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The Evolving Branch Office: Intelligently Reducing Your Network Infrastructure Footprint

by Robert Whiteley and Stephanie Balaouras

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by **Robert Whiteley and Stephanie Balaouras**
with Simon Yates and Christine E. Atwood

EXECUTIVE SUMMARY

Enterprises are facing a dilemma: How can they increase services like storage, security, communications, and application services that are available in branch offices while trying to consolidate infrastructure and decrease costs? To date, most firms have deployed numerous point products to solve these woes tactically. But recent technology advancements will streamline infrastructure requirements by consolidating numerous functions — like routing, wireless connectivity, security, application acceleration, IP telephony, IP address management, and remote monitoring — into fewer appliances. So can firms deploy a “branch-office-in-a-box”? No. But depending on the branch profile, firms can intelligently collapse similar services — like security with routing and communications, as well as storage with application acceleration — to reduce the management burden and still offer full-service sites.

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NOTES & RESOURCES

Forrester continuously interviews enterprises to best understand branch office trends. For this report, we also interviewed 10 vendors, including: Avail, Cisco Systems, Expand Networks, Lumeta, Uplogix, and Xceedium.

Related Research Documents

- [“Upgrading Branch Office Networks”](#)
September 1, 2006, Trends
- [“Application Delivery Optimization With Your Network”](#)
June 19, 2006, Best Practices
- [“Enterprises Ask Tape: What Have You Done For Me Lately?”](#)
March 8, 2006, Trends
- [“Remote Offices: Critical Links In Enterprise Architecture”](#)
March 24, 2005, Trends

TARGET AUDIENCE

Enterprise architecture professional, IT operations/engineering professional

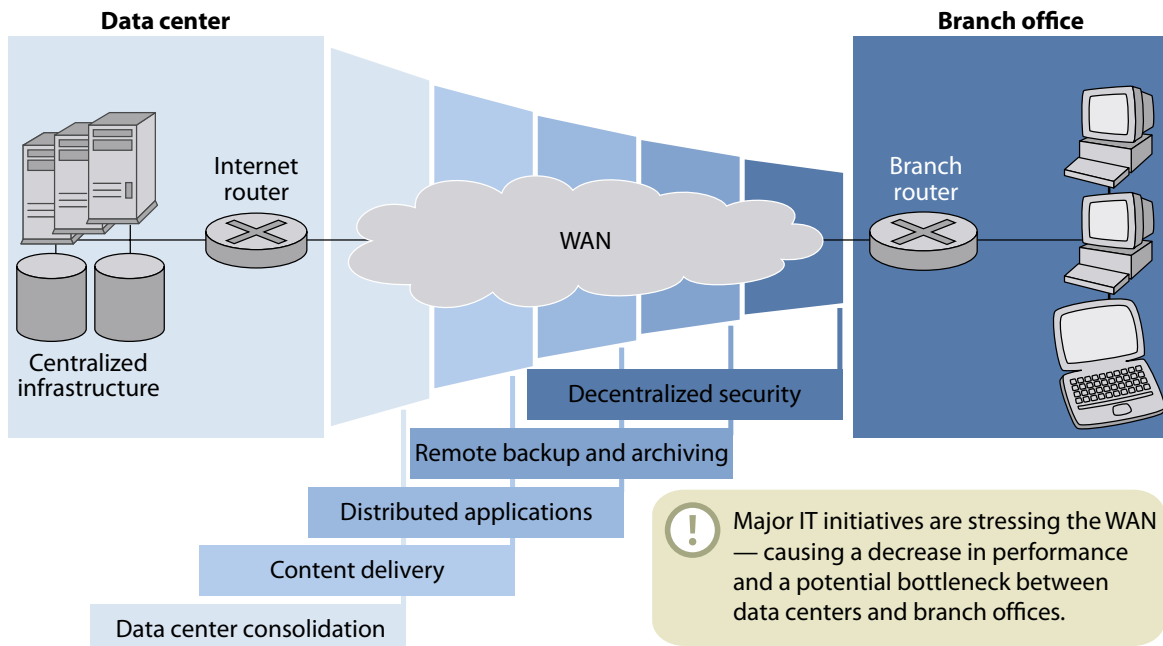
RESEARCH CATALYST

Clients selected this topic for Client Choice research.

INCREASINGLY DISTRIBUTED ENTERPRISES NECESSITATE SOLVING BRANCH OFFICE WOES

Enterprises are taking a fresh look at IT. Today, clients are tackling service-oriented architecture (SOA) and Web services to transform the application middleware. Utility computing and Organic IT are changing the data center hardware landscape. And network access control (NAC) and evolving threat protection have bolstered the data center border.¹ So what's next? The branch office. As the network evolves — with increased requirements for security, bandwidth, and multiservice convergence — remote and branch offices have become a key topic of concern for Forrester's clients. Specifically, Forrester found that the branch network is under siege from (see Figure 1):

Figure 1 Branch Office Networks Are A Potential IT Bottleneck



38904

Source: Forrester Research, Inc.

- **Consolidation of IT and data center infrastructure.** At the heart of branch office re-architecture is the move for IT shops to consolidate storage, computing power, and applications into fewer data centers. In fact, 51% of firms point to infrastructure consolidation as a priority in 2006, and almost one-third of firms have already deployed data center automation tools and server virtualization technologies to help with infrastructure consolidation.² Why? Consolidation provides better economies of scale — leveraging virtualization and Organic IT technologies — to deliver flexible IT infrastructure. For example, a distributed enterprise can choose to remove local copies of SAP running on distributed servers for a single, consolidated SAP server located in the data center. However, this strategy adds a high performance tax on the WAN to support always-on bandwidth for remote offices to reliably connect to consolidated IT assets.
- **Increases to remote security capabilities.** Significantly upgrading the security environment has been a perennial priority for enterprises during the past few years, with 57% of firms telling us that it's a priority for 2006.³ Our clients are indicating a shift from backhauling Internet traffic through a traditional hub-and-spoke WAN to split tunneling, which provides direct Internet connections at each branch location. This requires that companies increase security mechanisms like firewalls, antivirus, content filtering, and intrusion prevention in branch offices. But firms struggle to maintain IT staff and the skill sets to manage the additional complexity.
- **Poorly performing backup and recovery services.** Even for data center storage organizations, backup and recovery is one of the most complex, time-consuming, error-prone, and costly storage operations. Branch office backup and recovery is even more troublesome, requiring the deployment of local software, backup servers, tape, disk, and — most important — experienced staff to manage the process. Forrester has found that clients struggle with little to no insight into whether local branch office backups run regularly or successfully. In addition, most enterprises don't have a disaster recovery strategy for their branch offices. From a data integrity and recovery perspective, branch offices expose the enterprise to enormous risk. Consolidating data storage to the data center reduces not only capital expenses but also the operational expenses associated with local backup and recovery. Additionally, it will have the effect of improving data availability because data will now be protected as part of the data center backup and disaster recovery strategy.
- **Growth in data management and archiving services.** According to Business Technographics® data from May 2006, data archiving is the top storage priority for the year.⁴ Enterprises must archive ever-increasing amounts of data in order to comply with ongoing regulations like Sarbanes-Oxley. This mitigates the costs of legal discovery and is increasingly becoming a corporate best practice. Much like backup and recovery, data archiving requires the deployment of local software, additional disk or tape storage, and staff that can manage this operation, and enterprises have no insight into whether it happens regularly or successfully. Therefore, consolidation not only reduces expenses; it also ensures that this data is managed as part of the data center archiving strategy.

- **Bottlenecks in content delivery and storage.** Low-bandwidth WANs also suffer from an increase in the amount of content that needs to be stored or dynamically streamed to each branch office. Retail firms, for example, want to push video streams for in-store advertising to ensure that customers view the latest ads. Many large, distributed enterprises are increasing collaborative efforts with an offshore partner, which makes even Microsoft file sharing difficult across an international network link. As a result, WAN latency causes crippling performance bottlenecks and forces firms to rely on content caching.
- **Decreases in application performance.** Most applications are developed in a LAN environment. But as firms look to deploy client/server and Web-based versions of apps like Siebel across a WAN, lack of performance becomes a productivity killer. For example, queries that can be performed in a fraction of a second on the LAN often take several minutes across the WAN. In fact, a common inquiry our clients ask is: “Our New York to San Francisco SAP response time stinks. How do we fix it?” The introduction of real-time applications using video and voice over IP (VoIP) will only exacerbate this dilemma.

FIRMS SHOULD LOOK TO CONSOLIDATE BRANCH EQUIPMENT . . .

Enterprises tackle these issues by increasing the sophistication of the branch office networking equipment. By adding more security, storage, acceleration, and connectivity options, firms can provide full-service branch offices. But there's a catch: Sophistication is a synonym for complexity. Retail branches like those in Target's network of thousands of stores run critical point-of-sale apps and may have as many as 10 different “boxes” to provide their networked infrastructure. Companies in other industries like financial services and retail banking suffer a similar fate.

To handle this complexity, firms are clamoring for a sensible way to consolidate infrastructure. But before enterprises can deploy more streamlined branch architectures, they first need to examine the magnitude of this complexity.

Today's Branch Network Landscape Is Peppered With Point Solutions

The ever-increasing complexity is what we refer to as “yet another box” (YAB). YAB is the outcome of solving tactical pains with tactical solutions. You need wireless connectivity for employee productivity? Throw in a wireless access box. How about better file and application performance? Throw in an acceleration box. The cumulative behavior of tactically solving branch issues leads to scores of point solutions in a typical environment. The most common are:

- **Routers, switches, and wireless access points.** The most basic devices you'll find in a branch are those that provide basic connectivity. But we've found that the need to provide wide-area connectivity alone — through options like Frame Relay, multiprotocol label switching (MPLS), direct Internet, and often a backup option like ISDN or satellite — can create a multibox

environment. Add to that the local area connectivity of a 10/100 Ethernet switch and some Wi-Fi infrastructure, and basic connectivity adds up to a fairly complicated foundation.

- **Security devices.** After connectivity, next comes the need to secure those links. At the bare minimum, sites need a firewall and VPN to protect unwanted access. But today's more full-service branches also have gateway antivirus, content filtering, proxies to block branch users from surfing ESPN.com (or worse), and intrusion protection systems (IPSeS) to monitor abnormal behavior. We've already seen successful integration to form an all-in-one security appliance — typically referred to as unified threat management (UTM) — like Juniper Networks' SSG and Cisco Systems' ASA 5500 Series Adaptive Security Appliance.
- **File sharing accelerators.** Secure connectivity is great but often runs too slow to accommodate today's apps. To maximize the measly sub-T1 bandwidth, companies often add an accelerator, turning wide-area file services (WAFS) into a hot topic during the past five years. WAFS appliances specifically improve the performance of file access and sharing over a WAN through techniques such as file system protocol optimization and file caching. They also maintain file integrity, coherence, and consistency — even in the event of WAN disruptions. Riverbed Technology's Steelhead and Packeteer's iShared are often deployed to consolidate general purpose file servers and network attached storage (NAS) in branch offices.
- **WAN optimization appliances.** The sister technology to WAFS is WAN optimization, also referred to as wide-area data services (WADS). These boxes improve application performance delivery over a WAN through techniques such as TCP/IP protocol optimization, data reduction, compression, and application-specific accelerators. WAN optimization appliances can be used to accelerate business applications like email and Siebel and also IT applications like backup and recovery and replication. Today WAFS and WAN optimization are found in a single appliance — from vendors like Riverbed, Juniper, and Blue Coat Systems. But companies that have an older WAFS solution like Cisco's Wide Area Application Engine (WAE) must supplement with yet another box for the optimization from vendors like Citrix Systems, F5 Networks, and Silver Peak Systems.
- **IP communications infrastructure.** IP telephony is finally gaining serious traction, with our latest data showing a crest at 46% of North American firms using IP PBXs and 39% using site-to-site VoIP to communicate among branches, headquarters, and data centers.⁵ But for optimal performance and local survivability, this means putting a remote IP PBX at each remote site, like those included in Avaya's Branch Connect solutions. If you're lucky, this PBX will be SIP-enabled to provide a migration to right-time communications, but often separate applications and servers will be needed to augment legacy infrastructure.⁶
- **Infrastructure and management servers.** Secure acceleration IP connectivity and communications must be managed, but few enterprises can provide local IT support for each location. As a result, end-to-end performance network monitoring; IP address management

(IPAM), which includes domain host configuration protocol (DHCP) and DNS; and remote management capabilities are needed. Network General, Infoblox, and Uplogix solutions, respectively, offer the functionality. Although much of this infrastructure can be found in existing Microsoft servers, Forrester typically finds at least three additional boxes in each branch to extend IT’s eyes, ears, and hands into today’s branch.

Vendors Are Aggressively Building Branch-Office-In-A-Box Solutions

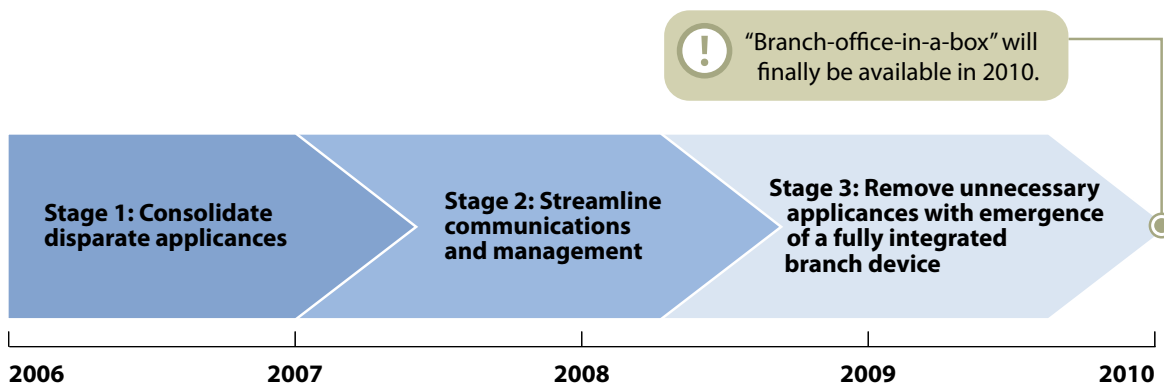
This 10-box complexity is ripe for consolidation. In fact, throughout the industry, there’s been a lot of hype around “branch-office-in-a-box,” glibly referred to as BOB. Although no single appliance covers the full breadth of technologies above, some vendors come close. Cisco, for example, has built its Integrated Services Router (ISR), which combines routing, switching, wireless, security, IP PBX, and soon WAFS and WAN optimization. Other good options include infrastructure from behemoths like Microsoft (with its combined ISA Server) and Tacit Software, as well as from startups like NetDevices with its Unified Services Gateway. All are close, but no BOB yet.

... BUT REALISTICALLY WE DON’T SEE AN ALL-IN-ONE BRANCH SOLUTION

In consolidating your branch office infrastructure, you must consider two things: 1) whether the technology is ready, and 2) whether your organization can handle a fully integrated device. The latter point is critical. In our experience, enterprises are not organized in a manner that can exploit a branch-office-in-a-box. You have WAN and network engineers who need access to the connectivity elements. Security operators need to set policies on threat protection devices. Finally, data center and systems management specialists need their own monitoring and remote management capabilities.

So even with the alluring promise of BOB equipment, firms will have to consolidate branch infrastructure in a multistage process (see Figure 2).

Figure 2 A Three-Stage Consolidation Will Take At Least Four Years



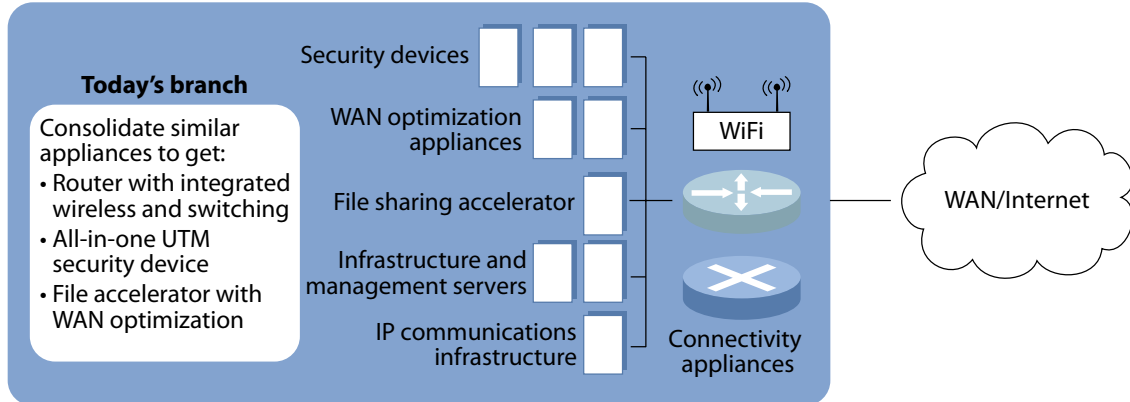
How To Consolidate Branch Infrastructure In A Three-Stage Evolution

Enterprises should expect branch office consolidation — at least if they plan to go all the way to branch-office-in-a-box — to be a four-year engagement. Why? Because in addition to acquiring new, multifunction devices, firms need to: 1) embrace evolving standards like IPv6 and SIP and allow them to mature because they will affect the infrastructure road map, and 2) allow network operations to become more familiar with aspects of communications, security, and monitoring.⁷ From a technology perspective, Forrester recommends the following consolidation plan (see Figure 3):

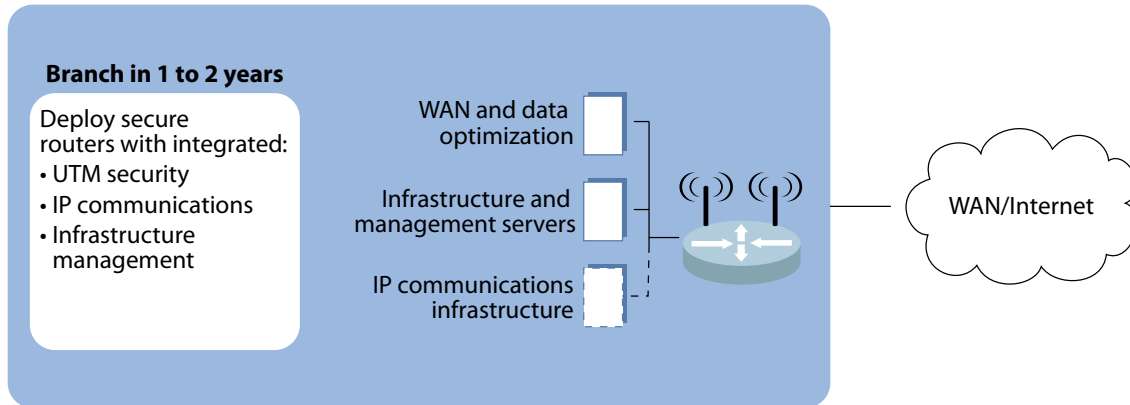
- **Stage 1: Deploy appliances that consolidate similar services.** The first stage focuses on consolidation within similar but disparate devices. To do so, focus on three areas: 1) connectivity; 2) security; and 3) acceleration. Connectivity means combining routing, switching, and Wi-Fi functionality; security means deploying an all-in-one UTM device; and acceleration means combining WAFS and WAN optimization. This will cut down branch infrastructure into five svelte components rather than the original 10 or more.
- **Stage 2: Integrate communications and management infrastructure.** Next, focus on streamlining further by folding the following technology into the next-gen branch router: security, communications, and much of your remote monitoring and management devices. IPv6 and SIP will have matured so that routers — which are already gaining a much-needed horsepower upgrade — will easily handle the combined functionality without performance degradation. Moreover, your average network manager will be well-accustomed to data connectivity, security, and communications, which is a trend that only today's bleeding-edge firms have mastered. Your branch office footprint will now consist of the secure communications router and separate acceleration devices for data and applications. Note that firms that have more aggressively deployed unified communications may have additional SIP application servers.
- **Stage 3: Integrate acceleration technologies.** At this point, the branch will have two basic categories of gear: 1) secure data and communications, and 2) application performance. This logical break may be as far as many firms go because it clearly delineates IT's network from the application group's applications — two factions that are often at odds with each other. However, groups that seek aggressive consolidation will go one step further and combine these two functions, which is the final stage. Although solutions will integrate these two as soon as the fall of 2006, we believe it's at this final stage, starting in two years, where the next generation of secure communications routers will be able to effectively fold in the caching, compression, protocol acceleration, and traffic management tools needed to form this final branch-office-in-a-box solution.

Figure 3 The Three Stages Of Branch Infrastructure Consolidation

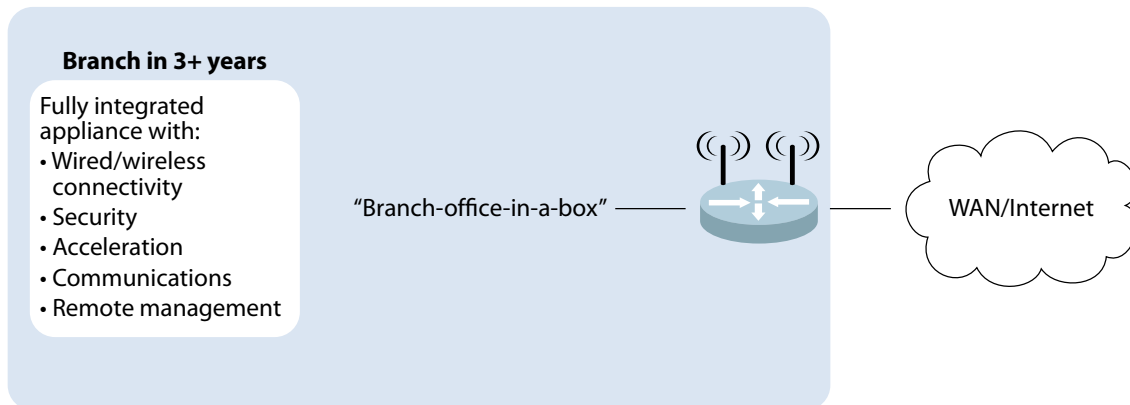
Stage 1: Deploy appliances that consolidate similar services



Stage 2: Integrate communications and management infrastructure



Stage 3: Integrate acceleration technologies



Source: Forrester Research, Inc.

NOT ALL BRANCHES ARE CREATED EQUAL: IDENTIFYING THREE BRANCH PROFILES

Although we've outlined a three-stage consolidation road map, Forrester does not recommend technology advances without the right business drivers. The ultimate goal is to manage branch offices cost-effectively while not compromising end user productivity or site availability. The optimal branch office solution depends on how the enterprise conducts its business. Completely consolidated branch office IT infrastructure does not make sense for all enterprises. For this report, Forrester categorizes enterprises into three branch profiles:

- **Enterprises with collaborative branches.** Collaborative branches rely on connectivity to one another for collaboration and to conduct business. They share and exchange information frequently. Examples include industries that share files or use collaborative CAD applications such as design and engineering firms. These enterprises are most interested in WAFS because they are exchanging files more often than not, and therefore, file integrity and consistency capabilities are critical to this type of enterprise. In fact, these types of enterprises were the first to adopt WAFS because they actually improve the ability of users to share data effectively. They are less likely to be interested in the application acceleration capabilities of WAN optimization.
- **Enterprises with dependent branches.** Dependent branch offices rely on connectivity to a central site — they exchange information with a central site or sites to conduct business and are very process-driven. Examples include industries such as retail or banking. These enterprises are the most interested in eliminating as much local infrastructure as possible because it not only reduces costs; it also assures the protection and archiving of critical business data as required by regulatory compliance and corporate policy.
- **Enterprises with autonomous branches.** Autonomous branch offices do not require an exchange of information with a central site to conduct business. It's more important that the branch have access to its email and other data — even when communication to the central site or data center is unavailable. Cost savings are less of a driver for this segment. Examples include knowledge- or service-based industries that execute on regional or local projects, such as law firms or consulting firms. These enterprises are less interested in consolidating IT infrastructure but might be interested in WADS/WAFS appliances that can improve the performance of remote backup, replication, and archiving over the WAN to the data center.

Mapping Branch Profiles To The Three Stages Of Consolidation

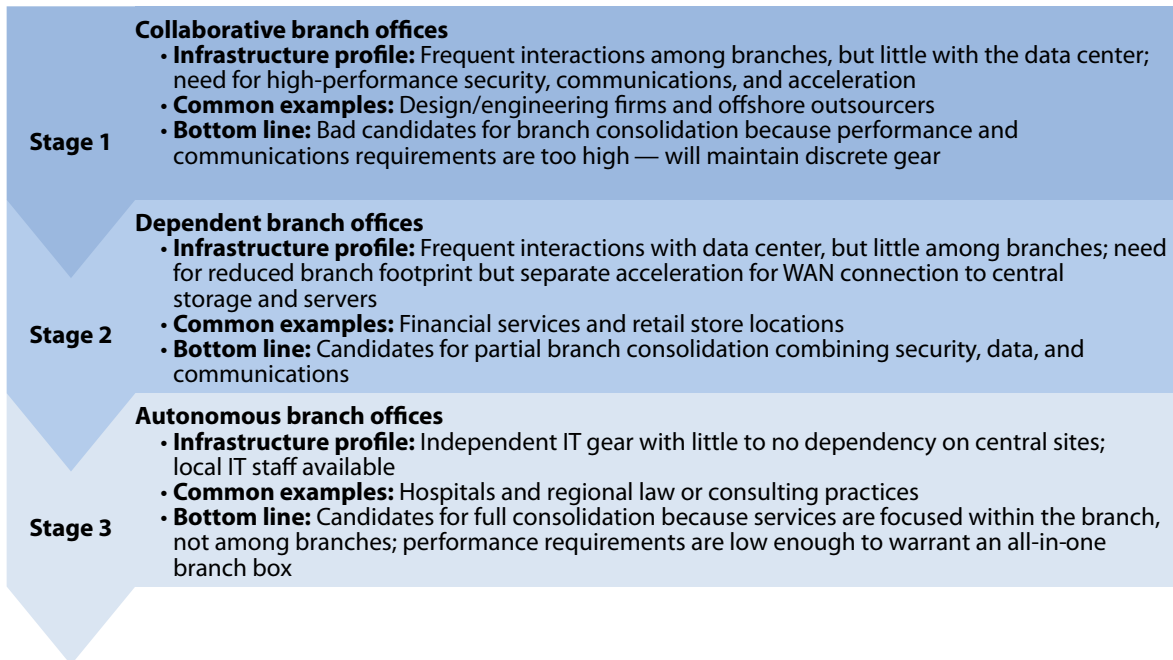
Mapping these branch profiles to the appropriate stages of consolidation will vary widely based on business requirements, budget, and IT aptitude. However, as a guideline based on our interactions with clients, we've found that (see Figure 4):

- **Collaborative sites map to stage 1: little to no consolidation.** Collaborative sites are highly dependent on consistent and frequent interactions with each other but not back to central infrastructure. As a result, the performance requirements for the individual branch components

— security for decentralized Internet access, acceleration for file sharing among offices, and IP communication for intra-site calls and virtual whiteboarding — are too high for a single, consolidated device. Enterprises with this profile should invest in best-of-breed solutions that keep the branch productivity as high as possible.

- **Dependent sites map to stage 2: partial consolidation.** At the polar extreme, dependent sites carry as little local infrastructure as possible and depend on constant, optimized bandwidth back to the data center. As a result, companies can consolidate parts of the infrastructure stack that do require taxing performance: security, communications, and connectivity. Furthermore, IT can centralize local infrastructure and management servers like DHCP and DNS. Ultimately, though, acceleration devices must be kept separate to ensure that the applications and data can be accessed quickly, efficiently, and with high integrity (i.e., not corrupted).
- **Autonomous sites map to stage 3: full consolidation.** The third site profile, by contrast, is neither dependent on a data center nor does it interact with many other locations within the company. As a result, autonomous branches are focused on providing services *within* the site as opposed to *among* sites. This independence puts little tax on the WAN or keeping a highly secure, highly optimized connection. Also, as highlighted above, this profile is less concerned with cost savings, and the enterprise can thus be most aggressive in consolidating the infrastructure in three to four years when it's ready.

Figure 4 Branches Will Map Differently To The Three Phases Of Consolidation



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Source: Forrester Research, Inc.

RECOMMENDATIONS

BEFORE YOU CONSOLIDATE, BUILD A BASELINE TO ASSESS YOUR BRANCH ENVIRONMENT

Before you start to consolidate and optimize your branch architecture, you first must know what applications are running, how many and what kind of assets you have, and the types of services that will be needed for each branch. Before enterprises start the three-stage evolution, they should first:

- **Deploy visibility and monitoring tools.** Before you can consolidate, you must first build a baseline along two dimensions: performance and inventory. To get accurate end-to-end visibility and performance metrics, deploy tools from vendors like NetQoS and Network General that leverage probes and NetFlow/Internet protocol flow information eXport (IPFIX) information to monitor application performance. This will inform you of the type, frequency, and criticality of your branch applications — as well as provide the usual byproduct of identifying rogue applications and users. Supplement this with tools like those from Hewlett-Packard, IBM, and Lumeta, which will give an accurate bottom-up view of assets and topology.
- **Deploy remote management tools.** After building a baseline, implement remote management. As you rely on the router to carry branch services, you'll need an out-of-band solution that can help configure, back up, and reboot the device. Xceedium offers solutions for out-of-band management, as does Avocent with the added support of kilobyte virtual machine (KVM) capability. For more advanced needs, Uplogix takes it one step further with its Envoy product, which provides standardized procedures for OS upgrades and patches, modifying configuration elements, and password updates and recovery — in essence building “best-practices-in-a-box” with scripts that automate branch management tasks.
- **Standardize operations.** The third step is standardizing your processes and operations. The baseline and remote management steps provide a foundation for standard configuration updates (what your infrastructure should look like), application templates (what applications you will provide to each location), and security policies (who can access what resources and when). From this foundation, you can decide which pieces of the infrastructure to reduce and where you can make any performance tradeoffs if necessary. For example, if you find you have a lot of site-to-site VoIP and Common Internet File System CIFS protocol running between your 25 remote sites and your data center, you may choose to adopt a “dependent branch” profile and reduce as necessary.

STEPS TO TAKE IF YOU DON'T WANT TO CHANGE YOUR NETWORK INFRASTRUCTURE

If re-architecting your branch office and consolidating infrastructure doesn't save money, increase productivity, or pave the path to new applications, it may not be worthwhile. However, there are tangential undertakings that can be done locally at each branch to streamline operations:

- **Consolidate servers and storage at the branch.** Many enterprises still deploy far too many generic file and print servers and satisfy application capacity requirements with direct-attached storage (DAS). Eliminate DAS and consolidate file and print servers with NAS. It's much easier to manage and back up a single NAS filer than it is numerous servers and DAS. It also increases capacity usage, thereby reducing future expenditures on generic servers and disk storage.
- **Centralize backups.** Local backup is one of the main culprits driving costs and complexity at branch offices. Today, backup applications provide capabilities to manage and configure distributed backup domains from a central console. In addition, the backups themselves have become very WAN efficient — they back up only changed data and often de-duplicate the data before it's sent; this makes remote backups possible with even limited bandwidth. Enterprises could solve many backup headaches by simply eliminating local backups and the requisite hardware infrastructure in favor of remote backups to a central site.

ENDNOTES

- ¹ Organic IT is Forrester's prediction of the third generation of IT infrastructure architecture that is emerging. See the May 18, 2004, Trends "[Organic IT 2004: Cut IT Costs, Speed Up Business.](#)"
- ² Emerging technologies like server virtualization and automated server patch management are becoming more widely adopted. At the start of 2004, only 22% of IT decision-makers were aware of and very interested in server virtualization. By the middle of 2005, 29% reported that they were using the technology, and another 29% were planning pilots for the next 12 months. See the October 17, 2005, Data Overview "[The State of IT Infrastructure Adoption: Business Technographics North America.](#)"
- ³ We spoke to 700 North American infrastructure and data center decision-makers and asked them, "Which of the following initiatives are likely to be one of your IT organization's major themes for the next 12 months?" We found that 17% and 40% cited "significantly upgrading the security environment" as a critical priority and as a priority, respectively — making it the No. 2 priority overall. We also found that 14% and 40% cited "upgrading disaster recovery capabilities" as a critical priority and as a priority, respectively — making it the No. 3 priority overall. See the October 17, 2005, Data Overview "[The State of IT Infrastructure Adoption: Business Technographics North America.](#)"
- ⁴ Source: Business Technographics May 2006 North American And European Enterprise Infrastructure And Data Center Survey.
- ⁵ We spoke to 475 North American enterprises in our Business Technographics March 2006 North American And European Enterprise Network And Telecommunications Survey. Here we measure "use" as the combination of those that reported that they were "fully deployed or upgrade underway" and "rolling out or partial deployment." For IP PBX technology, 14% and 32% of firms gave those two answers, respectively; site-to-site VoIP received those responses from 16% and 23% of respondents, respectively. See the August 22, 2006, Trends "[The Protracted North American Enterprise Migration To VoIP.](#)"

- ⁶ Today, emerging SIP-based applications deliver advanced capabilities that provide new levels of business connectivity and collaboration. Emerging right-time communication applications leverage IP and SIP to extend collaboration with voice access, resulting in the increased accessibility of knowledge workers to information. See the February 28, 2006, Best Practices “[How To Justify IP Communications Costs](#).”
- ⁷ Make sure your network operations staff is well-versed in multiple disciplines. This means providing training on the rest of the IT stack, permitting attendance to key vendor and industry forums each year, and forcing them to “shadow” the application development and enterprise architects, who solve more strategic infrastructure woes. Most firms will struggle to move network ops away from a 75% reactive, fire-fighting mode but will find operating advanced networks pays off with better manageability, application performance, and fewer end user complaints. See the September 8, 2006, Trends “[Refreshing Enterprise LAN Infrastructure](#).”

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