White Paper

# Cisco Unified Wireless Network: Reducing SMB and Branch Office Wireless LAN TCO

**This white paper discusses the Cisco® Unified Wireless Network, with emphasis on the Cisco Wireless LAN Controller Module (WLCM) and how it compares to separate, non-unified wireless LAN switch solutions in terms of total cost of ownership (TCO). This paper examines in detail how an integrated approach can save significant costs in ongoing operations, support, and lost productivity over a five-year period.**

## CHALLENGE

As IEEE 802.11-based wireless LANs enter their sixth year of deployment, the evidence of their maturation as a mainstream enterprise networking technology is clear. Increasingly businesses of all sizes are embracing the competitive and productivity benefits of wireless LANs. In a 2005 Sage Research survey of more than 600 companies with 1000 or more employees, nearly 60 percent indicated that they will deploy or expand their wireless LAN infrastructure in the next 12 months. The surveyed companies listed wireless LAN infrastructure as second only to intrusion detection technologies in importance. The growth in demand for wireless LANs catalyzes the need for wireless networks to meet the scale, resiliency, and security of wired networks.

Wireless LAN deployments have skyrocketed for remote and branch offices and small and medium-sized businesses (SMBs), and it's not hard to see why. With little or no onsite IT staff and rapid schedules for bringing the remote office up and making employees productive, wireless LANs have become a popular way to quickly deploy a network. Growing offices and frequent relocations increase the desirability of wireless LANs because employees and networks can be moved, added, or changed in a matter of minutes instead of hours or days. To manage these remote installations, businesses have shifted from standalone intelligent access points to centralized wireless LAN controller solutions (sometimes referred to as wireless switches) in order to simplify configuration and management. Centrally managed solutions offer dramatically simplified deployment through automatic discovery and configuration of access points. Wireless operation is also streamlined—data gathered from the access points can be analyzed by the central controller and used to adjust the RF environment, avoiding holes and dead spots that otherwise would cause network degradation or outages.

The benefits of a centrally managed wireless LAN for remote and branch offices are clear. With little or no onsite IT staff, access points can be installed by local personnel and automatically configured and managed centrally at the main campus by the IT staff. This method allows for quick, cost-effective deployment without requiring travel or expensive local services, yet maintains strict central control of security and configuration parameters. Centralized management will increase in importance as wireless LAN deployments move from simple e-mail and Internet access to advanced applications, such as guest networks, voice over WLAN, and location-based services.

Mobility services such as guest networks and voice over WLAN are more compelling for branch offices than for enterprise campus deployments, because remote sites often have little or no IT support. By deploying a centrally managed wireless LAN, companies can eliminate multiple networks and the associated training, support, and maintenance costs, all of which constitutes a powerful incentive. Recent research by IDC supports this claim. IDC reports that businesses should expect to "…depend on product vendors to supply more turnkey, easy-to-use and manage devices that provide connectivity and performance without incurring significant maintenance and management costs."

Thus, the new challenge facing product vendors is not only how to simplify deployment, but also how to reduce total cost of ownership of the wireless LAN network.

## THE NEXT REVOLUTION IN WLANS: UNIFICATION WITH LAYER 2 AND 3 SWITCHING AND ROUTING INFRASTRUCTURE

Integrating advanced services into the networking infrastructure is not a new concept. Cisco Systems® has led the industry by integrating critical, advanced services into its Layer 2 and 3 switching and routing platforms, including voice over IP (VoIP), integrated security, management and application-oriented networking. The widely deployed, proven portfolio of Cisco Integrated Services Routers provides data routing functions with features such as robust quality of service, network security, encryption, VPN, firewalls, and intrusion detection to address the business needs of small and medium-sized offices and branch offices. Today's savvy businesses are now using their Cisco small-office or branch-office router as a single, secure, integrated platform for the deployment of converged data and voice. With the addition of the Cisco Wireless LAN Controller Module, you can now quickly and easily extend the benefits of wireless LANs to small or mid-sized office environments. This solution serves offices of 120 wireless users or fewer and enables a robust set of mobility services, including guest networking, voice over WLAN, and location tracking.

By deploying a single platform to address all your data and voice business needs, you can streamline your operations and simplify management, maintenance, and training, resulting in lower total cost of ownership.

Integration with the Cisco 2800 or 3800 Series Integrated Services Router platform offers several benefits, including simpler deployment, streamlined management, faster upgrades, and perhaps most importantly, superior reliability. Integration also provides additional cost reductions by providing a shared infrastructure for the backbone, power, and cooling.

The Cisco Wireless LAN Controller Module allows small and medium-sized businesses (SMBs) and branch offices to cost-effectively deploy and manage secure WLANs. The module provides unparalleled security, mobility, and ease of use for business-critical WLANs, delivering the most secure enterprise-class wireless system available. As a Cisco Integrated Services Router module, it delivers centralized security policies, wireless Intrusion Prevention System (IPS) capabilities, award-winning RF management, quality of service (QoS), and Layer 3 fast secure roaming for WLANs. The Cisco Wireless LAN Controller Module, shown in Figure 1, manages up to six Cisco Aironet® Lightweight Access Points and is supported on Cisco 2800 or 3800 Series Integrated Services Routers and Cisco 3700 Series routers.

**Figure 1.** Cisco Wireless LAN Controller Module for the Cisco 2800/3800 Series Integrated Services Routers

The Cisco Wireless LAN Controller Module provides zero-touch access point deployment and configuration, making it easy for IT managers to extend secure wireless networks to branch offices. The Cisco Wireless LAN Controller Module eliminates the need to individually configure, manage, and monitor each access point. In conjunction with Cisco Lightweight Access Point Protocol (LWAPP)-enabled access points and the Cisco Wireless Control System (WCS), the Cisco Wireless LAN Controller Module minimizes deployment and operational costs, allowing businesses with limited IT staffs to easily deploy and manage wireless networks across hundreds of remote sites.

This next-generation solution represents a dramatic shift in benefits to businesses, not just an altering of the physical topology of the wireless LAN. The rest of this paper will demonstrate the significant TCO benefits of an integrated solution versus an overlay solution.

## ACQUISITION COST IS A FRACTION OF THE TOTAL COST OF OWNERSHIP

It is important to understand that the initial acquisition cost of IT technologies typically represents only 20 percent of the TCO over a five-year period. The remaining 80 percent of the cost—the ongoing upgrades, maintenance, and support—are often overlooked during the initial phases of a new technology rollout. While parallel infrastructure may be appropriate for smaller pilot deployments of new technologies, when it comes to widespread deployments that have mature capabilities, the financial implications of the ongoing cost of ownership to maintain these parallel infrastructures cannot be ignored.

TCO can be broken down into two main categories: direct costs and indirect costs. Direct costs and indirect costs each have subcategories that can be readily analyzed.

## THE DIRECT COSTS OF DEPLOYING A NONUNIFIED SOLUTION ON A LARGE SCALE

Deploying wireless LAN infrastructure to a large number of branch offices using a non-unified architecture currently involves many discrete steps that may require weeks to work through in order to bring the network online. The following details the necessary steps.

For smaller branch offices, the traditional site survey may not be necessary. With a typical branch office installation requiring only a couple of access points, placement can be done according to best practices. What remains is the deployment of the wireless LAN controller within the branch office. While doing so for a single WLAN controller might seem trivial, scaling this to tens or hundreds of branch offices will have a significant impact. The physical network in each office is likely to vary greatly, as office space is typically leased and therefore each network is unique. Consider that for each controller for each office, power and cooling requirements must be calculated. Identifying the appropriate points in the network to cable in the controller is the next challenge. Sourcing of additional racks may be required if sufficient open space in existing racks is not available. This creates not only additional outlays for the racks themselves and the cost of the floor space, but entails ensuring that the wiring closet or data center can supply sufficient power and cooling for the additional equipment.

Installation begins by physically cabling the WLAN controllers into the infrastructure. This involves connections not only downstream to the wired switching infrastructure or directly to access points (if powered over Ethernet), but also upstream to the wired infrastructure, including crucial security components such as firewalls, VPNs, intrusion detection systems (IDSs), and other network components.

Next is configuration. It's important to decide on and enter wireless parameters such as the mobility groups and access control lists (ACLs). With overlay solutions, it may also be necessary to add considerable time to configure the physical interfaces to the wired infrastructure, in particular to existing security systems such as firewalls and ACLs.

Another consideration with non-unified solutions is the cost of maintenance, which includes the purchase price of contracts and the labor involved. Multivendor solutions require separate contracts with each party for support. These costs can increase rapidly depending on the vendor's support program, but charges of 12 to 18 percent of the total acquisition cost per year are typical for access to software upgrades, telephone and e-mail support, and equipment replacement. What's more, because of the ongoing rapid evolution in wireless LAN capabilities and standards, you must plan for three to four software upgrades a year. Each upgrade requires reconfiguration, taking the network offline and resulting in lost productivity.

## THE INDIRECT COSTS OF UNPLANNED DOWNTIME

The direct costs just described are straightforward to measure and understand. However, they typically represent a smaller portion of TCO than indirect costs. The larger consequence of an overlay solution is the increase in unplanned downtime created by additional hardware and network complexity. As carefully as organizations plan rollouts, purchase management tools, and invest in training for their IT staffs, unplanned downtime will occur simply because of the complexity of the network.

Two types of downtime can occur: degradation and complete outages. While network degradation may sound less serious than outages, both types of downtime can be deadly to enterprise productivity and revenue. Consider, for example, the business traveler who tries to access a wireless network through a hotspot but finds that the network is down. Although the traveler may be frustrated, she is likely to try again the next time she needs the service. However, if the connection is repeatedly slow, that same business traveler is likely to switch to another service.

Detailed studies on the costs of downtime—both loss of revenue and loss of employee productivity—have been completed by multiple analyst organizations. A 2005 Infonetics survey of large enterprises in North America reveals just how costly downtime can be (Figure 2).

**Figure 2.** Annual Productivity and Revenue Losses as a Result of Network Equipment Downtime

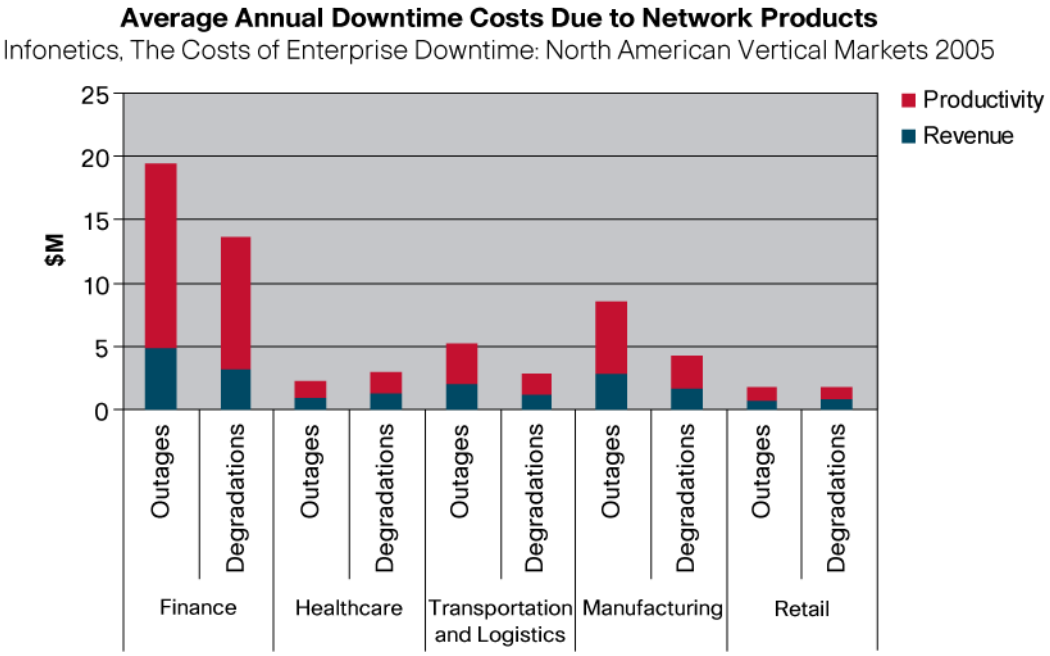



Figure 2 illustrates that downtime costs resulting from network equipment failures run into the millions annually for all major vertical markets. These numbers do not include cabling issues or human error, both of which are significant for overlay solutions because of the network's complexity. Obviously, mistakes or problems of this type can increase the financial impact of downtime.

For non-unified networks, a large portion of outages can be attributed not only to the network's complexity, but also to the time spent by administrators troubleshooting the true source of performance problems or equipment failures. With multiple vendors, it is frequently up to the administrator to prove the source of the problem. Simply tracking down the source may result in hours of wasted time, including calls to the branch office to have onsite personnel assist in troubleshooting over the phone and multiple phone calls to vendors. The costs multiply exponentially—not only is the network down, causing productivity and revenue losses, but additional losses occur from IT administrators' inability to work on productivity-enhancing IT projects.

## A SAMPLE WIRELESS LAN CASE STUDY

The TCO model used in this white paper is based on a nationwide bank in North America. This Fortune 100 company has one headquarters office and over 5000 branch offices spread throughout the United States. Branch offices average 20 employees, but can be as few as 5 or as many as 50. For most branch offices, the company leases space in office buildings and retail centers, resulting in unique office configurations for each branch office. Most branch offices have a mix of closed-door offices and open floor space to serve customers. The bank estimates that new branch offices will continue to grow at a rate of 30 percent per year.

Many employees use laptops when meeting with clients and to access corporate network information in conference rooms. The bank has deployed voice over IP using Cisco Unified IP phones and is pleased with the cost savings. Trials of voice over wireless LAN are currently underway in several branches with the expectation that widespread rollout will occur within the next 12 months.

The IT department is centralized at the headquarters site with limited support in region or the branch offices. The network is IP-based and QoS is enabled. Remote employees access network resources through IPsec VPNs.

### Customer Requirements

The customer requires that all applications supported on the wired network be supported on the wireless LAN network. In the corporate office and existing branch offices, the wired network is not being replaced but is being augmented with the wireless network as an extension. However, in new branch offices, the wireless network will be the primary network because of the difficulty and expense of hard wiring. The bank's desire for the speed and flexibility of a wireless network is fueled by its eagerness to reduce the complexity of additions, moves, and changes, and the need to quickly reconfigure the network at a new location if a branch relocates. The desire for voice over wireless LAN stems from the bank's "personal banker" initiative, in which each customer is assigned an account manager. The bank wants customers to be able to reach their account managers quickly and easily no matter where their account managers are within the branch. Additional requirements are:

- Support for Windows 2000 and XP laptops
- Support for the wireless Cisco IP Phone 7920 today
- Support for wireless VoIP phones using Session Initiation Protocol (SIP) in the next 12 months
- Rogue access point mitigation
- Support for guest access at the headquarters location

### TCO Model Details

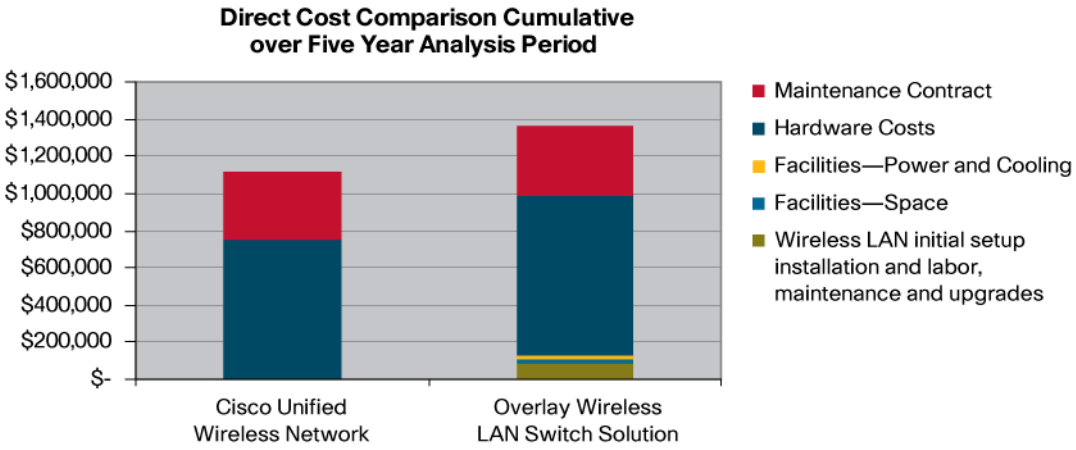
Two solutions are considered: a non-unified wireless LAN controller solution and the Cisco Unified Wireless Network solution. Because the wireless LAN is expected to become the primary network in the branch offices over time, a TCO analysis is performed to determine the true costs over a five-year period. As the offices are physically small with relatively few users, it is estimated that each branch requires three access points based on industry best practices. An initial 100 branch offices are targeted for the wireless LAN rollout, with an estimated growth rate of 30 percent per year to support pervasive voice over WLAN as part of the personal banker initiative. The IT group has standardized on the Cisco 2811 Integrated Services Router for WAN connectivity, as well as built-in Cisco CallManager support for those branches with voice over IP deployments. IT administrators familiar with wireless technology will manage the installation. Burdened salary for the administrators is approximately US$91,000 annually.

### Direct Costs

Direct costs used in the TCO model include the initial time for cabling and configuration, maintenance and upgrades, and facilities space and cooling. As Figure 3 shows, the Cisco Unified Wireless Network solution delivers a 25 percent cost advantage, primarily because of the high equipment costs and significant additional time for initial setup and configuration of the overlay solution.

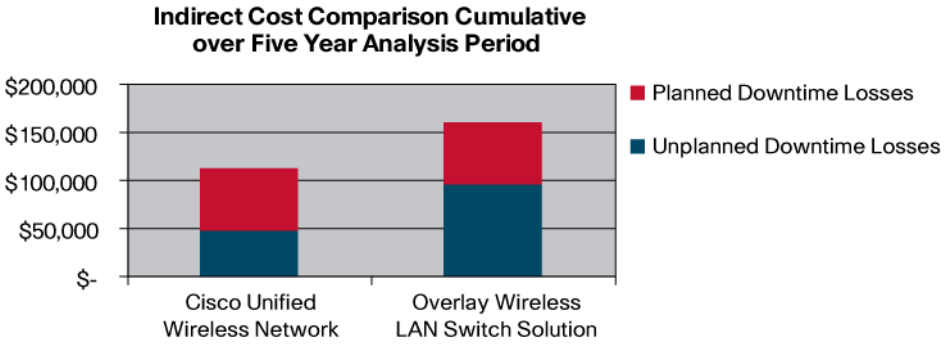
**Figure 3.** Direct Cost Comparison




### Indirect Costs

As Figure 4 shows, indirect costs present an even more striking contrast between the two solutions.

**Figure 4.** Indirect Cost Comparison

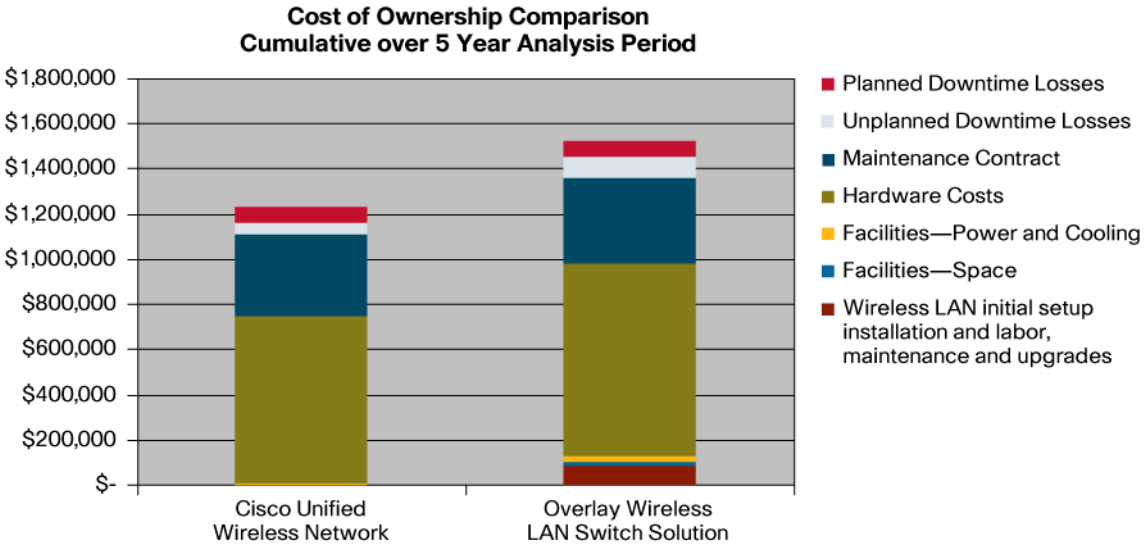



Using a conservative model that incorporates only productivity losses, the integrated Cisco solution provides a 42 percent cost advantage. Planned downtime is dramatically lower with the Cisco solution. Because of integration with the Cisco 2811 Integrated Services Router platform, the Cisco wireless solution eliminates additional cabling, fans, and power supplies. The Cisco wireless solution also reduces unplanned downtime and thus increases network availability to an estimated 99.995 percent. In addition, management of the entire wired and wireless network can all be accomplished from a single interface, which reduces training requirements.

Figure 5 shows the TCO differences for both the direct and indirect costs.

**Figure 5.** TCO Comparison for Direct and Indirect Costs




In total, the overall benefit of integration leads to a reduction of almost 25 percent in TCO when considered over five years. This model is conservative—it does not take into account the revenue gained from the increased network availability. Additional refinement of the model that takes into account the number of revenue-generating employees that are affected by network downtime would further demonstrate the dramatic benefits of an integrated solution.

## CONCLUSION

Wireless LANs are a fast, economical way for enterprises to bring up new branch or remote offices and for small and medium-sized businesses to adapt their network to additions, moves, and changes. What's more, the current generation of centralized wireless LAN controllers greatly simplifies deployment, configuration, and ongoing maintenance for enterprises with limited to no IT resources at the remote offices or SMBs with small IT budgets and staff. With large deployments and the increasing need for mobility services, centralized management is clearly required to simplify configuration and ongoing software updates. However, as wireless LANs move into a new stage of maturity, the new challenge is managing overall cost of ownership. Integration of wireless controller capabilities into the Layer 2 and 3 switch network provides a clear opportunity to reduce these costs, both direct and indirect. Doing so delivers hard benefits to the business' bottom line, allowing investment in other, more productive IT programs.

Even more important are the soft benefits delivered to the enterprise's employees, customers, and partners. By ensuring that wireless network availability is as high as possible, enterprises maintain employee productivity and reduce customer and partner frustration in being unable to access employees or retrieve needed information. Ultimately, network unavailability may even impact the enterprise's reputation and image. The Cisco Wireless LAN Controller Module (WLCM) for the Cisco 2800 and 2800 Series Integrated Services Routers allows businesses to integrate Cisco's award-winning wireless LAN capability into their trusted Layer 2 and 3 switching networks.

Designed for small to medium-sized office deployments, the Cisco WLCM delivers a significant payback in terms of TCO as a result 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 enterprise-class wireless LANs.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