Branch Modernization

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EXECUTIVE SUMMARY

Branch locations are increasingly important to the success of modern organizations. Branches enable businesses to provide a local "touch point" for customers, business partners, and others—a connection that can be critical in an increasingly virtual and disconnected world.

However, to be successful, branch employees need access to resources that are often only available at the company's headquarters. This might include valuable customer data, line-of-business applications or services, and more.

Your current branch infrastructure may be "distributed," with local, physical servers providing most or all services for branch employees; "centralized," where all services are provided from a centralized datacenter; or a "hybrid" infrastructure, where some services are provided by local branch servers and other services are provided from a central datacenter. However, regardless of your current infrastructure, you can reduce information technology (IT) costs, improve IT service levels, and enable new business scenarios by adopting best practices that will enable you to modernize your branch infrastructure.

These best practices include virtualization, centralized management, and increased network efficiency.

OVERVIEW

For large organizations whose IT infrastructure includes supporting branch offices or sites, ensuring that the branch infrastructure is optimized can be a key factor in organizational success. This paper will help IT professionals understand how to control the costs associated with their branch infrastructure without compromising business agility, and it will provide insight into three best practices for optimizing branch IT infrastructure.

IT PRIORITIES

Most organizations want to maximize the value of their IT investments. This usually means the following:

- ***Getting Value for Money* by Reducing Costs** – Driving operational efficiencies and getting the very most out of IT resources—in other words, maximizing the value of each dollar, euro, or yen spent
- ***Delivering Value* by Improving IT Service Levels** – Ensuring quality IT services across the organization
- ***Adding Value* by Enabling New Business Scenarios** – Enabling new business or organizational scenarios and using IT to help the organization compete in hostile or difficult market conditions

THE BRANCH OFFICE CHALLENGE

Branch sites are the frontline of any organization. They are the critical customer interface where the majority of business is won or lost. Yet despite their importance to an organization, branch sites are, by their definition, geographically separated from headquarters and from IT staff at headquarters. End customers have increasingly high quality expectations regarding the customer service they receive at branch sites, resulting in increased demands on IT and added infrastructure complexity. Organizations are challenged with infrastructure management issues, securing data stored and transmitted to branch sites, and providing an infrastructure that can adapt quickly to the changing needs of the business

On the flip side, organizations that want to achieve this level of agility are also facing decreasing IT budgets. Providing these capabilities often requires local IT staff at the branch site to manage an increasingly complex IT environment. Delivering media, applications, and increased amounts of data also increases bandwidth use. And as organizations attempt to increase capabilities within branch sites, they find that they're deploying additional servers at branches that require power and cooling and that are frequently underutilized.

HELPING IT DELIVER VALUE THROUGH THE CORE IO MODEL

Branch optimization works best when approached incrementally and in a customized format. Working in close partnership with an organization, Microsoft® can help organizations plan short- and long-range, scalable investments in their branch environments and move to a better level of organizational maturity that's ultimately more cost-efficient, flexible, and agile.

To support this effort, Microsoft has developed the Core Infrastructure Optimization (Core IO) model. The Core IO model is a maturity model containing four levels of optimization: Basic, Standardized, Rationalized, and Dynamic. The Core IO model helps organizations understand where they are today and what best practices they can implement to help optimize their infrastructure.

The model works by implementing a number of proven best practices along the continuum of Optimization stages, advancing organizations from one level of Optimization to the next. Underlying each best practice is a set of technology investments that Microsoft is making to help organizations advance their IT efficiency and reduce operations and maintenance costs. The strategy that pervades these investments is called Dynamic IT.

Benefits of Core IO

As organizations establish goals to move from one level of Optimization to another in the Core IO model, they'll also be able to better identify the

amount of investment they need to make in each of the three competing IT priority areas: costs, service levels, and enabling new business scenarios.

Reducing Costs

Costs are highest when an IT organization is at a Basic level of optimization. For example, IDC found that Basic organizations typically have annual per-PC costs—including hardware, software, and maintenance—of about U.S. $1,200, whereas organizations at a Rationalized level are able to reduce desktop costs per PC to less than U.S. $300.[i] These cost savings result from automated operations, easier deployment of upgrades, and simplified management.

Improving IT Services Levels

Another benefit of Optimization is that while costs go down, service levels actually go up. In the same IDC study, IDC assessed services-level changes across Optimization levels by tracking the number of help-desk calls. IDC discovered that help-desk calls decreased dramatically as organizations moved from Basic to Standardized, and from Standardized to Rationalized, at which point they leveled off through the Dynamic level.

Enabling New Business Scenarios

Finally, in the same study, IDC measured agility by how quickly an IT group was able to roll out a new technology to the broader organization. IDC discovered that the amount of time it takes to roll out a new technology decreases as organizations improve their IT Optimization. This results from things like reduced deployment time, greater automation, increased time for strategic thinking, and more—with the greatest agility increases coming in the Rationalized and Dynamic levels of Optimization.

BRANCH INFRASTRUCTURE APPROACH

Using the Core IO model, your branch infrastructure can be transformed into a powerful strategic advantage. For many organizations, their current branch architecture is often the result of a history of tactical, point solutions to specific business needs. Each branch location may be different, increasing complexity and reducing manageability. Sites often depend on legacy applications that may be difficult or expensive to migrate to new platforms. Limitations in the existing environment are the most often cited barrier to providing new end-user or business capabilities at branch offices. However, by implementing a branch solution, you can leverage your branch infrastructure to provide a competitive advantage in providing world-class customer service.

Microsoft has identified three different scenarios for designing your branch infrastructure. The scenario that's most appropriate for you depends on your organization, its business structure and objectives, and your network. These scenarios are a distributed infrastructure, a centralized infrastructure, and a hybrid infrastructure.

Distributed

In this scenario, all services are hosted at branch locations, and service delivery has little or no dependencies upon a centralized location or remote datacenter. This approach represents a situation where services are most distributed between branch locations and a central office or datacenter. Although branch infrastructure investments are higher, there's more resiliency and less dependence on wide area network (WAN) connectivity.

Centralized

In this scenario, all services to the branch office are located at a central site or datacenter. This approach represents one end of the branch service delivery spectrum, where services are most consolidated and investments in branch infrastructure are lowest. WAN utilization and dependency are quite high since the bulk of the services are centralized, and latency tolerance is low due to the reliance on the WAN infrastructure for resource and application access.

Hybrid

In this scenario, some services are centralized in the datacenter, and some are hosted on the branch appliance or branch server. Centralized services are often accelerated using WAN optimization. Generally this approach is used to address services that are difficult to centralize, while still lowering branch infrastructure investments through the partial centralization of services. This scenario provides medium WAN utilization and dependency, while lowering the latency tolerance to a moderate level.

OPTIMIZED BRANCH BEST PRACTICES

Microsoft has identified three best practices to help organizations lower their branch IT costs, regardless of which branch infrastructure scenario they have in place today or want to move to. These best practices provide an agile infrastructure that allows the organization to remain competitive. The best practices include virtualization, centralized branch management, and increased network efficiency.

Virtualization

As organizations drive to increase capabilities at branch sites, they quickly increase the number of servers at their branches, and each new server increases capital and operating expenditures as well as power and cooling costs. At the same time, servers are underutilized. Typically, server workloads consume only 5 percent of their total physical capacity, wasting hardware, space, and electricity. Additionally, because of application-compatibility issues, IT often has to separate applications by running them in different silos or on legacy operating systems.

Server Virtualization

Server virtualization is a core scenario in a branch infrastructure, as most workloads in a branch environment are not heavily taxed. Rather than using multiple small servers—each dedicated to a function like e-mail

Everything needed to support server virtualization is available as an integral feature of the operating system with Windows Server® 2008 R2 Hyper-V™:

- Consolidate multiple server roles as separate virtual machines running on a single physical machine.
- Run multiple, diverse operating systems in parallel, on a single server.
- Easily migrate workloads from Microsoft Virtual Server 2005 R2.

System Center Virtual Machine Manager 2008 helps enable centralized management of physical and virtual IT infrastructures, increased server utilization, and dynamic resource optimization across multiple virtualization platforms.

services, print services, faxing, or vertical applications—those servers can be consolidated on a single mid-level or high-end server. This helps you save on hardware and manageability. A single-server approach with virtual machines taking over for previously dedicated servers also means reduced power requirements.

An entire network with multiple servers can be designed, assembled, and tested in a central IT department. Its virtual machines can then be installed remotely or shipped to a branch office on one or more DVDs, eliminating the need to contract with local technicians—thus saving costs that were previously needed to hire local partners or IT professionals. The entire process is managed from the central office with little or no need for a local IT staff.

Finally, server virtualization enables migration of legacy operating systems such as Windows NT 4.0 Server and Windows 2000 Server and their associated custom applications from older hardware to new servers running with newer technology. Virtualization delivers the best of both worlds—application compatibility with legacy environments, while taking advantage of the reliability, manageability, and security features of the latest hardware. This gives your organization time to refresh older infrastructure systems first, then either upgrade or rewrite out-of-service applications on a timetable that best fits your business needs.

Desktop Virtualization

Employees increasingly want access to applications and data from anywhere or from any device. While this adds to workforce productivity, it can create complexity and higher pressures on cost control for IT departments. Additionally, as hardware theft rises, securing laptop and desktop PCs requires significant resources.

Through desktop virtualization, employees can access their applications and data safely over a network, minimizing the risk of data loss. On the IT side, desktop virtualization accelerates deployment of new capabilities without needing to acquire new hardware and configure components. It also helps reduce application-testing requirements and compatibility issues, and it simplifies disaster recovery and compliance.

Microsoft Enterprise Desktop Virtualization (MED-V) provides deployment and management of virtual Windows® operating-system desktops to enable key enterprise scenarios. MED-V helps enterprises upgrade to the latest version of Windows, even when some applications aren't yet compatible, because IT can create virtual machines that run earlier versions of Windows. Applications that require those versions can then be installed on those virtual machines to give end users the ability to access those applications when needed.

Application Virtualization

In a physical environment, every application depends on its operating system for a range of services, including memory allocation, device

Microsoft Application Virtualization transforms applications into centrally managed virtual services that are never installed and don't conflict with other applications:

- Stream applications on demand over the Internet or via the corporate network to desktops, terminal servers, and laptops.
- Automate and simplify the application management lifecycle by significantly reducing regression and application-interoperability testing.
- Accelerate operating-system and application deployments by reducing the image footprint.

drivers, and much more. Incompatibilities between an application and its operating system can be addressed through either server virtualization or presentation virtualization. However, for incompatibilities between two applications installed on the same instance of an operating system, application virtualization is needed.

Application virtualization remedies the incompatibilities between applications. Application virtualization transforms applications into virtualized services that run over the network. Applications reside on a server and are delivered to a desktop on demand. Because applications aren't installed on the physical desktop PC, they cannot conflict with other applications on the PC.

Based on your current branch infrastructure (distributed, centralized, or hybrid), we recommend the following virtualization efforts:

- **Distributed** – Consolidate branch servers using server virtualization. This allows you to maximize the use of server processing power, and it allows you to deploy fewer physical servers in your branches. By more efficiently using server processors, you save money on utilities (cooling), and by using less hardware, you're able to save space. Get more out of legacy hardware by using the Windows Server® 2008 operating system Server Core installation to improve performance through optimized traffic, increased security, and simplified management.
- **Centralized** – Centralize desktop applications (and desktops) in the datacenter to allow you to deploy thin clients in your branch sites that consume less power and are cheaper to replace. This may be made more efficient by deploying a modern client operating system like Windows 7 that accelerates traffic to hosting servers in the datacenter.
- **Hybrid** – Consolidate WAN optimization technology and core IT services on a single device. Many WAN optimization controllers today combine WAN acceleration with core IT services, such as dynamic host configuration protocol (DHCP), domain name system (DNS), print, and identity services. This allows you to save space consumed by hardware devices. Alternatively, upgrade to a modern operating system, allowing you to accelerate traffic on existing servers without the need to deploy additional networking hardware (i.e., WAN optimization controller).

Centralized Branch IT Management

Nowhere is efficient management more critical than at branch offices. A centralized branch infrastructure provides all of the branch services and support from a central location. This is appropriate for branch offices that can tolerate the performance and availability constraints that are inherent in a WAN connection or even Internet-based access to the main corporate network.

With a centralized management solution, total cost of ownership (TCO) can be much lower for monitoring and managing server-based services. This is because it's easier to manage the reduced number of components, which are in close proximity to the people who administer them, and the skills required to manage the services are generally more focused on individual technologies.

Hardware Provisioning
As organizations look to roll out new line-of-business applications or look to update their branch servers with new versions of Windows Server 2008, Microsoft SQL Server® 2008 database software, or Microsoft Exchange Server 2007, they're able to take advantage of System Center Configuration Manager 2007. Configuration Manager 2007 delivers standardized configurations for servers, similar to the management packs available for System Center Operations Manager 2007—making the process much quicker and more reliable, especially when local IT staff at branch locations is limited or nonexistent.

Workload Provisioning
The ability to provision goes beyond physical servers. Virtual Machine Manager 2008 allows you to do intelligent virtual server and workload provisioning for the virtual machines on your branch servers, enabling you to make the best use of the hardware and network resources in your environment. It also allows you to convert servers to a virtual state. This includes not only physical-to-virtual conversion, but also virtual-to-virtual conversion.

Patching and Deployment
Lots of manual patching still happens. With Configuration Manager 2007, patching a server that's been deployed to a branch is completely automated. This includes the management of drivers and the enforcement of server maintenance to support your efforts to meet your branch server compliance requirements.

Monitoring of Physical and Virtual Servers
Once servers have been deployed to your branches, the next step is to monitor their performance and health—which, of course, extends to both physical and virtual servers. Operations Manager 2007 delivers that monitoring capability for all of the servers in your IT environment, at both the datacenter and in branches, and it can even automate the discovery of servers once they've been deployed. Configuration Manager 2007 also has a major role to play here in monitoring how servers "drift" from desired configurations so that you can be alerted to changes in configuration in order to improve compliance, security, and performance—all of which can be impacted by server configuration drift.

Disaster Recovery and Backup
With Operations Manager 2007 monitoring, you can implement a disaster-recovery plan that would cover your branch capabilities. System Center Data Protection Manager 2007 also delivers the backup

capabilities that can secure the content on your branch servers, all through one environment. This even includes virtual-server-based data and the virtual machines themselves.

Based on your current branch infrastructure (distributed, centralized, or hybrid), we recommend the following centralized management efforts:

- **Distributed –** Standardize software across branch offices by centrally managing patches, updates, and systems software. This prevents you from having to send out IT staff to branch sites to do simple tasks. Standardization of systems allows you to more easily fix issues, and it saves money on training IT staff. Monitoring software can alert you to issues in your branch sites before they take the office down, impacting productivity. Centrally managing data backup can help you get rid of unreliable, costly tape drives, and it can help you ensure more accurate backups. You no longer need to rely on branch office employees to switch out tape drives, which can put your data at risk.
- **Centralized** – Centralize branch applications and infrastructure by utilizing the available network, using virtualization and Terminal Services to provide you with better control and manageability of your line-of-business applications, desktops, and infrastructure. Centralizing desktops through virtual desktop infrastructure (VDI) and remote application publishing can improve application standardization and management.
- **Hybrid** – Centralize branch applications or infrastructure by utilizing the available network, using virtualization and Terminal Services to provide you with better control and manageability of your line-of-business applications. Centralizing desktops through VDI can improve desktop application standardization and management.

Improved Network Efficiency

For organizations that have expanded their office boundaries to include geographically dispersed branch offices, the administration of distributed infrastructure resources and improvement of network performance can present serious challenges. Many organizations seek to maintain the performance, availability, and productivity benefits of local branch office services while overcoming several of the challenges associated with managing a mixed branch and global office environment.

Modern Server and Client Operating Systems

Many organizations are seeking to implement the most recent and advanced server operating system. They're expecting to develop, deliver, and manage branch user experiences and applications while providing a highly secure network infrastructure and increasing network efficiency within their organizations. Deploying an advanced server operating system with the most advanced client operating system can provide great advantages to an organization.

Windows 7 operating system and Windows Server 2008 originally started as part of a single development project. Since there are a significant number of common technologies in the platform, when they're implemented together, the combined client-server infrastructure provides great advantages, including more efficient management, greater availability, and faster communication.

Deploying Windows Vista® operating system or Windows 7 and Windows Server 2008 concurrently will enable advanced management and security functionality to provide tighter control and increase automation. For example, network performance is more than three times faster when an employee is using a Windows Vista or Windows 7 PC to connect to a Windows Server 2008 server as compared with an employee using a Windows XP PC to connect to a Windows Server 2003 server.[ii]

How does Windows Server 2008 perform against Windows Server 2003? When looking at pure network performance, Windows Server 2008 is the clear winner. Transferring a 10 GB file across the network, keeping all other variables equal, throughput was dramatically faster on Windows Server 2008 vs. Windows Server 2003.

BranchCache

Even inside a single organization, different departments can have unique needs. For example, branch offices have issues and requirements that are different from the main office. Organizations are investing in opening more branch offices to provide a work environment for mobile employees and to reach more customers.

This trend generates new challenges for both end users and IT professionals. For example, branch offices are usually connected to enterprises with a low-bandwidth link. Hence, accessing corporate data located in the enterprise is slow for end users. BranchCache™, a new feature in Windows Server 2008 R2, can help increase network responsiveness of centralized applications when accessed from branch offices, giving users in those offices the experience of working on a local area network (LAN). Caching also helps reduce WAN utilization. When organizations utilize data caching, a copy of data accessed from servers in the central datacenter is cached locally within the branch office. When another client on the same network requests the file, the client downloads it from the local cache without downloading the same content across the WAN. BranchCache retrieves data from a server only when the client requests it. Because it's a passive cache, it won't increase WAN utilization. BranchCache only caches read requests, and thus it won't interfere with a user saving a file.

BranchCache can be used even if there's no server in the branch through a mode called Distributed Cache. Rather than caching the requested file on the branch server, Distributed Cache uses peer-to-peer capabilities. When the first user downloads a file from the central datacenter, it's cached on his or her PC. When another user in the same branch attempts to download the file from the centralized server, Distributed Cache pulls the file from the first user's PC and sends it directly to the second user.

WAN Optimization Appliance

The WAN is the link that holds a distributed network together. This network connects employees and users in branch locations with

applications, systems, and data. Most organizations realize that the WAN must be optimized for performance or productivity can suffer. Advanced WAN optimization solutions—such as caching, protocol optimization, and traffic management—can improve performance when they're deployed correctly.

Microsoft has partnered with major WAN optimization vendors to deliver WAN optimization solutions. Cisco Wide Area Application Services (WAAS) is a comprehensive WAN optimization solution that accelerates applications over the WAN, delivers video to the branch office, and provides local hosting of branch office IT services. The integrated solution will provide an optimized architecture for Cisco and Microsoft customers to help consolidate their remote IT infrastructures and accelerate application delivery from centralized datacenters, while simultaneously delivering Windows Server 2008 services in the branch. By integrating Cisco WAN optimization with Windows Server 2008, organizations can help ensure branch end-user performance for accessing centralized datacenters and applications, while efficiently deploying locally critical Windows Server 2008 services—all through a common remote IT platform.

Citrix Branch Repeater is a branch optimization solution that accelerates application delivery to globally distributed users, while dramatically reducing bandwidth costs and simplifying branch infrastructure. Branch Repeater solutions, combined with Windows Server 2008, can reduce IT costs and increase user productivity by simplifying branch start-up and management, improving network utilization, and providing a high-definition experience to users. The Branch Repeater family provides architectural choices to address the full range of enterprise user scenarios and deliver unparalleled acceleration and optimization benefits.

Based on your current branch infrastructure (distributed, centralized, or hybrid), we recommend the following efforts to increase network efficiency:

- **Distributed** – Save money on future bandwidth upgrades by updating server operating systems. Modern operating systems take into account how data is being transmitted across the network, and they optimize the traffic based on your network. Servers in your branch offices are able to more quickly transmit data to servers in your datacenter by more efficiently communicating data across your network. Caching technology allows you to avoid sending duplicate data over your network, and it can allow you to pre-position data at your branch site, so that employees downloading the same file don't have to wait for it to download across the network each time—saving your employees time and driving up efficiency.
- **Centralized** – Cache networked data on client PCs through peer-to-peer caching without the need for a server in the branch. Also, modern desktop operating systems are more efficient at

transmitting data across a network when communicating with a server in the datacenter.

- **Hybrid** – Accelerate centralized line-of-business applications using a WAN optimization controller—thereby giving your end users quicker response rates, resulting in higher productivity.

DETERMINING THE RIGHT BRANCH APPROACH FOR YOUR ORGANIZATION

Consider the following questions to determine the best approach for your branch infrastructure:

- **How important is the availability of services in your branches?** If constant availability is critical, you'll likely want to go with a distributed or hybrid approach. Adopting a completely centralized approach may not meet your availability needs. However, if you can periodically deal with services not being available, you may benefit from a centralized approach.
- **How much bandwidth do you have for your WAN, and is the cost for high bandwidth acceptable?** If you have sufficient bandwidth, and the cost of bandwidth isn't an issue, a centralized approach may be the most appropriate. If you need to minimize throughput over your WAN, you may want to consider a distributed or hybrid infrastructure.
- **How important is system and network performance for your branch employees?** If high performance of systems in the branch is paramount, a distributed or hybrid approach may be best, but don't rule out a centralized approach. With new technologies, the performance of systems in your branches can still be good, even if your infrastructure is centralized.

CONCLUSION

Organizations with branch locations face a number of challenges that other organizations do not. Maintaining IT systems in branches can often be costly and difficult. Fortunately, you can optimize your branch infrastructure by selecting the right approach for your organization—centralized, distributed, or hybrid—and then adopting best practices that can help you optimize your infrastructure.

Three key best practices include virtualization, centralized management, and network efficiency. Adopting these best practices can help you reduce IT costs, improve service levels, and enable new business scenarios through enhanced agility.

ADDITIONAL RESOURCES

More information and examples of concepts covered in this paper are available at these links:

- Microsoft branch IT infrastructure solutions
- Microsoft virtualization solutions
- Microsoft System Center management technologies
- Network efficiency with Window Server 2008 and Windows 7

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[i] IDC White Paper, Optimizing Infrastructure: The Relationship Between IT Labor Costs and Best Practices for Managing the Windows Desktop, Oct 2006

[ii] IDC, 2008.