



Borderless Network Access

A Simplified Approach To Information Technology Access

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Abstract

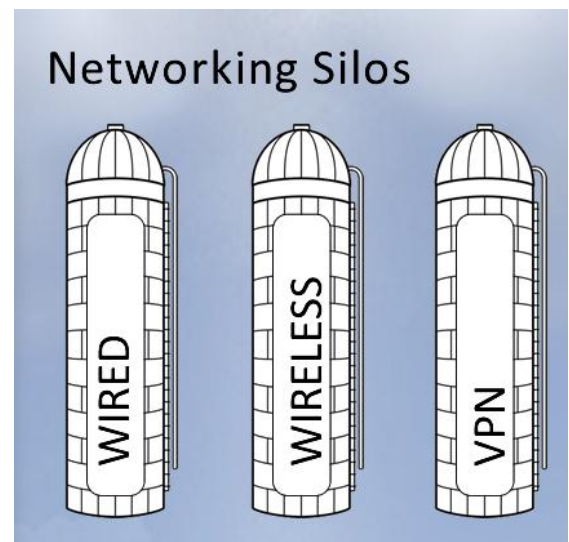
Network access has evolved rapidly as IT business leaders have embraced new network technology. Access methods such as wired, Wireless Local Area Networks or WLANs, and mobile plus Virtual Private Network (VPN) methods have flushed over the past business cycle. In addition, a plethora of new endpoint devices have emerged using multiple access methods. But all of these network access approaches have evolved at different rates resulting in siloed networks that do not interact with each other, thus increasing IT operational cost and decreasing application portability flexibility with user experience suffering. In this paper we offer a new unified approach to network access that is based upon a thoughtful five-phase method to enable IT business leaders to simplify management, increase user experience and decrease operational cost.

Traditional Network Access: Fragmented

As each new wave of computing entered corporate information technology departments, a new set of networking requirements arose. To connect remote 3270 terminals via SNA to mainframes, IT implemented an analog multipoint wide area network or WAN. To connect remote ANSI terminals to minicomputers, IT departments implemented pools of dial-up modems and private line WANs. To connect personal computers (PCs) via Client-Server computing IT departments implemented Local Area Networks or LANs via LAN switches, which we now call wired connections. To connect multiprotocol LANs over the corporate WAN, IT departments' implemented routed networks. To gain access to LAN based applications while remote, IT departments' implemented Virtual Private Networks or VPNs. And as computing and applications go mobile, IT has been implementing Wireless Local Area Networks or WLANs. In short, each network was deployed to service a certain computing style and application set. These networks are silos, and with advances in technology, IT business leaders can now design one borderless network to provide a broad array of access methods to support a plethora of endpoints and applications.

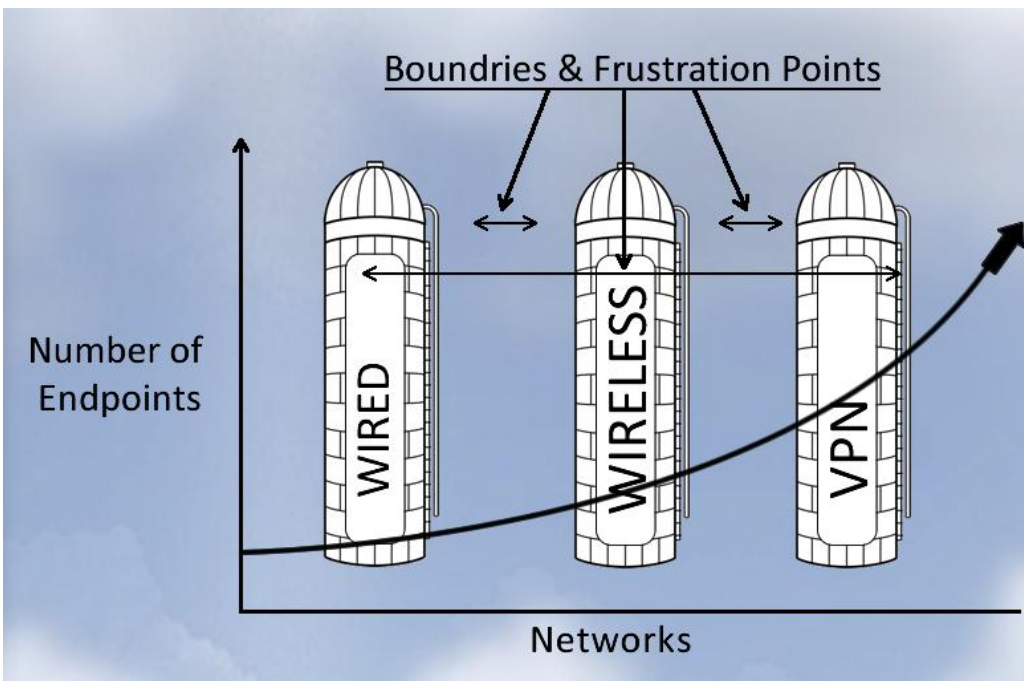
Computing Style	Connection Requirement	Implementation
Mainframe	Remote 3270 terminals	SNA, Multipoint WAN
Minicomputer	Remote ANSI terminals	Modem pools + private line WANs
Client-Server	PCs	Wired Switched LANs
All of the above + Internet	Remote PCs	VPN
All of the above + Internet	Laptops, smartphones, etc	WLAN

Siloed networking frustrates users as each access network performs differently depending upon its access method. Siloed networking also frustrates IT, as each siloed network has its own management system creating inefficient IT operations. In addition, siloed networking does not meet today's IT "any access" requirements. The old way of network access thinking is to implement Ethernet switching, WLANs and VPNs in isolation versus holistically. It is applications that drive networks. In today's modern IT world, applications are being extended over multiple networks e.g., wired, wireless and remote, where users need to shift their application access back and forth between these different network access methods and expect the same or consistent experience. In short, networks need to be borderless so that applications can be accessed independent upon wired, wireless



or VPN entry point and IT operations efficient. And this “any access” trend is accelerating as IT business leaders seek to connect not only traditional desktops and laptops, but smartphones, notebooks, tablets, ipads, cameras and building controls systems into a common general purpose network that support multiple logical network topologies.

Network Access Trends: More Endpoints & Access Methods



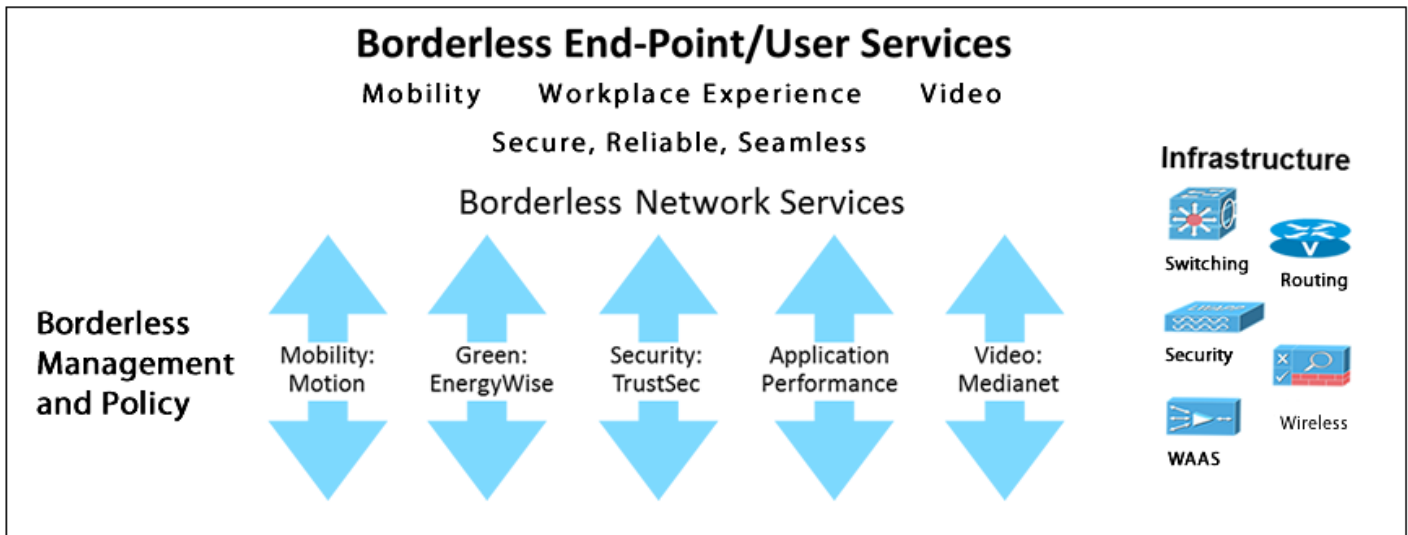
Crossing purpose-built silos is difficult for applications as bandwidth and quality of service issues limit application portability thus their usefulness. These different access methods offer limited consistency resulting in user frustration when they shift application access from desktop to mobile smartphone to VPN and back again. This shifting of application access between different networks and endpoints is only going

to increase. Apple sold over 3.3 million iPads in its first 3 months; the highest uptake of any endpoint device. Google activates 100,000 Android based phones a day. Cisco recently announced its CIUS android-based table for business use with tight links to its unified communications (UC) and videoconference systems. Every major UC provider will be offering similar devices while traditional computer vendors serve up android-based tablets over the next few quarters. The iPad and Android tablet is a new tier of computing which will drive users to access their applications over mobile and wireless networks in addition to their desktop and VPN networks.

If IT business leaders are unable to get ahead of this curve and think of network access from an architected and unified design point of view, than unfortunately, their users and IT cost will be more frustrated and expensive, respectively, than others. Siloed networks are friction points as they create boundaries between network access types degrading user experience, which results in decreased productivity and increased IT operational cost for wired, wireless and VPN networks. The result is a high total cost of ownership and less than optimal user experience, and thus decreased corporate productivity.

From a design point of view, borderless network access requires three core attributes: 1) reliability, 2) end-end

security and 3) seamlessness. For example, Cisco's borderless network architecture is built upon five pillars: 1) mobility or users in motion, 2) Energy efficiency called EnergyWise, 3) integrated network security via its TrustSec architecture, 4) application performance or Application Velocity and 5) video management, control and distribution via its MediaNet. These borderless network services are built within switching, routing, security, wireless and wide area application services or WAAS infrastructure products. It's the integration of these services into existing network infrastructure and their control via policy and management that enable a borderless experience to occur.

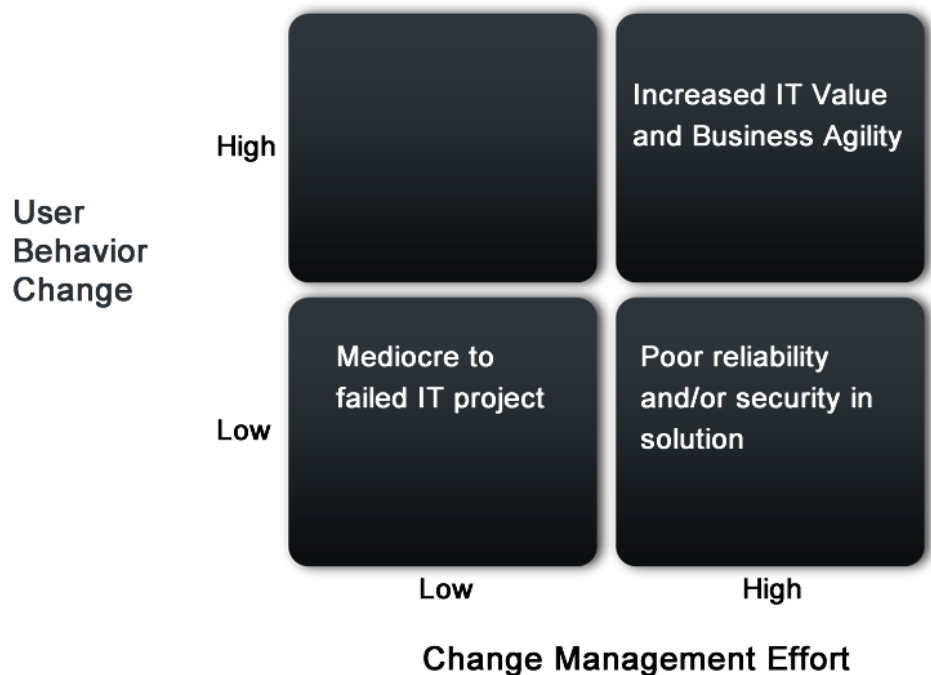


All of these borderless services contribute to a borderless user experience. For example, consider MediaNet and video communications. A MediaNet enabled LAN switch will manage multicast video and buffers to assure a good video experience, while MediaNet enabled on a WLAN access point manages video streams and the ability to multicast in a wireless environment. The borderless mobility service includes client software that increases bandwidth for 802.11b and 802.11g clients when connected to an 802.11n network, for example. In short, a borderless network eliminates the silos of network access by allowing the network to be aware of access methods, the applications that traverse it and endpoint capabilities that it connects, adding value by improving user experience.

From a reliability point of view, wired, wireless and VPN access require telephone quality reliability or 99.99% up time that is also endpoint independent. Users rely upon their access methods only when they are reliable. Reliability is tightly linked to user behavior. If a service is repeatedly reliable then users will change their behavior by utilizing the service. Changing user behavior is the key to successful IT projects. When technology is unreliable, the opposite is also true.

Borderless network access reliability, security and seamlessness come together to aid IT business leaders to change user behavior. For example, the IT business leaders we have worked with express that often under funded aspect of IT projects is “change management”; meaning educating users on new systems so they change behavior and utilize a new IT service yielding investment value. Automated borderless network access facilitates change management by freeing up IT staff so they can train users on new systems. In short, IT can take on the role of educator, hosting seminars and training sessions to assure users are comfortable and adopting the new technology. The payback is huge as users “good” experience rise, their behavior changes, increasing IT project value. Without behavior change, investment value drops and ultimately the IT project becomes mediocre and/or doomed to fail.

From a borderless network access perspective, seamlessness is the intelligence that automates and configures infrastructure devices to enable zero touch deployments of LAN switches, wireless APs and VPN networks. In addition, seamlessness is also gained via auto configuration of borderless services such as EnergyWise and MediaNet etc. These borderless technologies free up IT’s time to focus on “change management” and thus reap investment value and corporate profitability. In this paper we focus on an approach to Borderless Network Access as it pertains to a new unified method of enterprise network application admission.



An Architected Approach to Simplify Network Access

Network architecture is a bridge between business strategy and network evolution. Feeding architecture definition is business strategy; that is changes in business, such as growth, decline, mergers, acquisitions, new business processes, increase productivity edicts etc. These business imperatives are translated into a set of network requirements such as borderless networking, high security, faster application performance, unify and simplify network access, higher speed WLANs, increased network support of video conferencing and collaboration applications, cloud computing ready etc. Network requirements are used to develop a blueprint

or framework for what the network will look like and its associated attributes over the next three-to-five year period. This blueprint is the network architecture. As business requirements are gathered simultaneously, an inventory and audit of the existing network is conducted, resulting in a gap analysis. The gap analysis highlights the difference between the existing network and the new architected borderless network. Invariably, there is a large gap that needs to be closed. To close the gap between existing and new architecture, a network evolution plan is created, which is usually implemented in a phased deployment.

Above, we discussed Borderless Network Access as the means to integrate or unify network access methods into one. Next, we show you how. The following is a list of eight typical network access requirements that should be considered as IT business leaders design their corporate borderless network architecture.

Borderless Network Access Requirements

- 1) Access policies for endpoints and users:** Access policy is concerned with user and endpoint identity and what IT resources are available to them over the network. This is particularly important as consumerization has taken hold in corporations where employees buy and bring their own endpoints to work, wishing to connect to the corporate network and conduct business. In addition to employees, guests, contractors, suppliers, partners, etc also have needs to connect to the network and gain access to IT resources. The borderless network architecture should support constant access policy across wired, wireless and VPN networks for both users and endpoints.
- 2) End-to-end security:** Security needs to be systemic and embedded through the borderless access network. Network security technology has evolved to support siloed networks such as WAP for wireless, encrypted tunnels for VPNs and network access control or NAC for wired connections. In a borderless access network, security is a long-term investment to mitigate threats and provide defenses of IT assets. But security administration can be made simpler through centralization of security configuration and alarm monitoring with distribution of change management. Security services need to be implemented on an end-to-end basis that permeates all three-access methods.
- 3) Single plain-of-glass view of network operations:** Today, all three major network access methods have their own network management systems. To reduce operational cost and time of fault identification/resolution seek a single “plain-of-glass” view encompassing borderless network access for configuration, monitoring, fault isolation, etc services.
- 4) IT Support Coverage:** Large facilities often have the luxury of offering IT support while remote users do not. A borderless network access equipped with a single plain-of-glass view allows IT support to be extended across remote sites and continents. Increasing IT support coverage to remote workers, branch office employees and mobile users contributes to increased reliability and user productivity.

5) Regulatory Compliance: With various regulations such as HIPAA, Sarbanes-Oxley, Basel II, presidential directives and executive orders, etc impacting different businesses and government agencies equipping the borderless access network with the tools necessary to report compliance across wired, wireless and VPN, is a huge advantage to assuring corporate compliance during audits.

6) Green considerations: As most corporations have developed green plans to reduce carbon emissions and energy expenditures, the borderless access network is a key contributor to energy efficiency and sustainability. For example, borderless network access enables remote workers to collaborate and participate in business process while at home. Videoconference services embedded in borderless network access through MediaNet avoid travel, and for many, change business process. EnergyWise, which is an energy management, monitoring and control technology, is built within the borderless network access architecture to control both IT and non IT electrical systems energy consumption.

7) Plan for existing and unforeseen requirements: One of the pillars of good architecture is its ability to support existing and yet unforeseen requirements. One of the largest IT trends today is the increase use of mobile and cloud computing, which promises to change IT delivery. The borderless network architecture needs to be flexible enough to scale in its support for future growth in terms of business expansion, mobility and cloud computing.

8) Economic efficiency: Invariably, nearly every IT initiative will have to be cost justified in terms of return on investment, and at times, productivity gains. Borderless network access will be no different. Its economic efficiency will be found in lower capital and operational dollars when compared to the traditional siloed approach of network access. A total cost of ownership or TCO analysis will bear out its economic advantages.

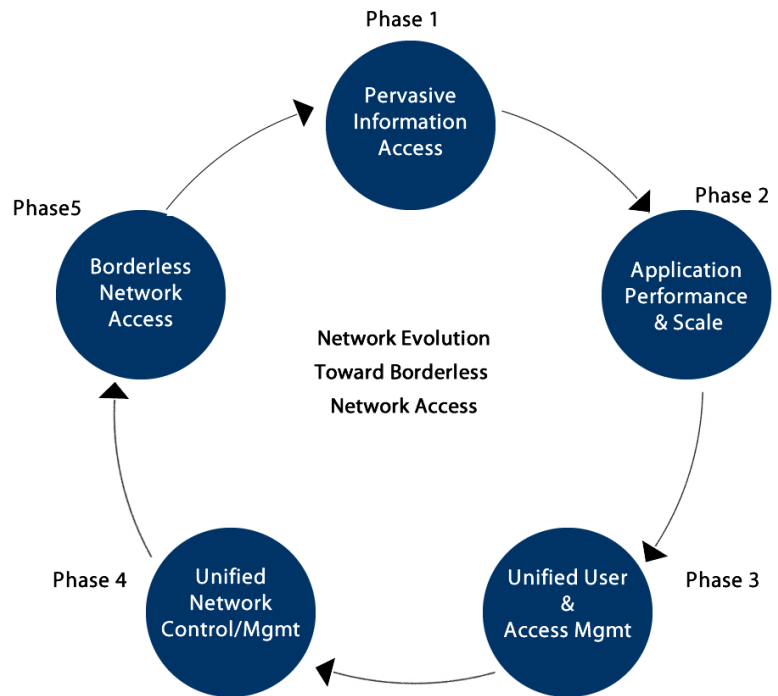
The above eight requirements should be used by IT departments to consider, debate, add and eliminate requirements that address their unique business strategy and drivers. In the next section, we'll take these borderless network access requirements and develop a five-phase network evolution plan, highlighting its associated business value attributes.

Five Phase Network Evolution Plan

Network evolution details how to change the network to realize business imperatives. The sheer fact of having a network evolution plan offers value to all stakeholders. IT executives gain improved TCO over the life of the network architecture as investments made today will be consistent with investments made tomorrow. In essence, the evolution plan is a journey, and as the evolution plan is funded and put in place over time, it delivers back incremental value, which is far greater than the "rip and replace" process so many IT executives undergo. In addition, service deployment is simplified as IT personally gain deployment experience which builds over time, hastening new rollouts.

For users, if IT includes network evolution as it engages change management through seminars, training etc from the start, then users know how the network will change over time and the new services they may expect. This tends to shorten user learning curves to utilize new capabilities and reinforce good behavior changes. The result is often, continued good user experience, plus productivity. For executive management, their business is more agile being able to react and respond to new opportunities, threats, and exploiting strengths while mitigating weaknesses through IT.

To realize the above stakeholder benefits, a five-phase borderless network access evolution plan is recommended. The following five-phase evolution plan may be implemented with all three-access technologies i.e., wired, wireless and VPN, simultaneously. Consequently, if a firm’s network access is dominant with one access technology while slowly implementing another, the following five-phase plan may also be implemented on an access technology basis, returning to a particular phase when new network access technology is required. In short, the five phase plan does not need to be



implemented sequentially, meaning that phase one does not need to be fully completed before starting phase two. But at any given phase, IT is advised to consider all three-access technologies and how they would be implemented in the borderless network access plan. For example, if IT is not considering wireless and VPN while implementing wired access, then IT runs the risk of making shortsighted decisions, which will cost more down the road.

The following is a five-phase evolution plan to borderless network access:

Phase 1: Pervasive Information Access: Phase one is the implementation of geographically independent network connectivity, enabled by reliable wired, wireless and secures remote network access solutions. An assessment of different types of access technologies already in place, where they are utilized and by what job function should be completed in the gap analysis. Phase one is the closing of access gaps by deployment of pervasive information access technologies needed by the organization in a widely deployed manner be it

wired, wireless or VPN. It may very well be that an organization does not need to offer each employee all three-access technologies, but it should know which employees require what access technology. Some may need all three while others may need one or two. Teleworkers for instance may only require VPN, while office workers require wired and wireless. Future shifts in where work is done should be considered too, as mobile/wireless computing will undoubtedly increase, as are teleworker trends.

At the heart of phase one is the ability for people (employees, guests, teleworkers, contractors) to have access to each other, appropriate information and tools, so that business process can move quickly throughout an organization. The lack of phase one is lost productivity and business efficiency, thanks to unsecured and/or reliable methods to connect devices, people and information. In short, phase one starts the dismantling of boundaries between network access silos by viewing all access technologies during planning and implementation.

Phase 2: Application Performance and Scale: With access connectivity provided to employees, IT can focus attention upon application performance and scale, with improved user experience being the goal. Enhancing the ability of the access network to support the growth and diversity in applications to enable a rich end user experience, is the result of phase two. The value of borderless network access is that the network contains embedded services, tools and control knobs IT can use to optimize application performance across access technologies. For example, Cisco offers a range of technologies that are built so that when IT engages three, four, five or six services, they scale together, assuring an application performance scales up, independent of network access method. For example, multicast on Catalyst switches scales a video experience corporate wide. Cisco VideoStream extends wired video experience to wireless networks. Cisco AnyConnect simplifies participating in video experience and other collaboration applications while away from the office. Phase two focuses upon scaling applications with a performance dimension that is acceptable and productive for users across different access methods.

Without phase two, IT organizations will realize inconsistent user experience, resulting from the inability to deliver a seamless application experience across access networks. The result is often reduced use, productivity and value.

Phase 3: Unified User and Access Management: Phase three focuses upon IT efficiency gained by unified network access management. For example, the convergence of networking, user and policy management to provide simplified and consistent provisioning, management, monitoring and troubleshooting of user access methods improves user experience and simplifies IT operations. A single plane-of-glass is the goal of phase three where IT operations can manage, optimize, troubleshoot wired, wireless and VPN access from a single application and computer. The user gains consistent network access process and policy that enable users to connect to each other, information and data needed, to move business process quickly around the organization.

IT organizations will gain reduced operational cost by avoiding network silos and their current disparate ways to provisioning, managing and troubleshoot access networks and users. In addition, IT gains automation and configuration efficiencies to free up IT staff for change management tasks.

Phase 4: Unified Network Control/Management: Over time, vendors will offer network infrastructure that supports all three access methods including wired, wireless and VPN with unified network control and management. Phase four is the streamlining of access network infrastructure for rapid deployment and sharing of multiple services such as video, location, security, etc across access networks. With a unified network control point, IT operations can define user policy across previous boundaries as well as new services such as green, location, identity security, etc. Phase four not only simplifies network access management but also simplifies how consistently IT can invoke new policies, deploy new applications, tools etc., taking action across the network both proactively and reactively.

A unified network control point allows a business to make changes faster of either contracting or expanding business, which is especially important in today's economy. Whether responding to a competitive offering or threat, or expanding into a new growth market, it's how fast an organization is able to translate business decisions into IT service rollouts that dictate outcomes. IT can reduce the time lag between business decision and IT implementation significantly through a unified network control point, allowing business to be more agile and reactive to marketplace dynamics.

Phase 5: Borderless Network Access: Phase five is a realization of borderless network access after progressing through the above four phases. The value proposition realized in phase five is that of elimination of siloed network access for a unified access network, based on a robust network infrastructure, with consistent management and security enforcement to provide geographic, time and application independent connectivity, with lower TCO. Phase five is enabled by the tools provided in phase one that drive productivity in a highly mobile, collaborative, and distributed business environment as the rigidity of network access silos are traded off for a unified and borderless network access delivery model.

Borderless network access is about wildly successful IT programs that make IT the business partner that IT wants to be. Part of IT's value to employees is in what they can visualize. Therefore, when employees see their applications across multiple endpoint platforms, that is a constant reminder of IT's value. Also, when users experience a significantly easier process to log on the VPN, the VPN works better, they consistently have wireless access available for themselves, guest, contractors, partners, suppliers etc., IT's value increases, as does the investment value in borderless network access.

Borderless Network Access Attributes

The attributes associated with borderless network access are that it supports all access methods including wired, wireless and VPN via a unified network access solution. Embedded in borderless network access are application optimization technologies to tune application performance across various access methods to increase user experience, independent upon endpoint. Over time, borderless network access will be packaged in integrated and consolidated hardware that will make deployment and evolution more efficient while contributing to environmental efficiencies or corporate green energy sustainability programs. In the mean time, user access policy and management will be integrated, offering consistent user access and IT operational methods as a single plane-of-glass becomes available. The combination of integrated management control and consolidated hardware promises IT economic efficiency from a capital and operational cost perspective, where cost are contained and reduced, while user experience and corporate productivity are improved.

In addition to the hard value above, borderless network access enables change management, in that end users, particularly non-technical users, enjoy a consistent experience that transcends their smart phone, laptop, desktop and teleworking environment; in short, to wherever they are. As users start changing their behavior, the business starts benefiting from productivity advances. Borderless network access is where all the pieces come together outside of IT to within business process and workflow. Unfortunately, progressing through the five phases takes time and productivity gains are made incrementally until user behavior has shifted to the point where business leaders realize material productivity gains. And this is where the real benefit to the business resides, as well as to IT. When user behavior shifts and productivity gains are realized, IT transcends being a cost center to being a business enabler.

Industry Recommendations

Thought leadership in the form of a model, and approach to consolidate three siloed networks into a consistent architecture, is offered. The Borderless Network Access Requirements can be used and discussed with IT and business leaders, plus a five-phase network evolution model to achieve the value and benefits associated with a borderless access network. Business benefits include, reduced increased operational efficiency, user productivity plus business agility.

To realize the value associated with borderless network access consider the following recommendations:

- 1) Consider cataloging application portfolio, existing endpoint use plus network access methods in place per employee role to perform a gap analysis. Include business imperatives and changes, new endpoint devices, applications and future network access method use cases,

- 2) Consider the eight Borderless Network Access Requirements to understand corporate network access needs, and to close the access gap. To be confident that the best decisions of how precious corporate resources are being deployed with the largest possible return, then IT needs to consider the Borderless Network Access Requirements with the simple question of “do we have a strategy for each requirement?”
- 3) Consider utilizing the five-phase evolution plan to transform a siloed network made up of wired, wireless and VPN into a borderless access network. This requires a debate and discussion among IT to explore a realistic journey for transitioning through the five phases. This process will assure IT business leaders of a holistic review of network access requirements, providing confidence that acquisition criterion and investments are guided by thoughtful analysis to corporate benefit.
- 4) Consider designating a senior IT leader as the borderless networks architecture manager to oversee the above process, work with business and IT leaders and explore professional services organizations to facilitate the above requirements and five phase evolution. Both vendors and their partners are well equipped to conduct such as study and assist in executive management discussions.

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 leaders to which over 35,000 business and IT executive leaders subscribe. Its Lippis Report podcasts have been downloaded over 110,000 times; i-Tunes 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. Mr.

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Mr. Lippis is a long-standing member of the Boston University College of Engineering Leadership Advisor Board. He has advised numerous Global 2000 firms on network architecture, design, implementation, vendor selection and budgeting. Clients include Barclays Bank, Microsoft, Kaiser Permanente, Sprint, Worldcom, Cigital, Cisco Systems, Nortel Networks, Lucent Technologies, 3Com, Avaya, Eastman Kodak Company, Federal Deposit Insurance Corporation (FDIC), Hughes Aerospace, Liberty Mutual, Schering-Plough, Camp Dresser McKee 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.