

Guide to Wireless Communications, Third Edition

Chapter 12 Wireless Communications in Business

Objectives

- List the advantages of wireless communications for businesses
- Discuss the challenges of wireless communications
- Explain the steps needed to build a wireless infrastructure

Advantages of Wireless Technology

- Basic advantages
 - Mobile data access
 - Easier network installation
 - Easier office moves
 - Better disaster recovery
- Business-specific advantages
 - Universal access to corporate data
 - Increased productivity
 - Ability for customers to access their own data
 - Data availability around the clock
 - Improved information technology (IT) support

Universal Access to Corporate Data

- Universal access can help a business generate more revenue
- Example: A sales representative can use a WiMAX network to access live data that will help make the sale
- Wireless technology benefits anyone who needs to be mobile but needs access to data
 - Useful when all parties are in one location
- Industry experts agree that universal access is the greatest advantage of wireless technology

Increased Productivity

- Having universal access to corporate data
 - Leads to increased productivity by employees
- Survey by Cisco as far back as 2001 showed that
 - By using a WLAN, employees could access data almost two additional hours each day than if they were only using a wired network
 - Average user could be 22 percent more productive

Increased Access to the Customer's Own Data

- Key factor in reducing business costs
 - Shift the burden of accessing a customer's data from the business to the customer
 - If customers can see data about themselves, they can make better and more informed decisions
- Customers can use WLANs to access their data
 - Example: Banking industry
 - Bank clients can access account balances, pay bills, and transfer money between accounts from a mobile device

Data Availability Around the Clock

- Wireless technology can help make data available from almost anywhere at any time
- Many business applications have been developed for smartphones
 - Example: software that allows a field technician to update trouble tickets and access technical documents

Improved IT Support

- Significant advantages include:
 - Easier system setup
 - Decreased cabling costs compared to wired systems
- Troubleshooting a wireless network is often simpler than troubleshooting cabling problems
- Other improvements
 - Easier and faster equipment moves
 - More efficient use of office space
 - Lower support and maintenance costs

Voice over Wireless LAN (VoWLAN)

- VoWLAN
 - Takes advantage of Voice over IP (VoIP) technology
 - Uses wireless infrastructure to carry voice and data
- Wireless VoIP phones
 - Telephone handsets that connect to a WLAN's access point
- Wireless VoIP SOHO routers
 - Can be connected to a DSL or cable modem
 - Provide both a WLAN and telephone services through the user's Internet connection

Challenges of Using Wireless Technology

- Challenges include:
 - Competing technologies
 - Data security
 - Privacy
 - User reluctance
 - Shortage of qualified staff

Competing Technologies

- Some wireless technologies are clearly based on approved industry standards
 - WLANs following the IEEE 802.11 standards
- Other wireless technologies do not have clear standards
 - Digital cellular telephony is an example
 - Business must determine which technology will be viable in the future

Wireless Technology	Primary Applications	Pros	Cons
Bluetooth (IEEE 802.15.1)	Cable replacement	Wide availability	Low-speed, limited range
ZigBee (IEEE 802.15.4)	Residential and industrial controls	Low-cost, low-power, mesh networking	Limited security (encryption), low-speed
WiMedia (IEEE 802.15.3c), WiGig, WirelessHD, WHDI	Multimedia distribution, interconnecting consumer entertainment equipment, telephones, and even data	Low-cost, low-power, high-speed, mesh networking with IEEE 802.15.5, QoS	Limited processing power and consequently limited security for some devices; limited range without mesh networking
WLANs—802.11a/b/g/n/ac/ad	Mostly data networking	Established technology; new enhancements to the standards that allow it to support voice, QoS, mesh networking, faster handoffs, multimedia; good security with RADIUS or VPN; LOS required; up to 7 Gbps	Good ability to handle voice and multimedia only for 802.11n; for 802.11b/g/n in the 2.4 GHz band, limited spectrum and limited range without mesh networking; for 802.11a, limited range
WiMAX (IEEE 802.16)	Data, voice, video; fixed or mobile	40 Mbps to 1 Gbps fixed wireless shared-bandwidth with range of up to 35 miles; high-security; 2 Mbps* for mobile applications; can be overlaid on cellular network; LOS or NLOS	Complex technology
Cellular	Voice, data	Up to 1 Gbps LTE Advanced	High-cost per-minute/per-user
Satellite	Voice, data, video	Covers remote areas not available with other technologies; can achieve 1 Gbps in dedicated connections	Very high cost of deployment; requires high-gain directional antennas for most applications
RFID and NFC	Data for product identification (RFID) or exchanging data between devices up to 1.6 inches (4 cm) apart	Worldwide standard for product identification (RFID) and for exchanging data and payment applications (NFC)	Short range; some security and privacy issues; low processing power and, consequently, limited uses for RFID tags

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Table 12-1 Wireless technologies

Data Security and Privacy

- Wireless technology's greatest strength
 - Allowing users to roam freely without being connected to wires
 - Can also be its greatest weakness
- Broadcasting network traffic over the airwaves
 - Has created a concern for keeping that data secure
 - Hardening systems requires expertise and may significantly increase costs

User Reluctance

- In technology, changes are nearly constant
 - As standards and technology advance, established vendors continue to improve products
- Change can be painful for users
 - Because it takes time and energy to learn a new system
- Human factor in implementing wireless technology is sometimes a significant obstacle

Shortage of Qualified Staff

- Need for information technology (IT) professionals has increased
 - To develop and implement wireless applications and provide support
- As technology improves and becomes easier to use
 - The life of a network administrator or a reseller can get more complicated
- WLAN networks must be constantly monitored
 - And IT staff must be trained in new technologies

Building a Wireless Infrastructure

- Similar to adding a new network to the organization
- Several of the steps necessary to build this new infrastructure are similar to those needed when adding a new wired network
- Some of the steps required to deploy other types of networks, such as WiMAX and cellular, are similar
 - Process is different
 - Cost of equipment and testing tools is much higher

Needs Assessment

- Question to be asked
 - “Do we really need it?”
- Evaluating the need for wireless technology
 - Time-consuming process
 - Involves
 - Looking at the organization and the current network
 - Gathering basic information
 - Determining costs

Look at the Organization

- First step in assessing the need for wireless networks is to examine the organization
- Basic questions
 - What is the current size of the organization?
 - How much growth is anticipated?
 - How do employees in different positions and departments perform their daily activities?
 - How frequently does the company move staff to other offices and need to reconfigure the wiring setup?

Look at the Organization

- Answering the basic questions can help focus the thinking on the organization as a whole and away from any part of it
- Employees who work primarily at their desks on a single computer may not require wireless access
 - Wired network will provide performance that is more consistent in the long run

Assess the Current Network

- Questions to ask include:
 - How does the current network support the organization's mission?
 - What are the strengths and weaknesses of the current network?
 - How many users does it support?
 - What essential applications run on the network?
- Different industries have different network needs
- Assessing the current network helps identify why a new technology is needed

Description	Data
Number of clients	72
Types of clients	35 using Windows 7 (Ethernet) 20 using MacBook Pro (802.11n 2.4 and 5 GHz, Ethernet) 17 using Apple iOS (9), Android (5), and Blackberry (3); 802.11n; 2.4GHz
Number of servers	1 using Windows 2008
Switches	2 × 48-port
Routers/Subnets	1/1
Type of network	Wired (Ethernet)
Type of cable (medium)	Category 5e; maximum length of 210 ft.
Other devices	5 laser printers (network), 1 wireless 1 scanner

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Table 12-2 Sample current network

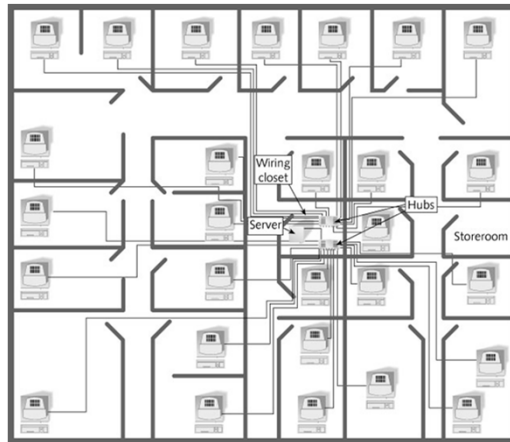


Figure 12-1 Typical network overlaid on a floor plan

Gather Information

- Expertise needed to gather the information may be beyond that of current IT staff
 - Turn to outside consultants to help
- Request for information (RFI)
 - Document that seeks information about what vendors may have to offer
 - RFIs are general in scope
 - Once all RFIs have been returned, the organization can examine each of them in detail

Perform a Wireless Site Survey

- Wireless site survey
 - Measures the strength and quality of the signal and the resulting transmission speeds and throughput
 - Achievable in all different locations around the office
 - Helps determine the existence of interference sources
 - Both internal and external
 - Helps ensure that the actual performance of the network will meet the needs of all users

Perform a Wireless Site Survey

- Wireless site survey should ideally be performed using the same type and model of equipment that will eventually be installed
- Factors identified by a site survey include:
 - Security features and policies required
 - Radio signal range (distance requirements)
 - Number of channels required (based on user/application load)
 - Throughput required
 - Location of AP radios and antennas
 - Location of client devices

Perform a Wireless Site Survey

- Factors identified by a site survey include (continued):
 - Type of client adapters (WNICs) and whether external antennas may be required
 - Power requirements (Power over Ethernet or line?)
 - Growth requirements and impact on current design
 - Potential interference sources and their location
 - Standards and frequencies to be implemented (802.11a or g)
 - Requirements for integration with the company's wired network

Site Survey Tools

- To evaluate the environment for a new deployment you will need at least one AP of the same model you intend to install
 - AP will need to be configured to transmit a signal in a channel that is preferably clear of other transmissions
- If you will be performing site surveys on a regular basis, there are software tools that allow you to load a floor plan, walk around, and complete the survey
 - Examples: Ekahua Site Survey and AirMagnet Survey



Figure 12-2 Fluke AirCheck Wi-Fi Tester

Site Survey Tools

- Other items required for site survey include:
 - Laptop computer compatible with the software you will be using
 - Ladder, wire, packaging tape or other means of mounting AP
 - Additional external antennas, if required
 - If floor plan is not available, some means of measuring distances
 - Some means of communication, such as a cellular phone or walkie-talkie
- Different site surveys may require additional tools

Return on Investment

- Return on investment (ROI)
 - Determines the cost in relationship to the benefits
 - ROI is the profit divided by the investment
 - ROI is best expressed over a specific period of time
 - Types of costs
 - Upfront costs: necessary to start a project
 - Recurring costs: costs that a user may continue to pay over an extended period of time

Develop a Plan

- Developing a sensible, workable plan is perhaps the most critical piece of the entire process
- Request for proposal (RFP)
 - Detailed planning document sent to potential vendors
 - Contains precise specifications for the products and services that the organization intends to buy
- Request for Quote (RFQ)
 - Asks vendors for their most competitive prices on specific equipment
 - Generally used when internal staff will design and implement

Develop a Plan

- Whom to involve
 - Organization's IT team
 - Users themselves
 - External consultants
- Regular meetings should be scheduled in which external consultants provide details on how the project is moving forward
 - Should include a schedule of activities, a listed of proposed technologies, and a phased implementation plan

Developing a Request for Proposal

- Some of the key elements in an RFP include:
 - Statement of value
 - Description of operations
 - Current network and applications
 - Timetable
- Vendors will respond with their proposal
- Wireless application service provider (WASP)
 - Can design and create a wireless application to run on a specific range of devices
 - May know how to get the project up and running quickly

Proposed Date	Activity
May 1	Date RFP is issued
May 15	Last date that written questions must be submitted by vendors
May 30	Date RFP responses are due
June 15	Week that initial cuts will be made
July 1	Week that presentations will be made by the finalists
July 15	Date the contract will be awarded
August 15	Date the contract will be finalized
September 10	Date work will begin
February 12	Date work will be completed

Table 12-3 Sample RFP timetable

Performing a Limited Trial

- Pilot project
 - Borrow sample hardware and software from the vendor who won the bid
 - IT staff should be thoroughly involved in the trial
 - Along with a select group of users
 - New wireless technology should be thoroughly tested
 - Including its security aspects
 - IT department should also learn how to troubleshoot the new technology

Training Staff

- Training helps users and support specialists
 - Knowledge to effectively operate and support the new wireless technology
- Can save time and costs during the transition
- Types of training
 - Small group sessions
 - Detailed written instructions
 - Web-based training
 - One-on-one sessions

Rollout to All Users

- Most efficient way to do a widespread rollout is in phases
 - Start with just one department or unit of the business
 - IT staff will be able to deal with problems more easily
- If project needs to go live before it is entirely debugged or finished:
 - Users should be alerted
- Confer and identify problems that may have arisen
 - Before additional units are brought on

Providing Support

- User support functions can be organized as follows:
 - Establish informal peer-to-peer support groups
 - Create formal user support groups
 - Maintain a help desk center
 - Assign support to the IT department
- Help desk:
 - Central point of contact for users who need assistance using technology
 - Manages customer problems and requests
 - Provides support services to solve problems

Providing Support

- Suggestions for running a help desk
 - Have one telephone number for the help desk
 - Plan for temporarily increased call volume after the new network is installed
 - Create a method to track problems effectively
 - Use surveys to determine user satisfaction and to identify any remaining issues
 - Periodically rotate network personnel into help desk
 - Use information from the help desk to organize follow-up training

Summary

- Wireless technology can positively impact an organization in many ways
- VoWLAN uses IP phones and VoIP on the same network the company uses for data
- Wireless technology faces various challenges
- Once a business has decided to invest in wireless technology
 - Must build a new wireless infrastructure
- Security needs may increase the cost of the project significantly

Summary

- Some organizations may send out a request for information (RFI)
- Next step is to create an implementation plan
- After RFPs have been received and vendor selected
 - The company performs a limited trial or pilot project
- Training provides all users and support specialists the knowledge to operate and support the new wireless technology effectively

Summary

- As the training nears completion
 - Business rolls out the technology to all users in phases
- After training is completed, support continues as users' questions are answered
 - An internal help desk is an effective support method