White Paper

Building the Mobile Business with a Unified Wireless Network

Decision making is happening at Internet speed. Providing access to information in real time has emerged as a new challenge for IT and presents the business with an opportunity to create sustainable competitive advantage. To respond to market demands, businesses require fluidity of information to enable decision makers and employees to be more productive. Mobility is enabling enhanced productivity by delivering real-time access to information and bridging the gap between resources and individuals.

The effectiveness with which employees make decisions promotes the success (or failure) of the business. As a result, the business must enable employees to access the information needed to exceed corporate expectations. Mobility allows employees to access business applications, services, and tools from any location, at any time. Mobility helps companies use existing business processes to deliver incremental value in real time through innovative business applications and services.

CHALLENGE

Wireless networking is at the core of today's business mobility strategy. Wireless networking has revolutionized the workplace, allowing companies to introduce compelling new applications and extend mobility services to employees in a secure, scalable, reliable manner. Wireless guest access is an example of the way in which mobility services have improved business processes by reshaping the way that businesses interface with external partners, suppliers, contractors, and guests. Companies must have a solid, secure wireless infrastructure to gain the most from mobility services. A corporate wireless network must be flexible enough to adapt to new business requirements, while integrating into the existing wired network to simplify business processes and deliver a compelling total cost of ownership (TCO).

The wireless infrastructure must be capable of building on the strengths of the existing wired network to become a platform for innovative mobility services and applications. By integrating the wired and wireless networks, enterprises can create a single network whose total value is greater than the sum of its parts. To deliver on the promise of mobility, business applications and services must extend to the individual while remaining transport and access independent.

Cisco Systems® has conducted extensive testing and analysis to determine the best approach to building a wireless infrastructure. As a leader in enterprise networking, Cisco® can use its decades of experience in building enterprise-class data networks to help ensure that the wireless network performs to the same standards as the wired network.

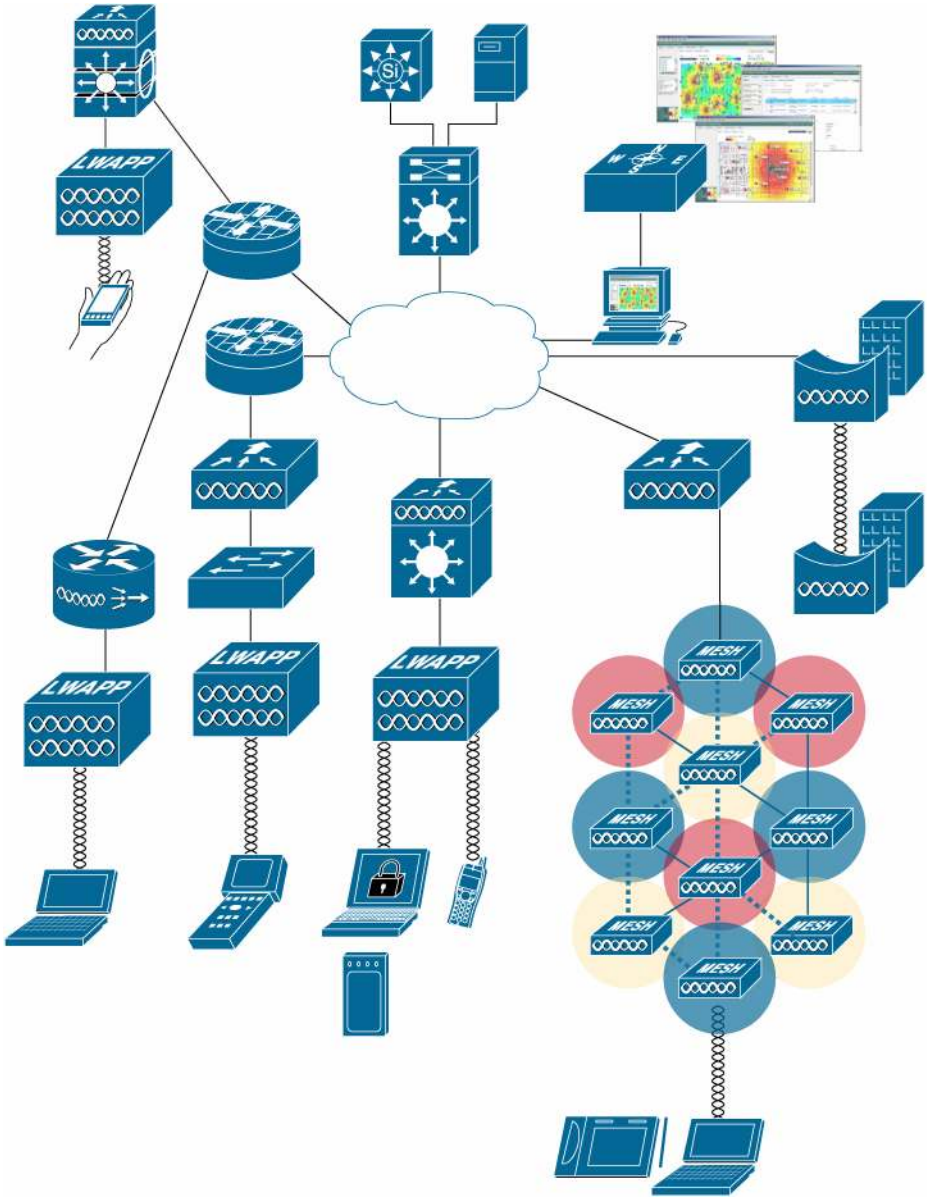
The goal of any infrastructure unification should be to support the business in value creation, either by serving as a platform for new applications or by improving operating efficiencies. To provide the full benefits of unification, the initiative must extend across multiple layers. Unification of components and products is necessary, but in no way a complete solution. True unification extends beyond the technology layer to include network services, business applications, and business processes such as management and support, administration, and even procurement. The business will see the rewards of unification in decreased capital and operational expenditures, single security and management frameworks, and improved application support, leading to greater employee productivity.

SOLUTION

The Cisco Unified Wireless Network is a solution that unifies the wired and wireless networks to provide enterprises with a secure, scalable, and manageable platform for delivering mobility services. With this innovative solution, unification occurs at all levels, including hardware, software, and services. The Cisco wireless solution takes a comprehensive approach that enables mobility from the application layer to the client device.

The Cisco Unified Wireless Network includes five interconnected elements: mobility services, world-class network management, network unification, mobility platforms, and client devices (Figure 1). For more information about the components of the Cisco Unified Wireless Network, see the brochure "Cisco Unified Wireless Network Overview" at http://www.cisco.com/en/US/products/ps6366/prod_brochure09186a0080184925.html.

Figure 1. Cisco Unified Wireless Network



Mobility Services
Unified mobility services deliver VoWLAN, advanced threat detection, location-based security, and guest access.

World-Class Network Management
Same level of security, scalability, reliability, ease of deployment, and management for wireless LANs as wired LANs.

Network Unification
Integration into all major Cisco switching and routing platforms. Secure innovative WLAN controllers.

Access Points
Ubiquitous network access in all environments. Enhanced productivity. Proven Cisco Aironet platform with large install base and 63% market share. Plug and play.

Client Devices
90% of Wi-Fi silicon is Cisco Compatible Certified. Proven Aironet platform. "Out-of-the-Box" wireless security.

Mobility is more than just wireless technology; it is the set of capabilities that are enabled after the user's access to resources becomes presence-aware and location- and network-independent. True mobility can only be achieved with the complete integration of the wired and wireless networks. This integration allows resources to traverse different network types with fluidity, reliability, and security. This paper discusses the business and technical advantages of an integrated wired and wireless network.

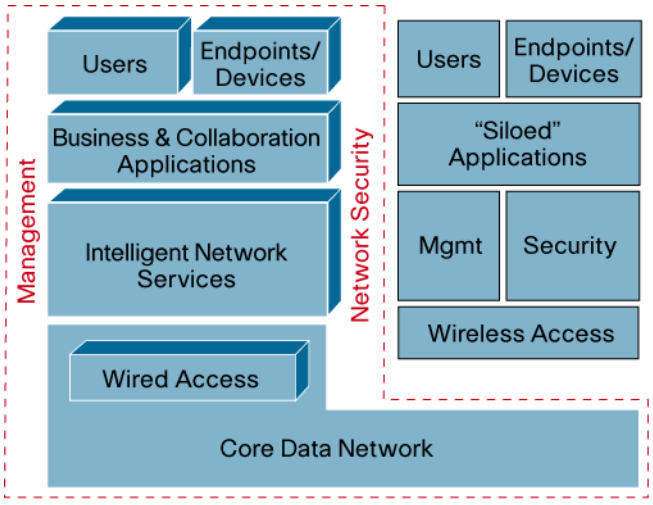
WLAN CENTRALIZATION

Business customers are accepting the architectural migration toward a centralized, controller-based WLAN network. In a centralized, controller-based WLAN, access points rely on a centralized management device for system wide policy intelligence. The benefits of this architecture include greater scalability, improved management, robust security, and lower cost of ownership. Combining a centralized, controller-based wireless architecture with an integrated wired and wireless LAN delivers even greater scalability and cost benefits than a nonintegrated centralized, controller-based WLAN.

Nonunified WLAN Architecture

A nonunified wireless network refers to a controller-based WLAN solution that has little to no unification with the wired network. Nonunified wireless solutions might or might not come from the incumbent data networking provider. Deploying a WLAN from a supplier other than the incumbent data networking provider usually results in different code, management, and user interfaces across the wired and wireless networks, resulting in a lack of benefits when compared to a unified solution. In this scenario, the wired and wireless networks remain separate, with the interface between the two being a standard Ethernet connection (Figure 2).

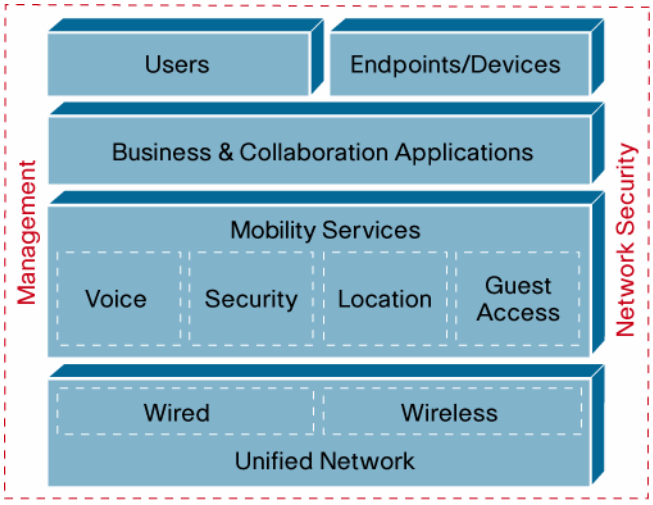
Figure 2. Nonunified WLAN Architecture



Unified WLAN Architecture

A unified wired and wireless architecture typically requires the wired and wireless infrastructures to be delivered from the same technology provider. In an integrated architecture, the control and management features are housed directly in the thread of the wired network. With this architecture, many of the services offered as standard features on the wired network can be extended into the wireless network because of the unification of user and management interfaces (Figure 3).

Figure 3. Unified WLAN Architecture



Although both nonunified and unified architectures can be classified as controller-based, the nonunified approach is less effective at delivering mobility services because it lacks integration with the wired network.

BENEFITS OF A UNIFIED WIRED AND WIRELESS NETWORK

Wireless connectivity is an important part of delivering enterprise mobility. However, not all types of wireless connectivity are the same. Because businesses use the wireless infrastructure to support mission-critical applications, building a business-class wireless network is imperative. An integrated wireless architecture that is unified with the wired network provides many benefits that set it apart from nonunified architectures. The rest of this paper describes the primary benefits.

Feature Parity

Cisco delivers networks that meet business needs. The network of today does not only provide connectivity; it also has the intelligence needed to serve as a platform for business applications. Building intelligence into the network is an important part of helping ensure that the network is flexible enough to respond to the velocity of changes required by businesses. To keep up, many businesses have deployed disparate networks composed of equipment from numerous vendors. By supporting different vendors for wireless and wired networks, enterprises forced themselves to learn and manage multiple sets of features and services. This approach is not cost-effective. A unified approach is a better solution that allows features to be used across both the wired and wireless networks.

A good example of where Cisco has delivered on network unification and feature parity is in the area of security. Network Admission Control (NAC) is an industry initiative led by Cisco. NAC allows the network to detect and quarantine potentially harmful traffic before it has a chance to cause problems to the rest of the network. Part of the Cisco Self-Defending Network, NAC is also supported across the Cisco Unified Wireless Network and helps to ensure that the entire network, irrespective of wired or wireless endpoints, responds in a single manner to obviate the threat of a network compromise.

Integrated Management

Network management also benefits from the integration of wired and wireless technology. As enterprises strive to decrease the complexity of management, having a unified management view across all domains enhances the ability to maintain unified network policies and detect and respond to alerts more quickly. A centralized management solution reduces training costs and allows the IT administrator to be more flexible when managing internetwork issues.

The wireless RF domain has a special set of characteristics that make managing it more challenging than managing the wired network. These challenges relate to the ever-changing nature of the RF environment and the fact that most enterprises lack in-house RF expertise.

The Cisco Unified Wireless Network takes the complexity out of RF management by supporting a series of RF-specific management tools such as dynamic channel assignment, RF interference mitigation, client load balancing, and power transmit control. These tools provide visibility into the wireless network. This visibility allows network managers to view performance, usage, availability, and reliability statistics from a single interface across wired and wireless networks. The combination of these features supports ongoing and automated site survey services to help ensure that the wireless network provides optimal coverage and capacity.

Innovative Mobility Services

One of the greatest benefits of an integrated approach to mobility is the ability to create new, innovative mobility services. As a part of the Cisco Unified Wireless Network, Cisco is delivering a set of mobility services that use the combined strength of wired and wireless networks. Cisco mobility services include location services, voice over WLAN, security, and guest services.

Location Services

An important benefit of wireless networking is the ability for resources and users to access the network from any physical location. Knowing the location of resources and users as they access the wireless network is becoming increasingly important. Being able to track the physical location of Wi-Fi devices facilitates a variety of innovative applications, including real-time asset tracking, location-based security, business policy enforcement, and improved network management. The Cisco Unified Wireless Network supports location services that simultaneously track thousands of devices from directly within the WLAN infrastructure. A location services solution can monitor the location of any active Wi-Fi device within the range of an access point.

Although some location functions are possible without the integration of wired and wireless technology, the overall richness of the solution is much higher with integration. Consider the example of a large, multifacility hospital. A doctor, equipped with a tablet PC, which she uses to access patient records and images in real time, is conducting her patient visits. As the doctor moves from the general patient unit into the intensive care unit, the location-aware network senses her movement and instantly instructs the underlying data network to adjust its quality-of-service (QoS) settings to help ensure that she has the highest level of bandwidth priority. In this way, even the largest image file receives guaranteed delivery when it matters the most.

The combination of location services and presence applications opens up a world of opportunity to refine the quality of communication. By unifying the wireless location and the IP communications platform, businesses can help ensure that users are being reached as needed, depending on where and how they are connected. Consider the hospital case again. Current location services allow internal hospital calls to be routed using voice over WLAN to the caregiver closest to the patient in need. However, the system cannot interpret whether the caregiver is available to respond. Through the combination of location and presence, the unified network now can match both parameters to determine not only the closest caregiver, but also the closest available caregiver. The caregiver can define his or her presence and signal different levels of availability, such as:

- Available
- Busy not with patient
- Busy with patient
- On break

Based on these different levels of presence, the system can combine presence and location information to improve the effectiveness of call routing. In a time-conscious environment, this added capability decreases the time needed for patients to receive the level of care they need.

Voice Services

By integrating their voice, data, and wireless networks, enterprises can extend the capability of the existing premises-based telephony system to add support for wireless telephony. The telephony system recognizes Wi-Fi handsets in the same way that it recognizes traditional desktop phones. This allows users to be mobile while making and receiving calls, improving productivity by reducing voicemail exchanges and expanding the reach of the premises-based telephony system.

A voice-over-WLAN system that is integrated with the wired network has the added benefit of allowing a single control point to guarantee the quality of the call, irrespective of the transport over which the call is carried. This tightly integrated infrastructure allows the call to roam across different network subnets, while facilitating roaming between wired and wireless networks. To illustrate this, consider the example of a global sales manager who is on his way from the conference room back to his office when he receives a call from a client who is on the verge of completing a very large business transaction. The IP communications system recognizes that the sales manager is not at his desk and automatically routes the call to his voice-over-wireless phone. The sales manager accepts the call while walking back to his office. After he arrives, he can transparently transfer the call to his desk phone, freeing his hands to access the information on his computer to complete the transaction.

Security Services

Business and IT executives can have increased confidence when dealing with network security because of the unification of wired and wireless networks. A unified network allows security policies to be extended uniformly across the entire network. No longer isolated, each network has visibility into what is happening around it and can use network intelligence to mitigate risks.

Mobility and wireless technologies make traditional perimeter-based security insufficient. The dramatic increase in the number of mobile devices that roam across private and public networks has emphasized the need to apply security from the client device and resource levels. The Cisco Unified Wireless Network is integrated with the Cisco Self-Defending Network to help ensure that each client is managed for secure, clean access to the network.

Cisco recognizes the important role that a secure client plays in maintaining the integrity of the network. The proliferation of mobile clients has dramatically increased the threat of network compromise from infected or malicious clients. The Cisco Compatible Extensions program, part of the Cisco Unified Wireless Network, helps ensure that client devices have the security features needed to mitigate the risk of a client-initiated security breach. The promise of Cisco Compatible Extensions, secure and simple connectivity, is delivered through strict third-party interoperability testing, resulting in 95 percent of today’s Wi-Fi silicon being Cisco compatible.

Rogue access points present a serious threat to the integrity of the enterprise network. Consider an example in which the network management system detects a rogue access point. Unfortunately for the enterprise, the detection occurs at 3 a.m., and all network administrators are at home asleep. Instead of allowing the rogue access point to pass traffic unstopped, the system isolates the traffic. When the network administrators arrive in the morning, they instruct the network to block the access point traffic at the physical wired port and dispatch someone to physically remove the threat.

Guest Services

Companies need to provide guest access for customers, vendors, partners, and others visiting their facilities. Guest networking is the ability of the network to assign special access rights based on the profile of the user. The system can customize the privileges granted based on the external employee’s role. As an example, a consultant can be granted more network privileges than a supplier. Wireless simplifies guest services by abstracting network connectivity from the physical port.

The wireless network is an excellent platform for providing guest services, given the ubiquity of wireless-enabled laptops and other handheld devices. An integrated wired and wireless network improves the quality of guest services by allowing the guest to maintain a single profile across all

network types. Consider the example of a management consultant hired to improve corporate knowledge management systems. The role requires the consultant to be highly mobile within the enterprise as she gathers information from a variety of employees. When the consultant is back at her desk, she must compare her new data with the data hosted on the corporate servers. After she logs in, the network recognizes her consultant status and allocates her the appropriate access rights. In such a way, access to network resources can be granted or denied based on the user profile, time of day, and type of content sought.

External guests can often be highly mobile within the business, moving between departments as they work across multiple projects or interface with different constituencies. The availability of a unified network that automatically adjusts the services offered based on the guest's location and connectivity type, allowing the IT department to realize cost savings through a decrease in moves, adds, and changes.

Scalability

The RF used by the wireless network is a finite resource that must be managed. Radio resource management (RRM) takes the complexity out of managing the RF and provides a scalable and efficient use of the wireless medium. RRM improves spectral efficiency through a series of wireless management tools:

- Dynamic client load balancing across access points
- Automatic interference detection and avoidance
- Automatic access point channel assignment
- Dynamic access point power transmit control
- Automatic site survey and RF recalibration tools

To help ensure adequate network coverage and bandwidth for all employees, enterprises require numerous access points throughout buildings and across the campus. A wireless network, capable of supporting the breadth of mobility services required for business application innovation, requires a single access point per every 3000 square feet of office space. By integrating the wireless network into the existing wired network, IT managers can rest assured that the underlying data network can handle any additional traffic the WLAN might generate (for example, from guests, contractors, or additional management) and still provide a unified view of network performance.

Complete wired and wireless integration allows the control and management of access points and controllers to be centralized into the core of the network. This centralized control significantly decreases the overhead and time required to manage the wireless system. Instead of touching individual controllers or access points, IT administrators can have a single management point that spans the breadth of individual wireless components. By integrating wireless management into the network core, Cisco can manage more than 80,000 WLAN clients from a single interface.

The integration of wireless components into the wired infrastructure allows companies to use their existing infrastructure investment more effectively. This integration provides a better use of resources, including support labor, equipment processing power, and physical wiring closet rack space. For example, with the Cisco Unified Wireless Network, enterprises can move from supporting multiple network components, such as data switches and wireless controllers, to a single network component that integrates into the wired infrastructure, such as the Cisco Catalyst® 6500 Series Wireless Services Module (WiSM) or the Cisco Wireless LAN Controller Module (WLCM) for integrated services routers.

Business-Class Wireless

The Cisco Unified Wireless Network meets exacting Cisco standards for business-class resiliency and reliability. Because businesses are increasingly trusting their mission-critical applications to the wireless network, preserving network uptime is imperative. Cisco places a strong focus on quality testing of its components, helping ensure that each product is designed to deliver superior performance.

Additionally, Cisco has enhanced its wireless solution to improve network resiliency through automatic failover between access points and controllers. In the case of a controller failure, access points will automatically communicate with the next available controller. Similarly, the system will detect any access point failure and will instruct the neighboring access points to increase their power transmission to avoid coverage gaps.

At the core of the unification of wireless and wired Cisco networks are the Cisco Catalyst 6500 Series WiSM and the Cisco WLCM. Cisco switches and integrated services routers are designed to provide superior uptime to help ensure that even the most demanding networks remain free from unplanned interruptions. The Cisco Catalyst 6500 Series WiSM and Cisco WLCM use the high service level provided by the Cisco Catalyst switches and Cisco integrated services routers to help ensure that the wireless network provides the same level of uptime as the underlying wired network.

TCO

The businesses view of IT expenditures has shifted dramatically over the past few years. Many business executives now view IT as a strategic investment that can provide competitive advantage through improved efficiencies, lower production costs, and new ways of reaching the customer. Enterprises are now increasingly aware of how IT investments affect profits.

Perhaps the best way to evaluate the benefit of an integrated mobility platform as compared to a nonunified solution is in the way each solution affects the TCO. Nonunified WLANs do not deliver a lowered TCO. Unified solutions such as the Cisco Unified Wireless Network can deliver on the promise of lower TCO because they unify two separate systems (wired and wireless) and extend the same capabilities across both systems.

TCO analysis can be divided between capital expenditures and operational expenditures. Analysis often shows that the acquisition price of technology is a small fraction of the total cost over the lifetime of the product, typically representing anywhere from 20 to 35 percent, depending on the technology and its maturity. Table 1 describes the ways in which an integrated wired and wireless mobility platform provides a lower TCO when compared with a nonunified wireless network.

Table 1. Unified Wired and Wireless Architecture Savings

Type of Saving	Benefits
Capital expenditures	• Lower capital expenditure because of larger purchasing volume • Implementation with existing network components (routers, switches, security devices), eliminating the need for additional equipment expenditures
Operational expenditures	• Better procurement management because of fewer suppliers • Lower training costs • Faster problem resolution because of elimination of multivendor conflicts • Faster implementation involving a single, experienced partner • Improved network management through a single centralized interface • Decreased labor support costs because of centralized network management • Lower network planned and unplanned downtime • Faster network adds, moves, and changes through centralization of access point configurations

SUMMARY

Business has moved into a “mobile age”, promoted by the proliferation of mobile devices and the need for employees to conduct business at any time and in any location. The concept of mobility has evolved to an individual-centric transaction model. Resources are now mobilized to be available regardless of how, when, and where the individual seeks to access them.

Businesses can use mobility to create value through new network services, business-relevant applications, and improved productivity. The Cisco Unified Wireless Network embodies the Cisco vision of an enterprise-class network ready for the new mobile world. By integrating their wired and wireless networks, businesses not only simplify the network, resulting in a decrease in TCO—more importantly, they become able to find new and better ways of doing business. The next wave of business is mobile, and Cisco is enabling its customers to be at the forefront of this newest business transformation.

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