White Paper

Elevate the Branch-Office Experience with an Application-Centric Platform

Today's branch office requires the same level of rich application services as the company headquarters to ensure business innovation and employee productivity.

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?

Currently 13 billion devices are connected today: 2 per person. By 2020, 50 billion devices will be connected to the Internet: 6 devices per person. According to Gartner, by 2020, 85 percent of enterprises expect to deploy employee-owned-device or mixed-use policies, which could triple the number of mobile devices in the workplace[1]. 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 traffic takes precedence over non-work-related 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 cloud[2]. Overall, cloud IP traffic will account for 34 percent of total data center traffic by 2015[3]. 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.

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[4]. 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.

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[1] Gartner Research, "Mobile Device Proliferation Is Forcing Network Leaders to Redesign Enterprise Wireless LANs".

[2] Why Cloud Computing Needs a Cloud-Intelligent Network, ZK Research, April 2012.

[3] Building Tomorrow's Branch, Nick Lippis, Lippis Consulting, 2009.

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

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 headquarters 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 accelerate innovation, and these services must be provided to more employees efficiently. IT faces the following challenges:

- Increased network security: The "any device, anytime, anywhere" nature of branch offices and the expanding network perimeter make 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: 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 some cases the service provider's offerings may 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.
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.

Branch-Office Requirements to Accelerate Innovation and Productivity

In order to accelerate branch-office innovation and employee productivity, support for rich application services is required. A robust device that integrates security, data, embedded services, voice, and video is critical to the solution. 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
Flexibility	Allow for flexible scalability and performance. As the customers' needs change, repurposing resources quickly based on business initiatives is essential.
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 pay-as-you-grow options.
Security	Protect data passing over untrusted connections. Provide advanced threat defense for rapid detection of malicious traffic originating from trusted and untrusted devices and applications. Offer common security technologies to simplify security policy enforcement across the branch office and enterprise.
Services integration	Offer service integration with voice, video, security, data, and embedded services.

The Application-Centric Platform

Positioning an application services platform in the branch office can deliver 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 high-definition (HD) collaboration at the branch office and provides a secure transition to the next generation of cloud and virtualized network services.

The Cisco® Integrated Service Router with Application Experience (ISR-AX) services enabled offers an application-centric platform that 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

The Cisco Intelligent WAN (IWAN) solution powered by the ISR-AX delivers an uncompromised user experience over any connection. It 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.

Cisco IWAN meets the specific demands of rich-media services, BYOD environments, and cloud computing with these features:

- **Transport-independent** features allow IT to have flexibility with transports without compromising on security, reliability, or performance. IT can transparently distribute branch-office traffic over multiple transport options, including Multiprotocol Label Switching (MPLS), cellular, and Internet WANs, and still maintain one routing domain for IT simplicity. (Technology: Dynamic Multipoint VPN [DMVPN] and IP Security [IPsec])
- **Intelligent Path Control** capabilities help IT take full advantage of its WAN investments and avoid oversubscription of lines. Through intelligent path selection, applications are sent over the best-performing paths based on policy and real-time path status. Now the growth of new cloud traffic, mobile, guest services, and video can be easily load balanced across multiple lines. (Technology: Performance Routing [PfR])
- **Application Optimization** services give IT full visibility and control at the application level and determine what traffic is running across the network, tunes the network for business-critical services, and quickly resolves network problems. These services also can minimize any WAN burden by applying advanced compression and de-duplication to help applications better perform with the smallest load possible. They also allow businesses to deliver immersive digital experiences over bandwidth-constrained networks. They can significantly offload the WAN by providing instant access to web applications. (Technologies: Application Visibility and Control, Wide Area Application Services (WAAS), and Akamai Connect)
- **Secure connectivity uses** dynamic VPN connections between all sites to enable high performance across any transport with strong protection. It also secures connectivity when using direct Internet access for better software-as-a-service (SaaS) application performance or offloading noncritical web traffic. Finally, when using centralized security policy management (for example, InfoSec), secure connectivity makes it easy to protect all branch-office endpoints and applications. (Technologies: Zone-Based Firewall, Sourcefire® intrusion detection system (IDS), and Cloud Web Security with Advanced Malware Protection)
- Server virtualization on the platform reduces cost and minimizes the branch-office footprint. Space is at a premium in the branch office, and an innovative feature of the Cisco ISR is the ability to consolidate physical servers to reduce costs, improve application uptime and failure recovery time, and shorten time to deployment for new applications. It can host 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. (Technology: Cisco Unified Computing System™ [Cisco UCS®] E-Series servers)

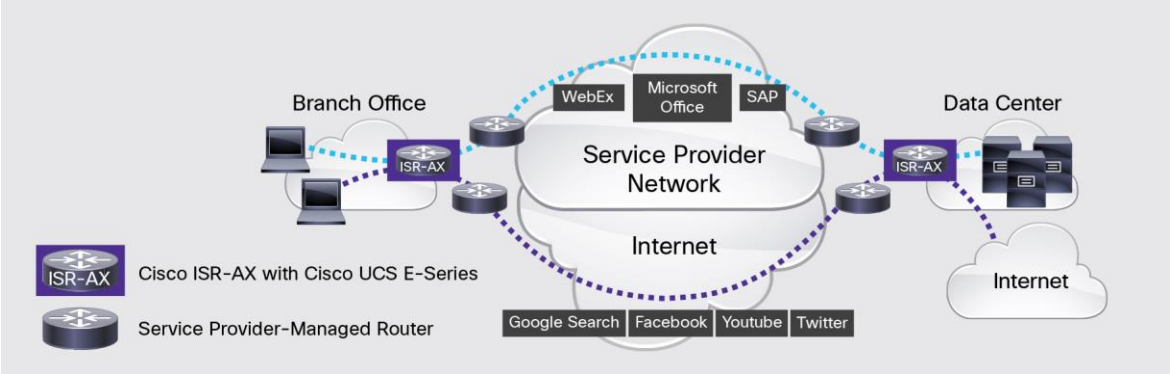
The newest and highest-performance platforms of the ISR-AX series is the Cisco 4000 Integrated Services Router Family. It introduces a new architecture with unprecedented network, compute, and WAN services, specifically designed to improve the application experience, increase network agility, and help IT quickly respond to changing business requirements and prepare for the Internet of Everything (IoE). The Cisco 4000 provides:

- An architecture designed to efficiently manage rich-media and immersive content transparently
- Appliance-level performance of virtualized services in an integrated design
- Pay-as-you-grow performance and natives services with zero touch
- Advanced application-centric Infrastructure to transparently propagate network configuration without error
- Consistent operations across branch office, edge, and cloud

How to Evolve to an Application-Centric Platform

Cisco Intelligent WAN powered by the Cisco ISR-AX can be added to both the branch office and the central location, working alongside the service provider-managed WAN devices (Figure 1).

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



The ISR-AX 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 Open Systems Interconnection (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 NAT instances 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 ISR-AX has been integrated, the following steps are required to realize the benefits discussed in this document:

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 enable PfR, 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 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.
4. Enable Dynamic Multipoint VPN (DMVPN) to provide secure connectivity for hub-to-spoke or spoke-to-spoke with one easy-to-manage routing domain. For protection against the growing threats at the branch office, enforce centralized IT security policy by enabling Zone-Based Firewall and Sourcefire IDS on the Cisco UCS E-Series. And to secure all traffic using direct Internet access, enable Cisco Cloud Web Security.

Conclusion

Branch offices now need to enable rich application services such as mobile, cloud, video communications, and collaboration applications. The Cisco Intelligent WAN powered by the ISR-AX Series 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 for any connection. It offers enhancements for service virtualization, video-ready capabilities, and operational excellence.

For More Information

For more information about the Cisco Integrated Services Routers, read about the Cisco Intelligent WAN or contact your local Cisco account representative.

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