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The Era of Application Centric Networking

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Why Branch Office Networks Must Change

IDC reports that Android smartphone vendors and Apple shipped a total of 207.6 million units worldwide during 4Q12, up 70.2% from the 122.0 million units shipped during 4Q11. For calendar year 2012, Android and iOS combined for 87.6% of the 722.4 million smartphones shipped worldwide, up from 68.1% of the 494.5 million units shipped during calendar year 2011. IDC further predicts that the expected value of the cloud computing market will increase as much as 130% to $43 billion in 2016.

From the market numbers above, it's clear that not only are applications being accessed on smartphones and hosted in public and private clouds, but business units are demanding and receiving self-service IT delivery. At the Open Networking User Group (ONUG) in Boston hosted by the Lippis Report and Fidelity Investments and attended by over 200 IT business leaders, large financial service firms showed that their Virtual Machine (VM) creation and deletion trend lines are growing exponentially. In short, IT managers are increasingly in the business of delivering the tools needed by business units to deliver their own IT services when and where they need them.

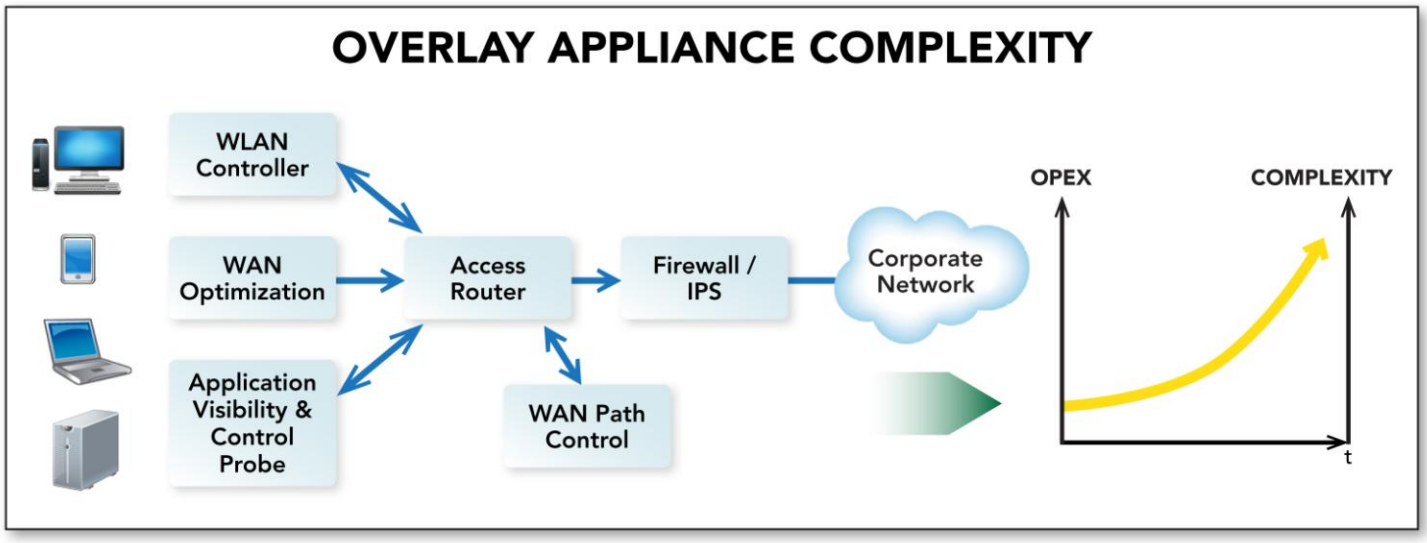
These trends are powerful, and what's startling is that they are in the early stages, meaning that the business of IT application delivery is, and will become, increasingly fluid and dynamic over this business cycle. This poses a challenge to network designers and planners as the rulebook they have referenced for the better part of a decade has become antiquated.

The Overlay Problem

As the IT industry moves to cloud and mobile computing, applications are moving further away from users. To maintain acceptable application performance, IT leaders were forced to deploy new levels of complexity in their branch office with multiple overlay networks; overlays that delivered network security, wide area network (WAN) optimization, wireless LAN (WLAN) controllers for bring-your-own-device (BYOD), voicemail applications, storage, servers and application delivery controllers or load balancing. But these overlays are expensive and add complexity, which drives up operational cost and worst of all, have not kept pace with the velocity of change in IT application delivery. As the number of overlays increase, so does IT complexity and its associated operational cost. This complexity is multiplied in branch office networking as each branch is equipped with a separate overlay requiring floor footprint, power, maintenance agreements, management interfaces, troubleshooting procedures and vendor management.

The systemic and paradoxical implication of this fundamental change in computing and applications is that corporations' users are experiencing slower application performance. From a network manager's point of view, application traffic patterns have changed as applications are hosted locally and in public plus private clouds. Clearly traffic pattern change will only accelerate. As a result, network operations are increasingly losing visibility into applications as they move further away from enterprise IT. This makes managing WAN bandwidth difficult to impossible to predict. This is a major transition network engineers are going through as the root cause of this IT shift is only starting, thanks to self-service IT expectations at the executive, business unit and employee level.

Historically, network engineers addressed poor application performance by adding bandwidth, but that's no longer the answer in modern corporate IT. For example, remote display protocol (RDP) is latency sensitive; therefore, adding more bandwidth will only partially allow the number of virtual desktop infrastructure (VDI) sessions to scale up. For example, a single VDI user may require 100Kbps to 500 Kbps of WAN capacity; therefore, 10 VDI sessions in a

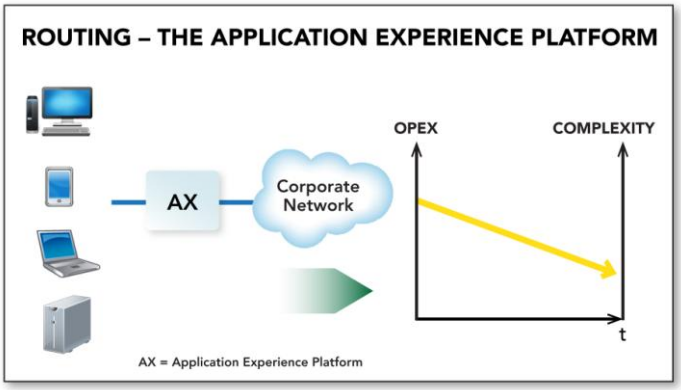


branch office may require 1 to 5Mbps of WAN bandwidth. WAN optimization can reduce this WAN bandwidth need by at least half. Adding more bandwidth in the wide area to increase application performance for applications hosted in public cloud facilities will do little if IT is backhauling all internet destined traffic over the corporate WAN. In addition, adding more WAN bandwidth to support certain applications will be ineffective without visibility and control so that non-critical applications don't consume this additional bandwidth. In short, just adding bandwidth does not necessarily increase application performance.

New Role for Networking: The Application Delivery Platform

IT managers, corporate executives and business unit managers who collaborate and work closely together to solve application performance problems realize that the network is a fundamental strategic IT asset to deliver business value. In a recent survey, when IT executives were asked about the leading causes responsible for slowing down a new application rollout over the past year, budget was cited as the number one reason (34%). Yet another 26% claimed data center infrastructure readiness, cloud readiness and network limitations, such as bandwidth, are slowing down application rollout.

To mitigate the readiness issue raised above, there needs to be a new, simpler model of building networks to support, optimize and secure applications. In short, the role of routing needs to be redefined! In the branch office network market, Cisco Systems leads in terms of market share and network services with its ISR G2 platform having over six million deployments. Cisco offers a view into how branch office routing can deliver optimal application experiences by expanding routing as a platform for application visibility and control, security and application optimization networking. The router is now the application delivery platform, which extends these services systemically across an enterprise by the sheer fact that the network, by definition, supports and sees every corporate application. Also overlays start to disappear as the networking model is implemented.

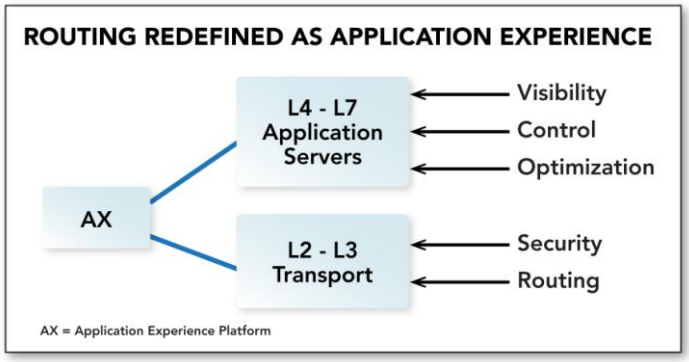


Routing as the application experience platform offers a change in network design away from simply scaling bandwidth and building overlays to increase application performance toward applications being able to take advantage, exploit, utilize, etc., WAN resources to deliver optimized user experiences. In this new network design model for branch office networking, overlays go away, IT operations are simpler—thanks to application visibility and control—network security is virtualized and integrated, and most importantly, applications are optimized. Further, routing borders LAN and WAN, thus has optimal application portfolio visibility—that is, where applications are hosted, what type of devices are being used to consume them, that state of WAN bandwidth resource, etc. It's this unique place in the IT value chain that enables routing to apply intelligence to optimize application performance.

The AX (Application Experience): One Network with Unified Services

To deliver on the above, Cisco is introducing an application-centric routing platform in the Integrated Services Routers or ISR-AX and Aggregated Services Routers or ASR 1000-AX as part of its Enterprise Networks Architecture. The Cisco Application Experience (AX) delivers data center and cloud applications with high performance and security to users anywhere. It provides granular application visibility, control and optimization, helping IT managers enhance end-user experience, lower WAN bandwidth costs and simplify IT.

The Cisco ASR 1000-AX is an application services platform optimized for secure WAN aggregation at Internet edge, data center and campus environments. The ISR-AX is a modular platform with advanced routing capabilities, along with its industry-leading security services of virtualized private network (VPN) and firewall/intrusion prevention system (IPS), plus application services, including its application visibility and control (AVC) and wide area application services (WAAS). In the area of application visibility, control and optimization, AX is equipped with application aware monitoring via NBAR2 or Next Generation Network based Application Recognition and embedded performance monitoring for data applications, voice and video, WAN Path



Controller via Performance Routing (PfR), WAN optimization via WAAS, application hosting and application survivability. AX promises to provide network engineers, architects and designers a solution to deliver application-centric networking to address a number of IT challenges as they journey towards cloud computing, BYOD and virtualization.

Cisco's offering is the ISR 4451-AX, 3900-AX, 2900-AX, 1900-AX, and 800-AX for the branch and ASR 1000-AX for the Internet edge, campus and data center. In addition to the unified services being integrated into the routers, Cisco is pricing this solution at 20 to 35% below a single stand-alone/overlay service, such as WAN Optimization, while providing comprehensive application level services on top of routing and security. The following are a few examples of how the AX is delivering as an application-centric routing platform.

Application Performance: Cisco has been working with companies such as SAP, Microsoft, Citrix and many others to understand their application signatures and protocols so that its routers can automate the recognition and acceleration of these applications. In some cases, such as SAP and Microsoft Office 365, this work has resulted in the reduction of bandwidth between 50 and 70 percent. Cisco's collaboration with Citrix has resulted in optimizing VDI sessions so that twice as many can run over the same WAN bandwidth with better user experience. These and other applications are able to run more efficiently, consuming less network, compute and storage resources while improving user experience.

SAP	Citrix Ready	Microsoft Office 365
50-70% Bandwidth Reduction	2x Number of Citrix Users in the Branch Office	Faster Document Browsing 70% Bandwidth Reduction

Cisco is the only SAP and Citrix certified router, placing them in a unique position. Cisco worked with Citrix to accelerate VDI traffic and now supports multi-stream ICA (Independent Computing Architecture) so that voice and data traffic can be differentiated and optimized as needed, for example.

Application Signatures: Thanks to the AX's unified services of application-level visibility control optimization and security, it is able to optimize application delivery and run business applications faster. Cisco is enabling any type of application signature to be updated to its routers without the requirement of an IOS upgrade, which will dramatically speed up the process of building an application signature library within its routers. What's important about application signatures in routers is that once a router recognizes an application signature, it can then apply services to it, such as optimization, prioritization, etc. If IT requires recognizing and prioritizing certain applications, even if they are customized, that can now be done by IT to monitor critical applications and engineer their performance. Over 1,000 application signatures populate the library.

Flexible IT Self-Service Delivery: Faster and efficient applications delivery offers both user experience benefits plus enables migration acceleration to cloud, VDI and BYOD. For example, AX enables IT provisioning, such as in the event of an application move to public, private or virtual private cloud. Visibility and control offers network engineers with predictive tools to application behavior so that self-service provisioning can occur at scale with optimized user experience.

Application Visibility within WLANs: One consequence of BYOD is that application load on wireless networks is heavy and mixed, meaning that personal and business applications are consumed. AX routers have the ability to recognize encrypted wireless traffic and still are able to perform deep inspection to provide network engineers application visibility so that applications can be optimized for business, if required.

Probe-Less Network Visibility and Monitoring: From a network management and topology point of view, AVC is a probe-less collector and distributor of application performance statistics and data, delivering deep troubleshooting tools so that network operations can address issues of application performance concern, prioritization, entire network monitoring and even determining if WAN optimization investment is delivering the desired return.

In addition to the above, Cisco continues to simplify network management by automating more network tasks to alleviate manual operations. For example, a zero-touch deployment for its WAAS service in the ISR-AX simplifies operations and reduces time to enablement to within few minutes. These examples are but a sample of what is available on the AX and what will be coming from Cisco. Cisco recently re-organized to innovate and add new capabilities to this effort. The application level services (the WAAS group), Routing and Security teams have organized to drive application level services into core networking, showing that these new unified services software capabilities are a fundamental area of investment for Cisco to support customers as their networks are transitioning and transforming.

Competitive Positioning

From a competitive point of view, Cisco is unique in its holistic approach to application performance to ensure application delivery meets user expectations. Cisco's approach to optimizing application delivery with its unified services is hard to compare with other networking firms such

as Juniper, Riverbed, F5, HP Networking, etc., as these firms offer point solutions primarily through appliance overlays.

As the AX routers are, in essence, virtualizing application delivery, there is an operational, facilities and capital expense dividend. Operational cost represents staff plus management software; facilities cost represents rent footprint plus wide area networking cost; and capital expense represents equipment cost. Consider a 25-branch office network that requires routing, security, WAN optimization and visibility. By just considering capital acquisition plus hardware and software support, a 25-branch office network equipped with an ISR 2911-AX and local T1 connection would cost an estimated $114K, inclusive yet including optimized application delivery via its unified services stack. Thanks to the WAN optimization service integrated into the ISR-AX and projected traffic load, local T1 connections can be extended, avoiding the cost of a bonded T1 or 10Mbs upgrade. The ROI is estimated at six months. In addition, when comparing the ISR-AX to a similar branch office solution from Juniper plus Riverbed, the ISR-AX network is some 80% lower in capital expense plus three years of support.

Summary

The AX is delivering IT simplicity and addressing the critical problem of application delivery, which enables a productive business environment. The network is the most efficient control point in IT infrastructure to deliver applications effectively. Those who have deployed AX claim between 50 to 70% performance improvement. AX is also driving business operational efficiency, enabling faster applications deployment and self-service IT. Once applications are deployed, those using AX claim that its application visibility and control affords over 50% bandwidth and latency reduction for certain application and hosting models.

With full visibility, control and optimization of wired and wireless networks, network operations are simplified. As AX has a universal view of applications flowing over wired and wireless network and the control to optimize applications, IT operations can exit from the business of manual tweaks and configuration to more strategic roles of supporting their business units.

About Nick Lippis

Nicholas J. Lippis III is a world-renowned authority on advanced IP networks, communications and their benefits to business objectives. He is the publisher of *the Lippis Report*, a resource for network and IT business decision makers to which over 35,000 executive IT business leaders subscribe. Its Lippis Report podcasts have been downloaded over 200,000 times; ITunes reports that listeners also download the *Wall Street Journal*'s Money Matters, *Business Week*'s Climbing the Ladder, *The Economist* and *The Harvard Business Review*'s IdeaCast. He is also the co-founder and conference chair of the Open Networking User Group, which sponsors a bi-annual meeting of over 200 IT business leaders of large enterprises. Mr. Lippis is currently working with clients to design their private and public virtualized data center cloud computing network architectures with open networking technologies to reap maximum business value and outcome.

He has advised numerous Global 2000 firms on network architecture, design, implementation, vendor selection and budgeting, with clients including Barclays Bank, Eastman Kodak Company, Federal Deposit Insurance Corporation (FDIC), Hughes Aerospace, Liberty Mutual, Schering-Plough, Camp Dresser McKee, the state of Alaska, Microsoft, Kaiser Permanente, Sprint, Worldcom, Cisco Systems, Hewlett Packet, IBM, Avaya and many others. He works exclusively with CIOs and their direct reports. Mr. Lippis possesses a unique perspective of market forces and trends occurring within the computer networking industry derived from his experience with both supply- and demand-side clients.

Mr. Lippis received the prestigious Boston University College of Engineering Alumni award for advancing the profession. He has been named one of the top 40 most powerful and influential people in the networking industry by *Network World*. *TechTarget*, an industry on-line publication, has named him a network design guru while *Network Computing Magazine* has called him a star IT guru.

Mr. Lippis founded Strategic Networks Consulting, Inc., a well-respected and influential computer networking industry-consulting concern, which was purchased by Softbank/Ziff-Davis in 1996. He is a frequent keynote speaker at industry events and is widely quoted in the business and industry press. He serves on the Dean of Boston University's College of Engineering Board of Advisors as well as many start-up venture firms' advisory boards. He delivered the commencement speech to Boston University College of Engineering graduates in 2007. Mr. Lippis received his Bachelor of Science in Electrical Engineering and his Master of Science in Systems Engineering from Boston University. His Masters' thesis work included selected technical courses and advisors from Massachusetts Institute of Technology on optical communications and computing.