Optimizing Branch-Office Network Infrastructure Total Cost of Ownership with Cisco Integrated Services Routers

The Rise of the Distributed Business

The world has evolved into a global village. Businesses see the need to establish their presence in strategically important areas and gain from unique partnering and customer opportunities. According to various industry sources, the branch-office users comprise 30 to 90 percent of enterprise employees globally, with remote locations and users consuming 70 to 90 percent of business resources. To be successful, these employees require access to the same applications, systems, and tools as employees located at a corporate headquarters.

Advances in technology are changing business policy, which is in turn driving changes in branch-office network infrastructure. Business continuity is accelerating resource centralization, with more and more critical assets moving into the enterprise headquarters and data center. This situation is having a ripple effect on branch and remote offices. To meet regulatory compliance and cost-control requirements, many organizations are optimizing resources and reducing complexity in the branch office.

Although centralizing branch resources and increasing access brings great benefits, it can also pose security, latency, and performance challenges. Optimal business productivity is achieved only when the same level of services is available in the branch office as in the corporate headquarters. Branch-office networks need to be secure, available, remotely manageable, and extensible—and they must deliver application performance and quality of experience that is as good as in the main offices.

Although the benefits of technological advancements and policy compliance are fairly tangible, the costs and complexity of owning and operating a full-service branch are difficult to predict. Does the existing equipment have enough headroom to support branch-office growth needs? What are the complexities in introducing a new application in the branch office? Is there a significant cost and learning curve to implement a new solution?

Network TCO—Under the Microscope

All networks have both capital and operational investments, but the degree to which these investments affect a company's profit line is governed by the features, functions, and adaptability of the branch-office network solution itself.

Following are some of the causes of higher total cost of ownership (TCO):

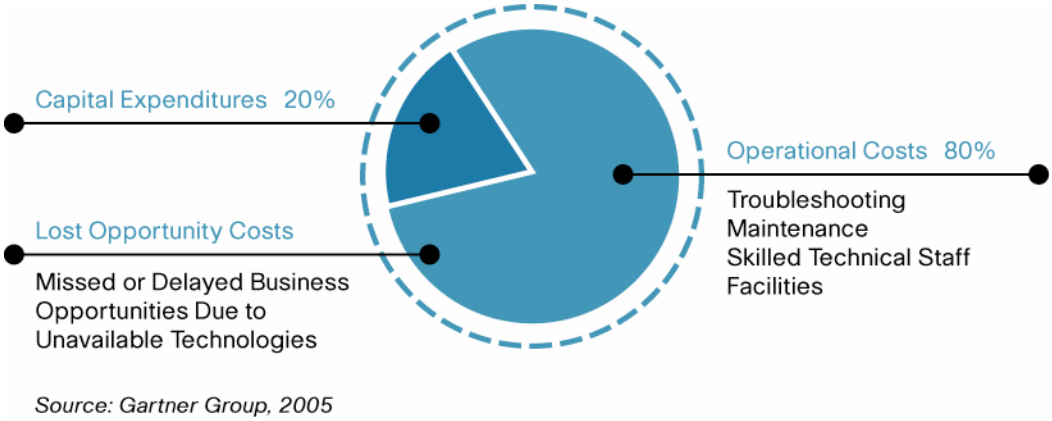
- **Hardware diversity**—As the number and variety of devices rises in a typical branch, the need for platform-related training increases—resulting in increased resource allocation toward personnel training and management.
- **Configuration and support complexities**—Intricate installations are burdensome to maintain; multiple hardware devices, software loads, and management systems cost much more than simple solutions. Identifying the root cause of a problem is difficult, resulting in longer mean times to repair and higher use of IT resources. Multiple devices in series are more susceptible to network outages. Downtime of a single device can affect the

performance and availability of other devices. Cabling “spaghetti” increases the risk of human and mechanical error.

- **Security and regulatory demands**—The need for encryption and physical security of hardware and data is growing. Equipment diversity increases the risk of a security hole and raises the chances of a single device being left vulnerable to attack. To meet regulatory compliance, many organizations are trying to remove resources and reduce complexity in the branch office. Operating diverse appliances in the branch office tends to slow down this process.
- **Conflicting performance criteria of equipment**—In a multiple-device cluster, one device may affect the performance and productivity of others. For example, network configuration requirements for voice and video applications may be hampered by security configurations.
- **Higher costs for incremental services**—Many appliances and purpose-built devices have limited or no flexibility to accommodate changes in branch-office networking needs. Providing a single incremental service often means a full upgrade to previously installed equipment, resulting in expensive site visits and large incremental capital costs.
- **Higher recurring expenses: power, carrier tariff, cooling, and rack space**—In a small branch-office scenario, real estate and rack space, power, and cooling setup are often at a premium. Finding ways to reduce these recurring costs can improve the branch-office TCO.
- **Multiple maintenance contracts**—The more devices in a branch, the more maintenance contracts that must be purchased and renewed. Management of different vendor relationships and maintenance contracts can be time-consuming and confusing.
- **Minimal synergies between applications**—In an integrated device, traffic follows a single path that ensures synchronized, reliable delivery while protecting service integrity. In an unsynchronized multidevice scenario, devices compete to apply quality of service (QoS), security, and network policy, resulting in a less-efficient network and more points for administrative error.
- **High upgrade costs**—Because a large portion of the costs of branch upgrades is related to service visits, it is crucial to minimize the frequency and severity of any site visits. With diverse appliances, it gets costly to add additional capabilities without adding new hardware, perpetuating bloat and complexity in the branch office, and reducing the agility and response time of the IT support team.

Gartner Group research indicates that over the full deployment lifecycle of a network, the initial cost of buying equipment is relatively the smaller part (20 percent) of the TCO compared with the ongoing operational costs (80 percent). Beyond these “hard” costs, additional opportunity costs result from “service lockouts” that are caused by underinvesting in enabling technologies. The operational costs and lost opportunity costs outweigh savings realized by buying a less-expensive but lower function- and service-capable platform (Figure 1).

Figure 1. Network Cost of Ownership



The Cisco Integrated Services Router

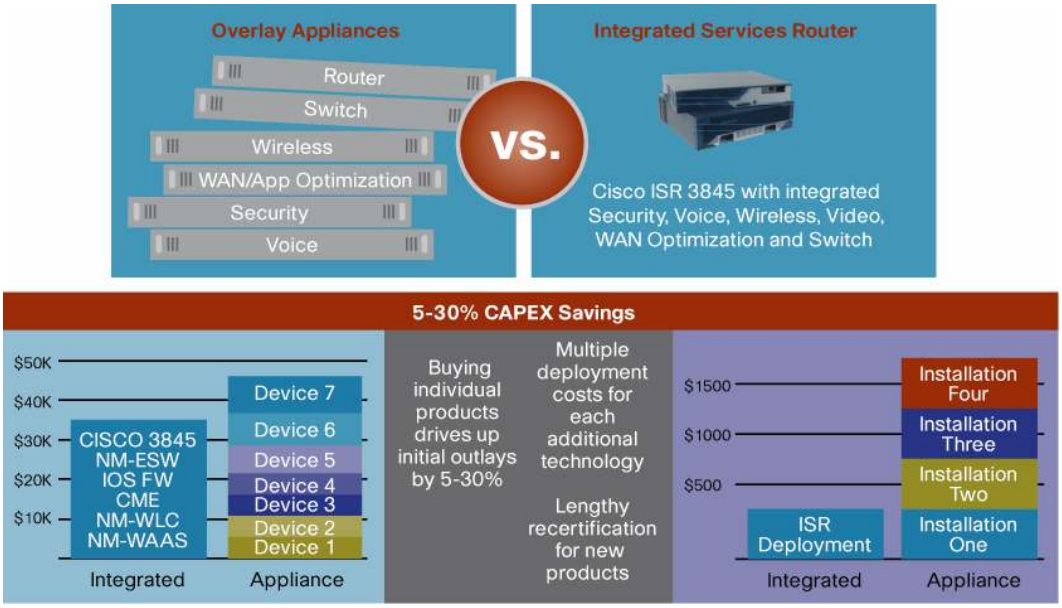
Cisco branch-office solutions distinguish themselves from other branch-office solutions by offering multiservice routers with the highest performance, availability, and density for concurrent data, security, voice, and application acceleration services with maximum headroom for growth. Cisco 3800 Series Integrated Services Routers feature embedded security, onboard digital signal processors (DSPs), performance and memory enhancements, and high-performance interfaces featuring the latest WAN technologies to meet the needs of the most demanding enterprise branch offices.

The Cisco Integrated Services Router offers several tangible benefits when compared to overlay appliances:

- **Service coherency**—Cisco Integrated Services Routers are designed and built with multiple concurrent services in mind, and they provide a higher degree of service integration and consistency than multiple independent devices.
- **System support**—Cisco offers complete accountability for deploying and operating an integrated services router because it approaches the network as a whole. There is a single point of support and fewer complications in terms of maintenance contracts and software licenses.
- **Operational efficiency**—With an integrated device, there are fewer devices to manage, and fewer user interfaces to deal with. Troubleshooting faults and errors is easier with integrated technology as compared to overlay appliances.
- **Investment protection**—The integrated approach of an integrated services router provides flexibility to evolve through system modularity or to take advantage of the power of Cisco IOS® Software to deploy new features.

The TCO Model

Figure 2. Lower CapEx with Cisco Integrated Services Router



The integrated approach of the Cisco Integrated Services Router helps decrease TCO. Based on a comparison of capital costs of buying network infrastructure, it is clear that buying individual products can drive up capital expenditures (CapEx) 5 to 30 percent more than buying an integrated solution. Similarly, the cost of deployment also rises with individual devices.

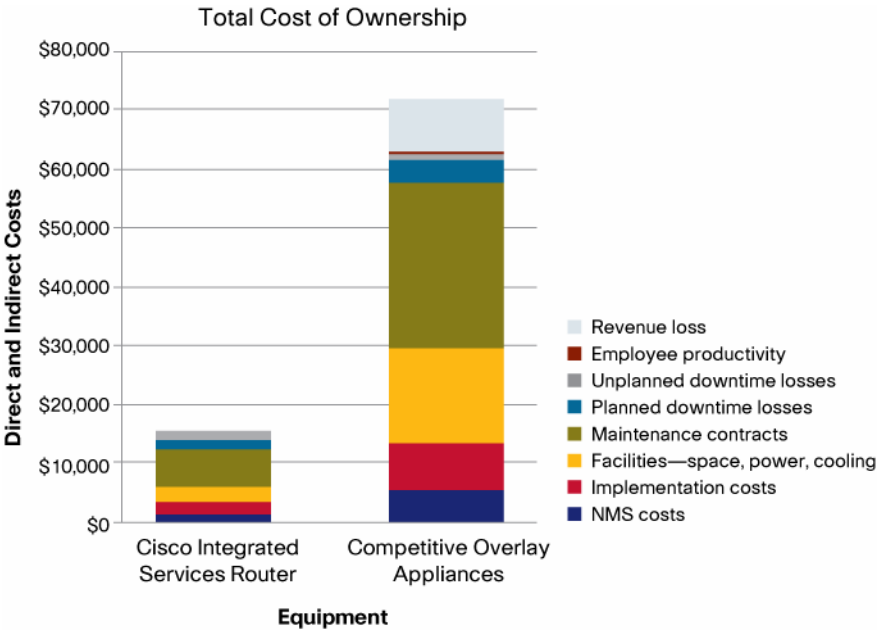
To calculate the bigger cost component of TCO, Cisco studied a comprehensive model consisting of implementation expenses (IMPEX) and operating expenses (OpEx). Using installation and deployment costs provided by a reputable systems integrator, an initial deployment of the branch-office solution was estimated for 10 branch-office sites. Each branch office is estimated to have an average of 50 employees.

The model accounts for a yearly growth rate of 8.9 percent as a result of headcount increases as well as the rollout of multiple advanced services over an IP network in the next 3 to 5 years.

The enterprise is assumed to have an extensive and available infrastructure composed of a data center with a highly available and redundant network. Specific comparisons in operational expenses over a 3-year period include the following:

- **Direct costs**—Network management and hardware management tools, annual maintenance contracts, facility costs (space, power, and cooling requirements), and implementation (deployment and provisioning) costs
- **Indirect costs**—Availability costs, such as planned downtime, unplanned downtime, loss of employee productivity, and revenue loss due to network downtime

Figure 3. Total Cost of Ownership



While offering a distinct 5- to 30-percent CapEx advantage, owning a Cisco Integrated Services Router over a 3-year lifecycle, in comparison to overlay appliances, constitutes a saving of more than 70 percent per year. In other words, an enterprise network with 10 branches and 50 employees will end up spending over $560,000 for diverse, overlay point products in their network—apart from multiple layers of complexity related to ongoing operations, support, and troubleshooting.

This model is conservative—it does not account for the corporate revenue gained from the increased network availability. Additional refinement of the model accounting for the number of revenue-generating employees that are affected by network downtime would further demonstrate the dramatic benefits of an integrated solution.

The Cost Benefit Equation

Owning a Cisco Integrated Services Router clearly provides a lower TCO as well as an extremely compelling return on investment (ROI) for the network. A summary of the amounts amortized over a 3-year lifecycle of the equipment appears in Table 1.

Table 1. Direct and Indirect Costs of Ownership

	Cisco Integrated Services Router	Appliance	
Direct costs	$12,600	$57,900	> 4X
Indirect costs	$3,100	$14,200	> 3X

The above figures given in Table 1 do not include equipment costs (CapEx), because this is a study based on operational expenses and implementation expenses. It is evident that owning a Cisco Integrated Services Router provides more that 300-percent improvement in return on investment ROI over 3 years.

Following are some additional salient findings of the TCO analysis:

- **Annual maintenance contract**—A single annual maintenance contract from Cisco, incorporating contracts for hardware maintenance (Cisco SMARTnet® support) as well as maintaining software updates on all components of the integrated platform (Cisco Software Application Support plus Upgrades [SASU]) costs only one-third of the multiple contracts from diverse vendors.
- **Facilities costs**—Cisco Integrated Services Routers are a more environmentally friendly choice—owning an integrated device obviously results in remarkable savings related to facilities, power, and cooling requirements. A Cisco Integrated Services Router consumes only one-fifth the resources when compared to six independent appliances.
- **Network management tools**—In terms of network management tools and deployment costs—which form a major expenditure in the first year of owning the device—Cisco offers simple elegance apart from resulting in 66-percent cost savings. There is a direct relationship between the number of devices being managed and the number of engineers required to support them—more devices means more people.
- **Downtime and outage**—A comparison of the cost of outage as well as planned downtime results in striking savings for the customer owning a Cisco Integrated Services Router. It costs more than twice as much to own disparate devices daisy-chained together to operate in an integrated manner. The flexibility and high availability of the Cisco Integrated Services Router platform serves as an ideal backbone for a branch-office environment.
- **Availability**—In calculating associated costs such as employee productivity and revenue-related losses due to customer downtime, the Cisco Integrated Services Router is four times more available, resulting in outstanding cost savings and ROI on the platform.

Cost of Doing Nothing

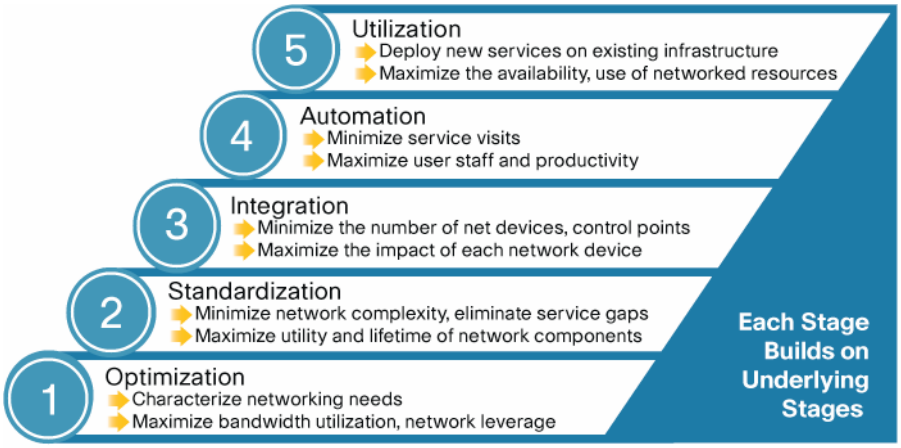
To summarize, the fact that branch-office operational costs are magnified quickly is accounted for—a minor cost increase for a single location gets magnified across many locations—or in case of service fees, over many months. Each time a technician must be deployed for a new onsite hardware configuration, it costs another $300 per hour (substantially more in remote areas) for a man-in-the-van. Therefore, if requirements change a few years later (for example, adding voice to the network or migrating to a VPN service), redeploying new equipment manually will escalate costs.

In the case of the branch-office network TCO, it can cost more than $700,000 in OpEx for a 10-branch network over a period of 3 years. Apart from these concrete costs, which affect revenue as well as profitability of the company, what also needs to be accounted for is related opportunity costs, which have not been monetized in this model. These costs includes MORE network complexity, MORE engineer training requirements for handling disparate network management tools, MORE time and energy spent in managing vendor relationships and diverse annual maintenance contracts, as well as MORE troubleshooting in case of equipment failure.

A variety of vendors can also result in a confusing troubleshooting scenario, with no single owner. Additionally, uncoordinated vendor roadmaps can result in a stunted branch-office evolution and reduced headroom for growth.

The Roadmap to Lower TCO—Unification Breeds Success

Figure 4. Roadmap to Lower TCO



- **Lower TCO of networking equipment**—Lower TCO of networking equipment can be possible through this 5-step process—and the Cisco Integrated Services Router offers you the benefits of an integrated solution every step of the way. Optimization—Cisco Integrated Services Routers have the embedded intelligence to monitor and understand the characteristics of the network, and they can be used to maximize bandwidth usage and ensure the network resources are being properly utilized.
- **Standardization**—The flexibility of the Cisco Integrated Services Routers ensures they can be utilized used as a standard offering for both today's and tomorrow's needs.
- **Integration**—Cisco Integrated Services Routers can provide a variety of services, ranging from voice, security, and WAN optimization to integrated switching. This flexibility and service density allows IT organizations to minimize their branch networking devices and, therefore, the number of control points while maximizing the impact effect of each device.
- **Automation**—Cisco Integrated Services Routers have a broad suite of capabilities and tools to minimize deployment, monitoring, troubleshooting, and threat-mitigation costs.
- **Utilization**—The highly flexible architecture of the Cisco Integrated Services Routers allows them to adapt to changing branch-office service environments. With more than 100 modules and countless Cisco IOS Software features, the Cisco Integrated Services Routers provide maximum investment protection and allow you to minimize the need for a complete equipment upgrade.

The nonunified, overlay appliances in a branch office are a source of huge operational costs and an inefficient way to address branch-office needs. To support the pace of growth and innovation required to remain competitive, today's businesses need to use an integrated approach to minimize TCO while maximizing branch-worker productivity.

The Cisco Difference

Figure 5. The Integrated Services Router Family

The Cisco 3800 Series Integrated Services Routers, the flagship of the Cisco Integrated Services Router product line, provide the maximum opportunity to reduce the total cost of operation of your network by providing unmatched levels of integration, availability, and network flexibility. The Cisco 3800 Series is a single device that can meet a variety of branch needs, including WAN connectivity, connectivity services (QoS, compression, and access lists), secure connectivity (encryption and VPN), security services (firewall, intrusion detection system [IDS], and URL filtering), wired and wireless LAN, voice services (call processing, voicemail, autoattendant, Survivable Remote Site Telephony [SRST] gateways, and conferencing), application acceleration (caching, prepositioning, streaming, and URL filtering) and advanced management (full Remote Monitoring [RMON] services).

Designed for a variety of deployments, the Cisco 3800 and 2800 series routers deliver a significant payback in terms of TCO because of improved facilities use, simplified installation and upgrades, and significantly reduced downtime. This solution allows IT managers to take full advantage of their existing knowledge, training, and infrastructure to cost-effectively implement enterprisewide branch solutions.

Redundant Configuration

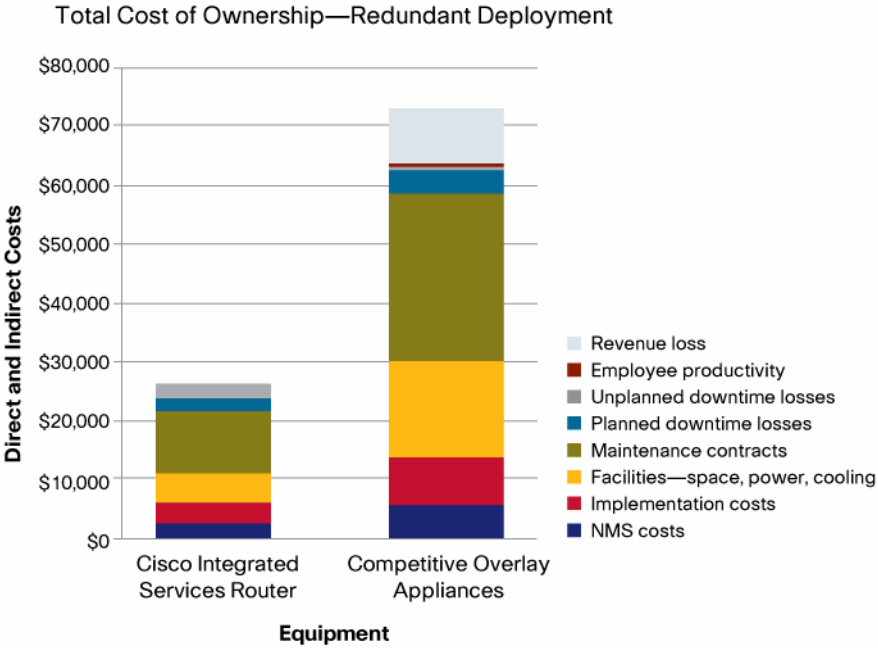
Designed for large-scale pervasive deployments, the Cisco 3800 Series Integrated Services Routers deliver a sizable payback in terms of TCO because of improved facilities use, high availability, simplified installation and upgrades, and significantly reduced downtime. This solution allows IT managers to take full advantage of their existing knowledge, training, and infrastructure to cost-effectively implement enterprise wide branch solutions.

The Cisco Integrated Services Router provides a completely robust and reliable deployment—exemplifying a true branch in a box. In a redundant scenario, customers are assured of a highly available and hot-swap environment for critical applications. Cisco further studied how the profit line will be affected by deploying and running dual Cisco Integrated Services Routers with redundant voice and security features.

In a redundant scenario, the branch network cost of ownership increases with respect to direct and indirect expenditures. Compared to the 3-year TCO for a single Cisco Integrated Services Router—which is expected to be $15,600—a redundant dual Cisco Integrated Services Router deployment will cost $25,900.

From a competitive perspective, this solution still offers a savings of almost 60 percent over an overlay appliance deployment. Over a 3-year period, this is nearly a 250-percent ROI when compared to the competitive scenario (Figure 6).

Figure 6. Total Cost of Ownership—Redundant Deployment



The Need for 3G WWAN Backup

A high-speed, broad-reach wireless technology for business backup solutions introduces a significant set of future possibilities for both business and entertainment markets, creating a powerful and flexible growth opportunity.

What is 3G WWAN back-up? Is it a secure, high bandwidth technology, rapidly deployable for critical enterprise back-up needs? Is it a business lifeline designed to reduce loss of productivity, loss of opportunity and damaged reputation? Is it an insurance policy against network outage that may be caused by physical damage to the primary and back-up WAN links- by way of WAN diversity?

The answers are Yes, Yes and Yes. Lets explore the relative importance of this technology with respect to it's applications as well as it's impact on the business bottom line.

Network outage can have several sources. Traditional backup options have drawbacks such as:

- **Lower speeds**—ISDN offers 128 kbps, but this is ineffective and expensive because of its lower bandwidths. Enterprises have to choose from a limited number of applications that can be operational in a backup scenario, seriously affecting branch productivity and revenue generation.
- **The backup connection may share the conduit with the primary connection**—In this case, if the primary connection goes down, the backup goes down too. Broken or damaged cable and fiber are caused by a variety of situations, and can occur during moves or maintenance. Other situations that can also affect performance is service provider network equipment failure and faulty network equipment.
- **Terrestrial disruptions**—In case of natural disasters, there is a high probability of outage due to breakage and damage to the cables and conduits.

In the modern world, the network is the lifeline of a business. With increased convergence of voice, video, and data over IP, enterprise WAN resiliency has become even more critical. Network downtime results in loss of employee productivity, loss of opportunities, and damage to business reputation.

3G WWAN Backup

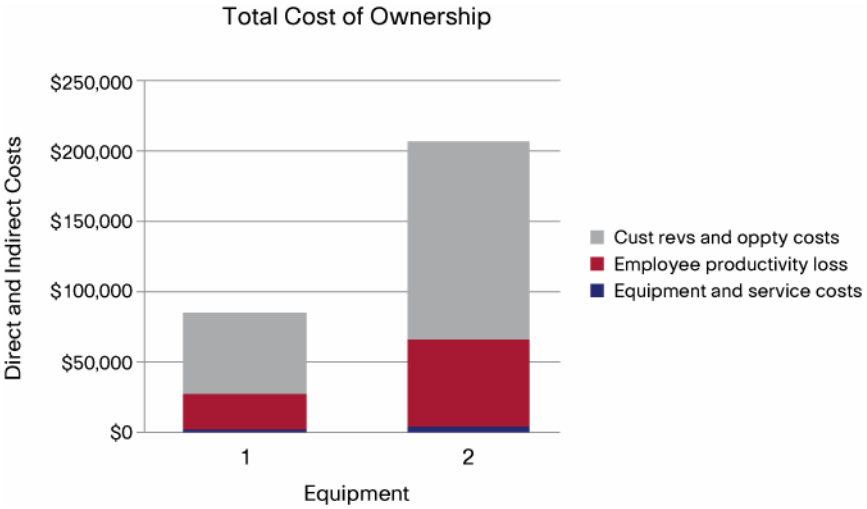
In addition to the inherent value brought by the integrated approach, using an integrated services router in a WWAN backup solution provides more benefits because of factors such as WAN diversity, multihomed connections, and higher bandwidth. In creating a model that accounts for the benefits of 3G technology as opposed to traditional WAN backup means, including ISDN, specific comparisons in operational expenses were made.

Over a 3-year lifecycle, owning an integrated services router-based 3G WWAN backup solution clearly constitutes a 40-percent cost savings per year when compared to traditional terrestrial backup solutions. In other words, cumulating the branch backup expenditure over 10 branch offices for 3 years accounts for savings of nearly $1.2 million, or the cost of operating a highly available backup solution at **three new branches**.

Following are some additional salient findings of the total cost of ownership (TCO) analysis:

- **Service installation and monthly service costs**—Based on service provider costs in North America, in this comparison of a traditional ISDN backup solution to a 3G WWAN option based on integrated services routers, the integrated services router-based solution costs less than half the expense incurred to own and operate traditional terrestrial backup lines of similar bandwidth. This advantage is huge because recurring service pricing incurred on a monthly basis per branch can accumulate on the enterprise balance sheet to affect profitability. Any reduction of this recurring cost can add up to a sizeable savings for a business.
- **Employee productivity loss**—A comparison of cost of outage as well as planned downtime results in striking savings for the customer owning an integrated services router-based 3G WWAN solution, in terms of both higher bandwidth and greater availability due to WAN diversity. This productivity loss also includes lost data and rework costs associated with returning business applications to operational status after a network outage. The integrated services router-based solution is twice as available, resulting in higher productivity.
- **Revenue and opportunity loss**—In calculating associated costs such as revenue-related losses as well as opportunity losses due to customer downtime, the integrated services router-based 3G WWAN solution offers twice the availability, directly resulting in outstanding opportunities for revenue generation and return on investment on the platform.

Figure 7. Comparison of Operational costs of 3G WWAN back-up to traditional back-up



The Cisco Difference

Figure 8. 3G WWAN HWIC

Designed for a variety of deployments, the Cisco® 3800, 2800, and 1800 Series Integrated Services Router 3G Wireless WAN High-Speed WAN Interface Card (HWIC) delivers a significant payback in terms of TCO due to improved facilities use, simplified installation and upgrades, and significantly reduced downtime. This solution allows IT managers to take full advantage of their existing knowledge, training, and infrastructure to cost-effectively implement enterprisewide branch solutions. For a branch environment, it also offers the advantages of rapid deployment and instant service activation.

The Cisco 3G WWAN solution provides the additional advantage of being the first fully integrated product on the market—while offering all the required WAN network resiliency, reliability, and availability in a backup situation. There can be a single service provider contract for all branch offices, also adding to the cost advantage by enabling sharing of bandwidth between branch offices—directly resulting in even lower monthly fees. This true, cost-effective alternative to traditional backup solutions provides the required bandwidth and business continuity for business-critical applications.

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Printed in USA

C11-383332-01 3/07