



Cisco Application Services Platform: Optimize the Branch Office Experience

Today's branch office requires the same level of rich application services as the company headquarters.

Why are these services needed? What impact do they have on the network, IT staff and service provider? What is the best way to boost the branch-office network to optimum levels—both technically and tactfully—if the devices provided do not meet the new requirements? Read on to learn more.

The “little branch office” is growing up. Just like its parent headquarters, the branch office now requires rich application services. Specifically, the branch office now demands bring-your-own-device (BYOD) and other IT services, cloud computing or data center hosted applications, plus videoconferencing and collaboration services—all highly reliable and secure. Why are these types of rich services necessary in the branch-office environment?

With regard to the BYOD trend, currently 13 billion devices are connected today: two per person. By 2020, 50 billion devices will be connected to the Internet: six devices per person. In a recent survey of employees¹, more than 80 percent of those surveyed bring their personal devices to work—87 percent of which are used for work-related activities. These devices bring with them new security, mobility, and wireless requirements,

necessitating a scalable network to accommodate them. Moreover, it's important to have application visibility and control to ensure that business-critical network traffic takes precedence over non-work-related BYOD applications.

With data center real estate at a premium, services and applications hosted in the cloud or in remote data centers are becoming increasingly prevalent for the branch office. Per ZK Research, cloud computing represents the next evolutionary step for computing, and by 2014 more than 50 percent of all workloads will be processed in the cloud². Overall, cloud IP traffic will account for 34 percent of total data center traffic by 2015³. Hence, the branch-office environment requires remote data center-hosted installation of application-aware services to accommodate the business environment changes and the migration to cloud-based services.



¹ Dimensional Research, “Consumerization of IT: A Survey of IT Professionals”, Dell KACE 2011.² Why Cloud Computing Needs a Cloud-Intelligent Network, ZK Research, April 2012.³ Building Tomorrow's Branch, Nick Lippis, Lippis Consulting, 2009.

Visual communication is at an inflection point in the way organizations are adopting it. The richness of information shared through video makes it a compelling capability. Per Lippis Consulting, the adoption of video communications for increasing productivity and reducing operating costs has spiked in branch offices. Videoconferencing, training, streaming, surveillance, and signage are increasing collaboration among employees and customers. The network is the key to ubiquitous and effective use of video services.

Along with growing up, the branch office is growing out, extremely crowded with onsite and mobile employees.

According to various industry sources, branch-office users comprise 30 to 90 percent of enterprise employees globally, with remote locations and users consuming 70 to 90 percent of business resources. To be successful, these employees require access to the same applications, systems, and tools as their headquarter counterparts.

All this growth challenges the organization's IT department to connect its branch offices securely and efficiently. Along with seeking intelligent solutions, the organization strives to lower the total cost of ownership (TCO) for running its network and increasing the overall employee productivity with more centralized and collaborative network applications.

Often overextended, the branch-office IT team needs to provide more services to more employees with fewer resources, and it faces the following challenges:

Increased network security:

- » The "any device, anytime, anywhere" nature of branch offices and borderless networks makes security a top priority. The branch-office IT team needs to secure devices both on the local network and across cloud services.

Larger remote workforce

- » As the remote workforce increases, the organization must deliver processes and tools that enhance employee effectiveness and innovation. The branch-office IT team must provide transparent mobility with location services for anytime, anywhere communications.

More effective real-time collaboration

- » The branch-office IT team must deliver a robust network platform that can deliver real-time, high-definition collaboration experiences to any device and any user. The increased video-based collaboration and rich-media services will increase employee productivity.

Working with the service provider (SP):

- » Often, the service provider offers these network services and routers to the midmarket. However, the IT team may prefer to manage its services in-house, because in many cases the service provider's offerings may be cost-prohibitive or not meet the specific needs of the branch office.

Consequently, the network requirements of today's midmarket organizations often rival those of their enterprise counterparts—despite lack of enterprise-level funding or resources.

Table 1. Business and IT Needs Accelerating Rich Application Services

Rich Services	Business Need	IT Need
BYOD trend	• Enable employees to bring their own devices to work to improve productivity and mobility.	• Deliver secure next-generation WAN and network service requirements.
Cloud computing and data center-hosted applications	• Move to the cloud to reduce costs.	• Provide the secure transition to the next generation of cloud and virtualized network services.
Operating expenses (OpEx)	• Reduce extraneous costs and streamline business processes.	• Reduce energy consumption and costs to support corporate sustainability. • Lower OpEx by providing on-demand WAN optimization.
Videoconferencing and collaboration	• Improve productivity, increase efficiency and the pace of business, and lower travel costs. • Enable remote workers to collaborate easily. • Enable on-demand product information, training, and support.	• Enable cost-effective delivery of high-definition (HD) collaboration at the branch office. • Design the WAN with optimization technologies and assured quality of service (QoS). • Deliver low latency and high resiliency, and ensure end-to-end traffic prioritization.

⁴ Building Tomorrow's Branch, Nick Lippis, Lippis Consulting, 2009.

Branch-Office Requirements to Support Rich Application Services

Supporting rich application services—in addition to reliable connectivity—requires a robust device that integrates security, data, embedded services, voice, and video. In many cases, the router can manage most of this work.

Branch-office network demands typically have seasonal increases and decreases, so WAN virtualization is an important requirement for the router (Table 2). WAN virtualization performs bandwidth aggregation, which allows all links on the WAN connections to be used almost all the time. A well-designed WAN virtualization solution does dynamic, real-time traffic engineering, reacting in a subsecond to both link failures and congestion-related network problems. Enabling multiple links on the WAN connections addresses multiple concerns, and is used in a variety of ways:

- For backup and business-continuity purposes
- To forward mission-critical traffic on the highest performing link
- To use all of the available bandwidth in each link and maximize network usage



Table 2. Requirements in the Branch Office

Requirement	Description
Services on demand	Allow for remote installation of application-aware services without compromise. Applications need to be run and managed identically to their counterparts in dedicated appliances.
High performance	Deploy solutions in high-speed WAN environments with concurrent services enabled up to 2 Gbps. Enable high-bandwidth module-to-module communications up to 10 Gbps without compromising router performance.
Network agility	Offer performance and services to accommodate the changes in the business environment brought about by the migration to cloud-based services. Performance on demand. Dual power supplies for redundancy. Increased bandwidth.
Investment protection	Support a rich set of software. Offer flexible growth options.
Security	Support VPN and threat defense (firewall/intrusion prevention system [IPS]). Data, voice, video, and mobility.
Services integration	Offer service integration with voice, video, security, data, and embedded services.

⁴ Building Tomorrow's Branch, Nick Lippis, Lippis Consulting, 2009.

The Application Services Platform

Positioning an application services platform in the branch office can deliver the necessary network services such as WAN optimization, application visibility, and cloud web security. With an application services platform, the branch office has greater power to deploy “on-demand” services as business needs dictate, while reducing overall operating expenses (OpEx). Such a platform enables delivery of HD collaboration at the branch office and provides a secure transition to the next generation of cloud and virtualized network services.

The Cisco® Application Services Platform can work hand-in-hand with the router provided by the service provider to meet the required videoconferencing and collaboration, BYOD, and cloud computing needs of the branch office. Options include:

- Obtaining a managed WAN service from a service provider
- Obtaining more than one WAN connection from the same or different service providers for business-continuity purposes

Cisco Integrated Services Routers (ISRs) enable the ultimate application experience. The Cisco ISR Application Experience (ISR-AX) Series of application services platforms provides the necessary visibility, QoS, and optimization of applications, as well as security and performance routing with intelligent WAN path selection. Designed to meet the requirements of the branch office, these platforms provide a complete solution for secure connectivity with voice, video, mobility, and application services.



The ISR-AX meets the specific demands of rich media services, BYOD environments, and cloud computing with these features:

Cisco Application Visibility and Control (AVC):

- » A concern with any BYOD initiative is that the numerous mobile devices might cause congestion in the network, particularly if the devices are being used for non-work-related web surfing or accessing sites such as Facebook or Netflix. HTTP is the new TCP, and by distinguishing between different applications on the same IP port number, the IT staff can reduce and control unwanted network traffic. The ISR-AX provides mutual awareness between both the network and the applications. Cisco AVC uses stateful, deep-packet inspection to identify and analyze more than 1000 applications on the network, including Citrix, YouTube, and Netflix. The AVC and Layer 7 services on the ISR-AX measure the user experience and eliminate the need for adding probes into the network.

Application-based QoS:

- » Videoconferencing and collaboration services require a device that can give priority to business-related traffic by dynamically adapting to the changing needs of the branch-office environment. Unified communications is enabled through a rich signaling and media-processing infrastructure, including a variety of protocols, media interworking, signal and media security, transcoding, conferencing, and QoS. The unique separation of the control and data planes of the ISR-AX provides the ability to deliver application-aware network services while maintaining a stable platform and high level of performance during periods of heavy network load. During these peak periods, non-business traffic is carried as “best effort,” irrespective of the IP port number.

The Application Services Platform

WAN optimization

- » All of the rich application services are enhanced by Cisco Wide Area Application Services (WAAS). Cisco WAAS is a comprehensive WAN optimization and application-acceleration solution that accelerates applications and data over the WAN, optimizes bandwidth, empowers cloud computing, and provides local hosting of branch-office IT services—all with industry-leading network integration.
- Cisco WAAS solutions for the ISR-AX platform enhance branch-office and mobile user productivity by optimizing application performance and increasing IT agility with faster delivery of branch-office services with the Cisco Services-Ready Engine (SRE) and the Cisco Unified Computing System™ Express (UCS® E-Series) Service Module.
- Cisco WAAS reduces capital expenditures (CapEx) by enabling centralization of IT resources and reducing bandwidth expenses, and lowers OpEx through integration of functions on a router platform.

Security:

- » All of the rich application services require security: Rich media and BYOD environments demand the toughest security possible, and concerns about corporate security in the cloud plague many organizations. The Cisco Application Services Platform can be the best place for securing network traffic to safeguard against threats such as malware, intrusions, and denial-of-service (DoS) attacks. The ISR-AX offers integrated network security for data, voice, video, and mobility. It offers a wide array of protection features such as advanced application inspection and control, firewall, and encryption architectures for enabling more scalable and manageable VPN networks.
- With the ISR-AX, security services can be added to the local router instead of hair-pinning all traffic to the data center, a model that allows for secure access to the Internet or cloud locally.

WAN path selection:

- » For optimal cooperation with the service provider, the ISR-AX adds link intelligence to enable link sharing among multiple WAN connections, and provides services for intelligent WAN path selection that enable an optimal application experience at lower costs.
- To enable videoconferencing and collaboration services, link intelligence can be used to route mission-critical traffic based on the bandwidth of the link, delay, jitter, and cost.

Server virtualization:

- » Space is at a premium in the branch office, and a unique feature of the ISR-AX is the ability to insert Cisco UCS E-Series server blades. This feature consolidates physical servers to reduce costs, improves application uptime and failure recovery time, and shortens time to deployment for new applications. The ISR-AX hosts business-critical applications locally, storing the network, compute, and storage functions in one “box”. This solution is best suited for multisite organizations with centralized IT infrastructure that need to host a small number of essential applications locally in the branch office.

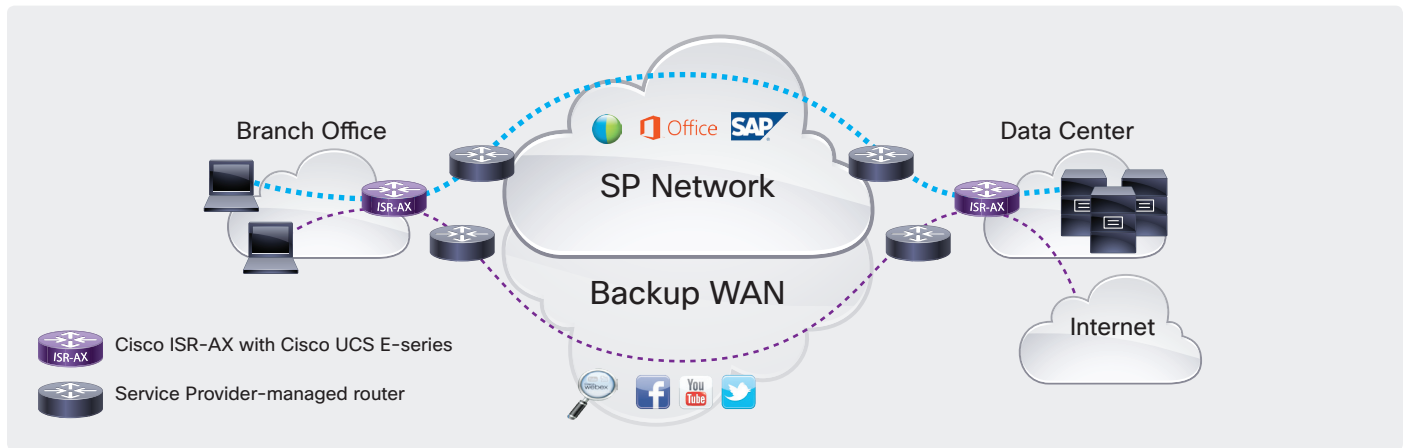
The newest and high-performance member of the ISR-AX series, built to meet the branch-office application and network services, is the Cisco ISR 4451-AX. The ISR 4451-AX is the only router that separates control, data, and services planes, revolutionizing the delivery of application-aware services in the branch-office environment and offering encryption acceleration, voice- and video-capable architecture, call processing, embedded services, and application firewall.



How to Add the Application Services Platform

The ISR-AX can be added to both the branch office and the central location, working alongside the service provider-managed WAN devices:

Figure 1 Physical Integration of the Application Services Platform in a Branch Office



The application services platform can be placed immediately behind the service provider’s WAN router, which would be retained. The service provider’s contract dictates the exact physical integration into the network topology, the logical configuration of the routing functions, and possibly the Network Address Translation (NAT) (Table 3). Because service provider contracts can vary by both provider and customer, the Cisco partner can assess what is required and assist with the implementation.

Table 3 Integration Considerations

Consideration	Description
Routing and Layer 3 topology	In the seven-layer OSI networking model, the network layer is Layer 3. The routing and Layer 3 layout can vary by solution provider.
NAT	There may be NAT implications, which can also vary by service provider. The simplest type of NAT provides a one-to-one translation of IP addresses, where only the IP addresses, IP header checksum, and any higher-level checksums that include the IP address are changed. However, most NATs map multiple private hosts to one publicly exposed IP address (that is, one-to-many NATs). The router has a private address in that address space and is also connected to the Internet with a “public” address assigned by the service provider. As traffic passes from the local network to the Internet, the source address in each packet is translated in real time from a private address to the public address. The router tracks basic data about each active connection. When a reply returns to the router, it uses the connection tracking data it stored during the outbound phase to determine the private address on the internal network to which to forward the reply.

After the application services platform has been integrated, the following steps are required to realize the benefits discussed in this white paper:

1. **Enable Cisco Performance Routing (PfR)** in both the branch office and headquarters ISR-AX devices if you are using more than one WAN link. To do this, you’ll need to define the criteria for routing the mission-critical protocols across the WAN. Configure this logic into the branch-office ISR-AX (also called the “border router”) and the ISR-AX at the headquarters (also called the “master controller”).
2. **Enable the Next-Generation Network-Based Application Recognition 2 (NBAR2)**, Performance Agent, and the Flexible NetFlow to provide application visibility. The NBAR2 Custom Protocol feature enables the administrator to create attribute profiles and attach these attribute profiles to protocols. This process identifies all traffic traversing the ISR-AX by application. It can be trained to recognize new protocols or encrypted protocols.
3. **Enable WAAS** to improve network responsiveness and provide LAN-like performance on the WAN. This process reduces application latency through application-specific optimizations. It also reduces the WAN usage through advanced caching techniques, and optimizes the TCP performance over high-latency WANs.

Conclusion

Branch offices now need to enable rich application services such as BYOD, cloud computing, and data center applications; and video communications and collaboration. The Cisco ISR-AX Series Application Services Platform offers one of the industry's most comprehensive solutions to meet the rich

application services performance, scalability, availability, and enhanced user experience requirements for branch offices of all sizes. The Cisco ISR-AX Series offers enhancements for service virtualization, video-ready capabilities, and operational excellence.

More Information

For more information about the Cisco Integrated Services Routers Generation 2 (ISR G2), [read about the Cisco ISR-AX](#) or contact your local Cisco account representative.



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