point.

> **Lack of application visibility and control:** Improving the user experience and application performance has been a challenge for network managers responsible for WANs. A high level of visibility into the network enables network managers to better understand how applications perform. Based on visibility, applications can be controlled in various ways depending on their criticality to the business.

> **The widening network complexity gap:** IT leaders are under tremendous pressure from line-of-business (LOB) managers to lower costs. However, this directly conflicts with the trends in IT as, according to ZK Research, more than 80% of an organization's budget is used to maintain the status quo. Also, a number of new technologies introduced in the past decade have impacted the WAN, causing the network complexity gap to continue to widen ([Exhibit 2](#)). IT leaders must find a way to lower the cost of running a WAN to meet the demands from other business leaders.

> **Infrastructure management difficulty:** Branch offices require many technologies to be

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“Leveraging the cloud was one of the critical initiatives for our company’s five-year IT vision. We will move aggressively to the cloud to get a leg up on our competition.”

— CIO, Nationwide Retailer

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a secure part of the corporate network. This includes routers, WAN optimization devices, security appliances and servers. These are often deployed using multiple platforms, creating a highly complex environment.

> **Security deployed as an overlay technology:** With legacy networks, securing the network was accomplished by deploying security tools as an overlay to network technologies. This makes it difficult to keep security policies aligned with network policies. A hybrid WAN demands deeper integration of security with the network.

> **Lack of agility:** LOB managers and business leaders have been striving to create greater business agility, which means having the ability to respond to opportunities and threats almost immediately. This is one reason why organizations have spent billions of dollars on virtualization and cloud services as these deliver greater compute and application flexibility. However, businesses can only be as agile as their least agile IT component, and the WAN remains a static, inflexible resource. It’s time for the WAN to evolve and better align with business goals.

The challenges associated with legacy networks are significant today, as companies look to migrate their IT strategies. It’s critical that CIOs and other IT leaders make evolving the WAN a top priority.

### Section III: It’s Time to Evolve the WAN

IT trends drive WAN evolution. The network needs the same level of attention as compute

or application resources. The WAN needs to evolve from its current state into an intelligent WAN fabric capable of adapting, in real time, to emerging needs of the hybrid WAN. Below are key points to consider when designing an intelligent WAN fabric—for today and the next decade:

> **Connects users to applications regardless of device, connectivity or cloud:** The intelligent WAN fabric needs to connect workers with devices across the private WAN, but also extend out to private and public cloud services. The rise of cloud and mobility has extended the WAN past the traditional boundaries, but this barrier must be transparent to the user.

> **Transport agnostic:** Historically, business-class WANs were built using private transport services such as MPLS and leased lines. An intelligent WAN should be transport agnostic and offer a similar experience over traditional services but also broadband Internet and wireless services. This is crucial in being able to efficiently access SaaS and Web applications, and it is a key step on the journey toward a hybrid WAN.

> **Simplified control of distributed services:** While having distributed services may seem ideal for a branch office system, provisioning services and managing resources can be extremely difficult. The WAN needs to have centralized management that can control any resource anywhere. Ideally, provisioning and management could be automated based on business policies with application context.

> **Optimize for cloud and mobile computing:** Legacy WAN thinking must be shed to support the needs of an increasingly consumerized, cloud-driven and mobile business. Hub-and-

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“Shifting IT control points to the network is the only scalable way we can migrate our applications to the cloud without putting the business at risk.”

— CIO, Mid-Atlantic Based  
Financial Services Firm

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spoke architecture must give way to greater meshing and local Internet access.

> **Integrate security into the network:** The WAN optimized for future applications must protect the enterprise in new ways and at multiple points. Security must be integrated with the network to provide maximum protection.

> **Application-aware networks:** To optimize application performance, the network must recognize certain types of applications and apply the right optimization techniques. This ensures all users a consistent experience.

> **Application platform:** The network needs to provide the capability for applications to be more network-aware. It must be an application platform and tightly couple applications to the network. Being able to deploy applications anywhere in the network without compromising performance and security will increase agility.

> **Pervasive visibility:** A key to optimizing user experience is understanding how the network impacts applications. Network managers must have more visibility to set thresholds, find bottlenecks and prioritize applications.

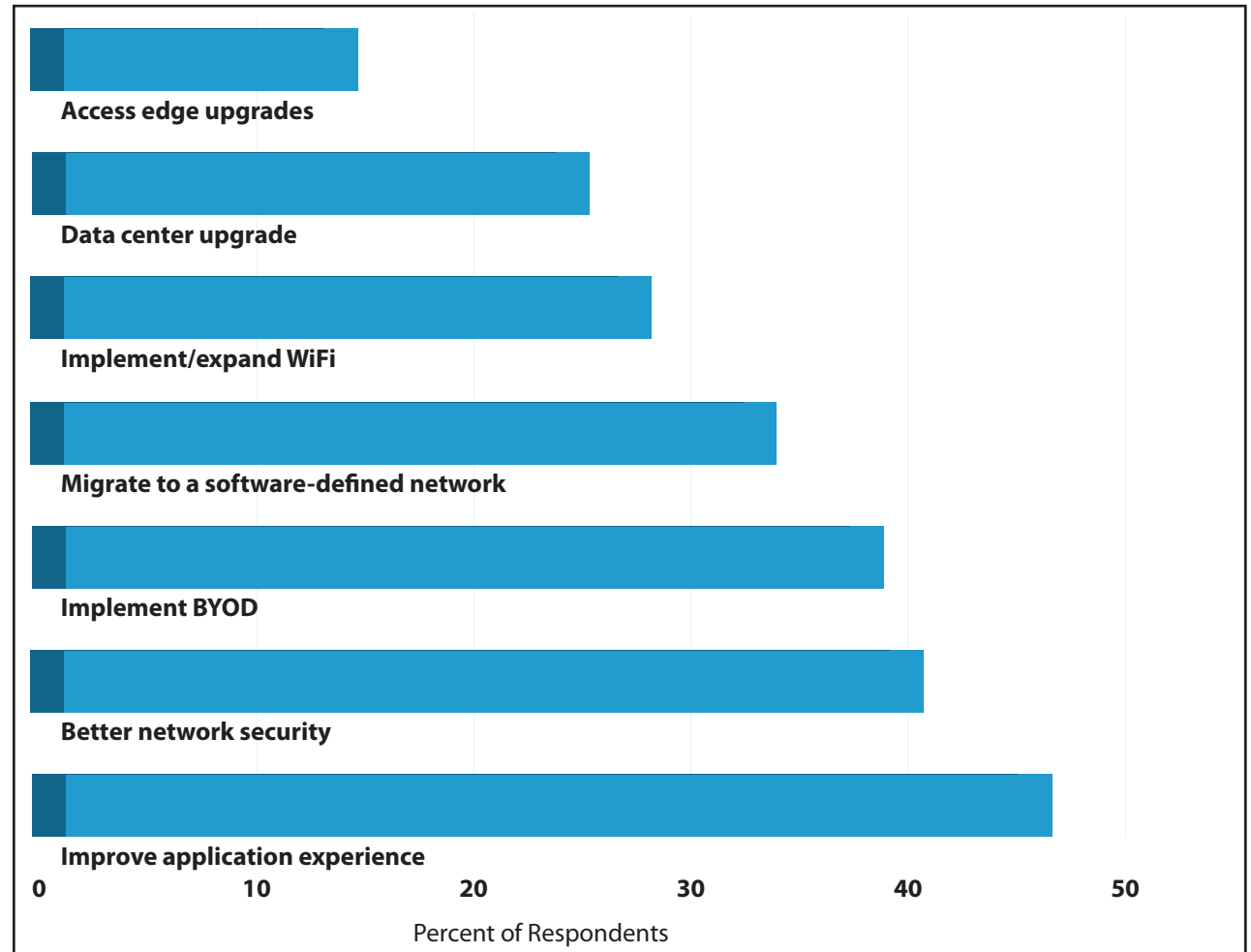
> **Rapid provisioning of applications and network services:** The business environment continues to get more competitive. Gaining an edge means being able to deploy applications and services across the network faster. The network must be an enabler of rapid provisioning instead of an inhibitor.

> **Optimize user experience and mobility:** Fulfilling the vision of cloud and mobile com-



puting is imperative. In fact, a 2014 ZK Research study shows improving the application experience

### Exhibit 3: Top Priorities for Network Managers



Source: ZK Research, 2014

rience is the top concern of network managers ([Exhibit 3](#)). The infrastructure that powers the network must evolve.

#### **Section IV: Cisco ISR 4000 Series: Purpose Built for the Hybrid WAN**

Branch offices and the WAN are in a state of transformation. Network managers must strike a balance between maintaining the status quo and pushing forward with strategic IT projects. However, the complexity of current infrastructure means network managers spend almost all of their time keeping the lights on. Shifting the balance to the network as a strategic platform requires a new approach to branch networks.

Cisco's Integrated Services Router (ISR) elevates the concept of the branch router to a full multi-service branch platform. The ISR is a single device that is easy to use and manage, which provides customers with combined data, security, UC and wireless services.

The ISR 4000 Series of branch routers takes the ISR concept and adds higher level (layer 4 to 7) services. It can be thought of as a purpose-built network and application platform that delivers an optimized user experience. The ISR 4000 Series combines traditional layer 2 and 3 services such as routing and security with layer 4 to 7 application services for greater visibility, control and WAN optimization.

This new ISR platform redefines branch routing and WAN connectivity, and it enables companies to leverage mobile and cloud computing. The ISR 4000s are Cisco's latest ISR family,

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“Optimizing the performance of our traditional, cloud and mobile applications across our end-to-end network has become one of the most important tasks for network operations. This has a direct impact on user productivity.”

— Head of Network Operations,  
Global Law Firm

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and the products combine high-performance branch routing with scalable service delivery and simplified IT operations in a 2-RU form factor or smaller. Despite their compact form factors, the routers have leading-edge performance, with up to 2 Gigs of forwarding performance. The ISR 4000s are leading networking and security products, but they also bring compute capabilities to the branch office, such as servers and storage, with the integration of Cisco UCS E-Series Server blades. The new ISR 4000s bring a number of new capabilities not offered by any other solution provider, including:

> **Pay-as-you-grow deployment model for performance and network services:** The ISR 4000s have services natively integrated on the platforms, which can be enabled any time via a license. In addition, performance can also be updated via license. This means greater agility with minimal downtime and disruption to the business with no truck rolls.

> **Integration with Cisco Application Centric Infrastructure (ACI):** The new line of ISR 4000s integrates seamlessly into Cisco's APIC (Application Policy Infrastructure Controller) Enterprise Module for greater simplicity and management. This is an ideal first step for organizations looking to shift to a software-defined network (SDN) model.

> **Integrated security:** Network managers can provision traditional network security features such as IPsec VPNs, and application-level security such as zone-based firewalls and cloud Web security. Integrated, multifaceted security is crucial in securing business applications while increasing business agility.

> **Appliance-level performance:** Network managers often must choose between the flexibility of an all-in-one solution and the performance of appliances. Unlike many integrated platforms where an increase in breadth of service means a decrease in performance, the ISR 4000s have separate control, services and data planes, and they run the individual services in separate containers. This compartmentalizes new services to be provisioned without affecting the performance of services already running. With the ISR 4000 Series, organizations no longer must compromise on performance to gain the benefits of integrated platforms.

> **New consumption models with Cisco ONE:** Cisco ONE brings a subscription model to branch infrastructure. Customers can purchase the licenses they require for the features they need on the right model of ISR 4000 ([Exhibit 4](#)). If a customer chooses to then upgrade to a higher performing platform, all of the licenses will port to the new platform. The software flexibility of the Cisco ONE pricing model ensures customers are never overspending and always have the right platform.

Companies that leverage the ISR 4000 series will realize the following benefits:

> **Faster time to market:** The pay-as-you-grow pricing model means customers can add performance and services at any time through license key enablement. Businesses can respond immediately to competitive pressures and have new services deployed on a moment's notice. In addition, ACI introduces WAN automation to enable faster provisioning of branches and services.

> **Path to software-defined networking:** The new line of ISR 4000s integrates seamlessly into Cisco's APIC Enterprise Module for greater simplicity and management. This is an ideal first step for organizations looking to shift to a software-defined network model and a necessary component of a hybrid WAN.

> **Lower WAN costs:** The ISR 4000 series includes a feature called Performance Routing (PfR), which enables intelligent path selection so businesses can route different traffic over various transport mediums. For example, instead of having an MPLS circuit with Internet or 3G/4G wireless as a backup, the business can actively use all of its WAN connections and set application priorities. PfR will steer traffic based on application type and network conditions to meet application SLAs. Cisco has included a number of templates to make the implementation of PfR simple.

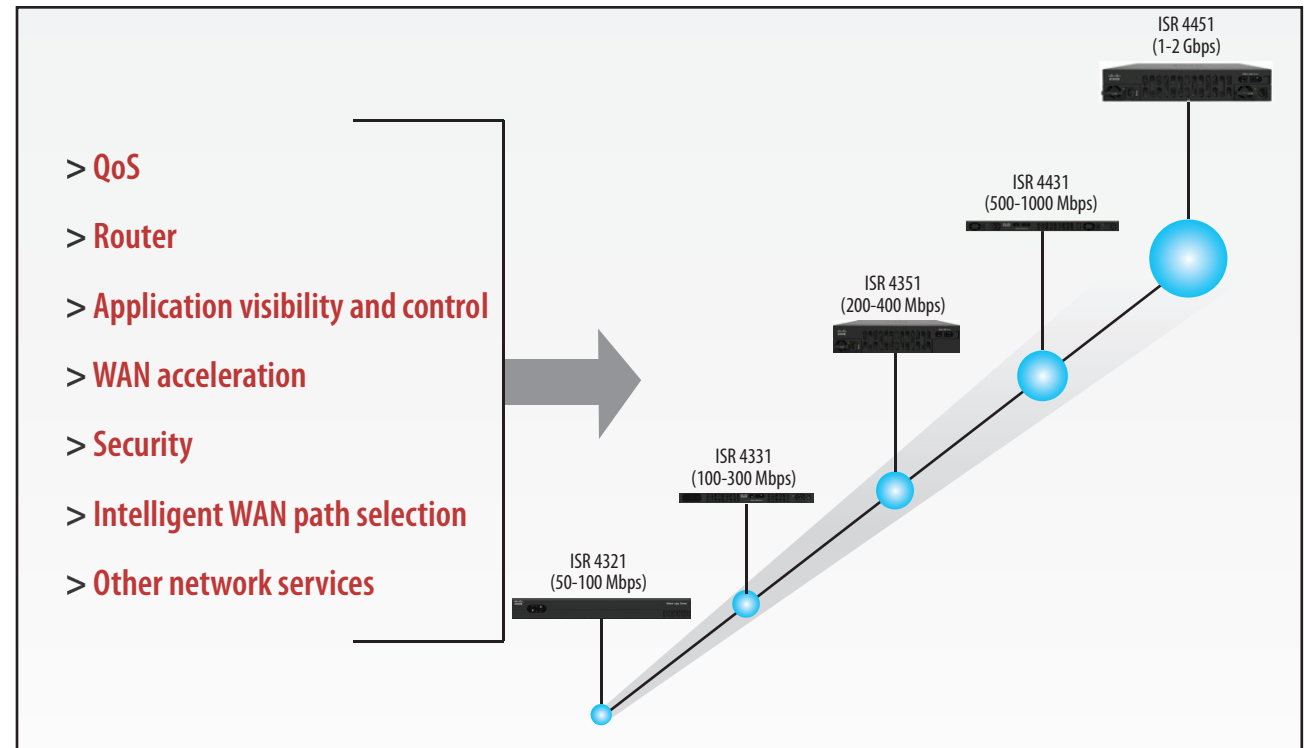
> **Optimization of real-time applications:** The new router's features optimize the performance of real-time services such as VoIP and video. The router supports SIP, has an integrated session border controller (SBC) and also provides voice-quality management for benchmarking. Network managers can provision intelligent paths as well as QoS to ensure the performance of real-time services is not impacted by other traffic.

> **Future-proofs the WAN:** With up to 2 GB of performance and native services, companies can leverage the ISR 4000 platforms today and keep them in place for the foreseeable future. The product offers outstanding value as an enabler of WAN services and also provides investment protection, as it will not need to be replaced for future services. The performance

of the platform is predictable, even with the addition of new services. This is what enables the future-proofing, since services can be added at any time with no degradation of performance.

> **Unmatched TCO:** It's common to see branch offices with separate devices for security, WAN optimization, routing, performance and other branch functions. The ISR 4000 Series has all

**Exhibit 4: The ISR 4000 Series Offers Fully Integrated Services Across a Broad Range of Routers**



Source: Cisco and ZK Research, 2014

branch services natively integrated and optimized with hardware performance for best-in-class performance across all services. This offers TCO advantages through hardware consolidation and operational simplicity.

> **Investment protection without oversubscription:** There are five ISR 4000 Series routers to meet the needs of the smallest branch up to the largest locations. Each router is designed to allow a business to start at the lower end of the range and only pay for the processing power required. As the demands increase, the business can enable more processing capacity through licensed performance. With this model, organizations can buy what they need today without worrying about overpaying or oversubscribing.

## Section V: Conclusion and Recommendations

The nature of work is changing, and organizations want to leverage the flexibility and power of mobile and cloud computing. Although these compute models are very powerful, they are the most network-centric compute paradigms to date. The corporate network can no longer be thought of as a tactical resource or cost center. Business leaders, CIOs and IT leaders should consider the network a strategic asset that will play a significant role in enabling companies to rapidly respond to the new business opportunities and efficiencies of the cloud and mobile era.

However, to reach this level of strategic value, the corporate WAN must evolve into a hybrid WAN and become an enabler of application experience and network services. The successful

implementation of a hybrid WAN depends on the right architecture but also a next-generation network platform capable of delivering all of the branch services with uncompromised security and performance. Cisco's ISR 4000 routers are ideally suited to meet the challenges of today and the future, and they should be considered as a building block for any company looking to leverage the WAN for strategic value. To successfully build a hybrid WAN, ZK Research recommends the following:

> **Take an architectural approach to building the hybrid WAN.** A network is more than a collection of routers and other devices. An architectural approach ensures the network can not only connect users to resources, but can also ensure a high-quality, optimized user experience with a lower TCO than a nonarchitectural approach. Cisco ONE Software for Enterprise Networks enables enterprises to evolve the WAN with minimal risk.

> **Invest in the network now.** Any organization even thinking about cloud and mobile computing should invest in the network to ensure the foundation is there to transition to the enterprise—no matter how quickly the business wants to move forward. It's critical that companies choose infrastructure that can enable the proper level of network intelligence, security and application intelligence to deliver a quality user experience, rather than using network infrastructure that is simply good enough. A good enough network is no longer good enough.

> **Leverage the network for computing success.** Legacy network thinking needs to go.



Computing success is highly dependent on the network. Business and IT leaders must consider the network when planning any kind of IT initiative. Focusing on the hybrid WAN will create the most secure and lowest risk deployment strategy for future applications and network services.



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