



Case Study of Wireless Networking for Small Business

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Abstract—Mobile and wireless networks have undergone rapid changes and have seen an unprecedented growth during the last few years. Traditional ways of networking have changed to accommodate new lifestyles and newer ways of working. Wireless networks offer several advantages over fixed or wired networks through mobility, flexibility, ease of access, speed of deployment, and low cost. Flexibility of wireless networks facilitates rapid deployment. Finally, this paper identifies the benefits of wireless technology for small businesses and features of wireless networks.

Keywords—Wireless Networking, Wireless Technology, Benefits & Features of Wireless Networks.

I. INTRODUCTION

The Communication is the key to survival for any business organization. In today's business scenario, where small businesses are expanding and shifting bases rapidly, the need for keeping all the units of an organization synchronized has increased. Further, to cater to a large mobile workforce, business organizations have started using the wireless technology. Wireless technology enables you to transfer data in voice or data format from one computer to another using airwaves. Thus, it eliminates the need for electrical plug-in devices to enable physical connectivity.

Wireless communication has revolutionized the way people work and conduct their day-to-day business activities. Using wireless technology, you can send and receive instant messages and browse the Internet from a remote location. You can also access corporate databases from any location in the world using a cell phone or handheld device, and stay in touch with the digital resources that you require irrespective of where you may be geographically located. The emergence of an increasingly mobile global workforce has dynamically changed the frequency and immediacy of internal and client communications [1]. In this scenario, as a small business owner, you might want to weigh the business benefits that new technology offers in terms of the cost of ownership.

Wireless networking for small businesses has the advantage of providing computer connectivity without the encumbrance of cables, complicated wiring closets, or the requirement of

drilling holes.

II. TYPES OF WIRELESS NETWORKING

There are two kinds of wireless networks, ad-hoc or peer-to-peer wireless networks and infrastructure or Basic Service Set wireless networks. In an ad-hoc or peer-to-peer wireless network, wireless clients communicate directly among themselves without using an access point. In this kind of a network, there are a number of computers, each equipped with a wireless networking interface card.

The advantage of an ad-hoc network is that it is quick and easy to set up even at a location where a network infrastructure does not already exist or is not required permanently. For instance, you can have an ad-hoc wireless network in hotel rooms and convention centers. However, ad-hoc wireless networks have the disadvantage of denying access to wired networks and limiting the communication amongst wireless clients. An infrastructure or Basic Service Set wireless network consists of wireless clients and an access point, where the access point acts like a hub that provides connectivity for wireless computers. The access point can connect or "bridge" the wireless LAN to a wired LAN, thus allowing wireless computer access to LAN resources, such as file servers and existing Internet connectivity.

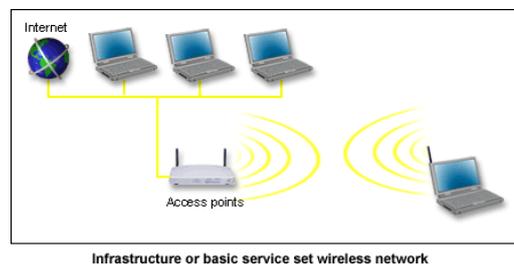


Fig. 1 Infrastructure or Basic Service Set wireless networks

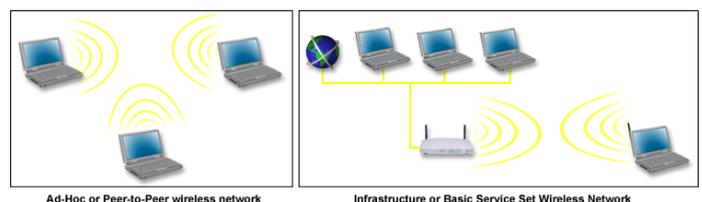


Fig. 2 ad-hoc or peer-to-peer wireless networks and Infrastructure or Basic Service Set wireless networks

The number of access points that exist in a WLAN can be

increased to accommodate more users or to increase the coverage area. This results in the creation of an Extended Service Set (ESS) that comprises two or more Basic Service Set (BSS) wireless networks. However, a distinct drawback of ESS WLANs is that all wireless clients and access points must be a part of the same network to enable users to freely roam between each access point. In addition, it can become difficult to manage one large network.

a. *Wireless Networking*

Wireless technology, when implemented using specific hardware that enables two or more computers to communicate, is referred to as wireless networking. Wireless technology uses standard network protocols but does not use network cables to enable the communication. It provides full-featured LAN functionality, such as the sharing of files and hardware resources over the network. A wireless network uses radio or microwave signals for communication. However, this form of communication has a security risk associated with it because an intruder does not need access to your physical network to gain access to your data. However, enabling the security features offered by this technology can mitigate this risk [2].

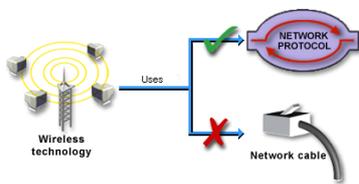


Fig.3 Show Wireless networking enables to communicate two or more computers

III. BENEFITS OF WIRELESS TECHNOLOGY

The benefits of implementing wireless technology in small businesses are far-reaching and can positively influence the organization. Some of these benefits are listed below.

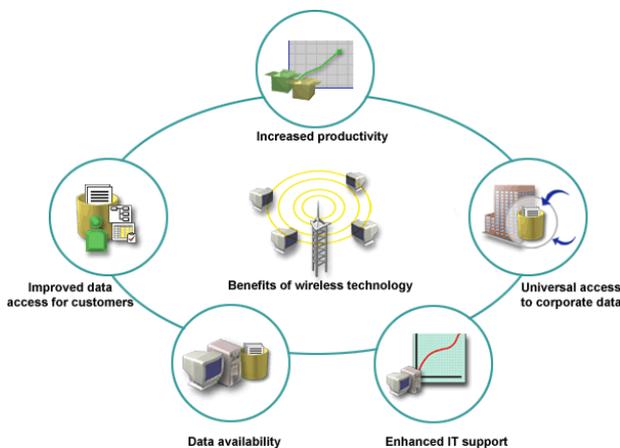


Fig. 4 Show benefits of wireless technology for small business

a. *Increased Productivity*

A business organization that allows universal access to its corporate data helps in increasing the productivity of the organization. Wireless technology allows employees to continue with their work even if they are not at their desk or are at a distant location that is not connected physically to the corporate database. A survey conducted by CISCO in 2001 reflects that employees, who had wireless LAN (or WLAN) access, used the corporate database for two hours more than the usual office hours. This enabled them to complete more tasks, and therefore, helped in increasing the productivity of the organization. These employees could do so by connecting to their corporate database even when they were in a meeting, conference call, or at home.

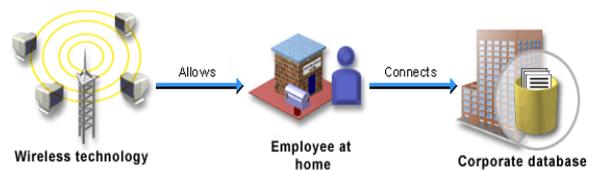


Fig. 5 Show increasing the productivity of the organization

b. *Universal Access to Corporate Data*

For a business organization, wireless technology provides access to its corporate database from any location. This is beneficial to their employees, who are regularly on the move. For example, corporate people visiting their branch offices or other organizations for business purposes need to present the latest facts and figures to validate their presentation. For this, they must have these data at their disposal. They can achieve this result by simply connecting to a central database from any location using handheld devices, such as a cellular phone or a wireless notebook.



Fig. 6 show universal access to corporate data

c. *Enhanced IT Support*

Another area where wireless technology has proved to be useful is in the area of IT support. It has improved the working of an IT department because it requires less setup cost as compared to wired networks.

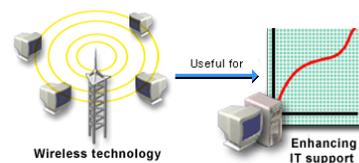


Fig.7 Show wireless technology useful for enhancing IT support

The reason for this is that wireless technology requires reduced movement of equipment's and reduced cost of maintenance. For example, wireless networks have reduced the needs for network equipment's that are required to provide connections at various locations across office buildings.

4. Data Availability

In today's business scenario, where everyone strives to meet deadlines, accomplishing the given task might require inputs in the form of data and analysis. The use of wireless technology helps make data available from anywhere at almost any time. This enables you to complete your tasks from any location. For example, sales persons traveling on a business deal can keep themselves updated with the latest sales figures of their organization and clients. They can do so by connecting to the corporate database using handheld devices, such as laptops and tablet PCs.

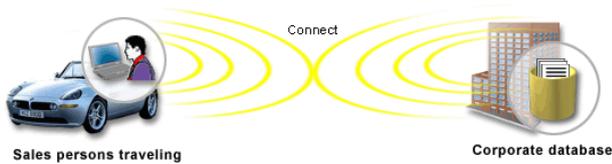


Fig. 8 Show connecting to the corporate database using handheld devices

d. Improved Data Access for Customers

It today's growing world of competition, the only way to succeed in business is to keep customers satisfied with the services offered to them. One major way of doing this is by proper management of customer data. However, this needs the use of added human resources to manage all customer data, thus escalating costs. A possible solution for this problem is to allow a customer manage his or her own database using wireless technology. An example of such a solution can be seen in the job market today. Most job consultants have their own Web sites, where customers can enter their job preferences, view their job details, and cancel or make modifications to their preferences by logging on to the Website. These job databases are then accessed by the organizations that need to recruit people. These results in low cost to the organization because it diminishes the total cost associated with the recruitment process, such as the cost of advertising and the need of additional human resources. This feature, when provided using wireless technology, further reduces unnecessary staffing and other costs to the organization [3].



Fig. 9 show Improved data access for customer

5. Wireless Solutions

Internet and its associated applications such as e-mail and instant messaging, have led to increased internal and client communications. In addition, organizations today have a large mobile workforce that needs to be in synchrony with all the other units of the organization. This has increased the need of a solution that is free from the hassles, such as cabling costs, which are inherent to a wired network. Wireless networks are the solution because they provide the following advantages [4].

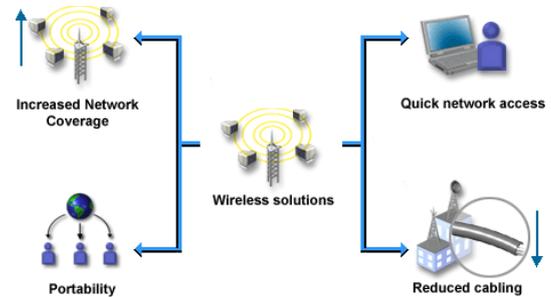


Fig. 10 shows wireless solution has following advantages

6. Increased Network Coverage

Wireless network provides a quick and cost effective solution for expanding existing Ethernet networks. For example, if an organization is planning to send some of its employees to a client location, it can provide access to its network so that these employees continue to work on the project. Wireless network, thus, provides a cost effective network solution, as it is free of the cabling costs and the maintenance costs associated with a cabled network.

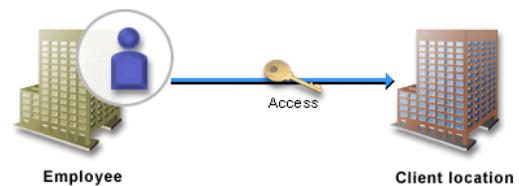


Fig. 11 Show cost effective network solution

7. Portability

Business organizations today have a large mobile workforce that requires access to corporate data when they are on the move. Wireless networks provide universal access to corporate data as a solution for such a workforce.

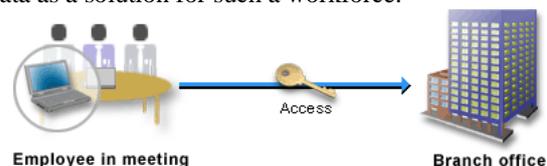


Fig. 12 Show access to corporate data

For example, a visiting employee of a branch office can

access its branch office network, when needed, during a meeting without having the need to find a spot that would provide an available wired connection.

e. Reduced Cabling

Wireless networks provides an excellent solution to a business organization that are based in spaces that are hard to wire, such as old buildings, asbestos walls, or buildings that have solid walls. This solution is also very effective for corporate houses that frequently change their place of work. The network moves with the office and has no need of re-wiring. In addition, wireless networks eliminate the time required to re-wire a building is high and the re-wiring process disrupts the smooth working within the office.

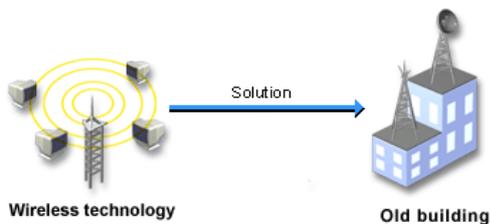


Fig. 13 Show wireless network reduced the cabling

f. Quick Network Access

A wireless network is easy to set up. All you need to do is install the software and Network Interface Cards (NICs), plug in the access points, and your network is up and running in minutes. For example, during a conference with a client, if the physical network of the organization crashes, the organization might lose a valuable client. However, if the organization has a backup network mechanism in place, the working can be quickly restored. A solution to such events is the wireless network that allows the organization to resume work until the primary network is restored.

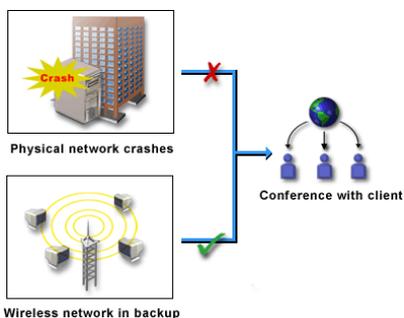


Fig. 14 Shows wireless solution has following advantages

VIII. FEATURES OF WIRELESS NETWORKS

A wireless network has various features that you, as the manager in a small business organization, can use. Some of these features are given below.

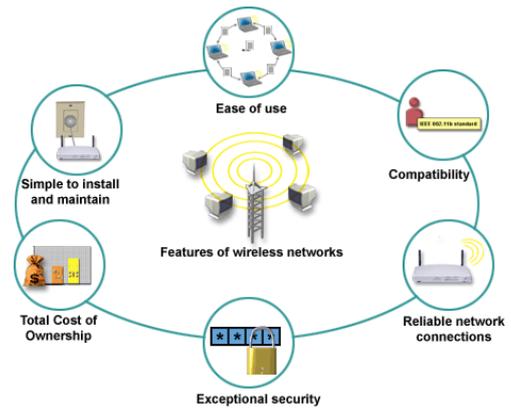


Fig. 16 Shows wireless networking features for small business

a. Ease of Use

Wireless networking allows two or more computers to connect to each other in the temporary mode without the use of a wired LAN. This network can then be used to share data among these computers. Wireless technology automatically configures network client settings and selects the best channel for data transfer.

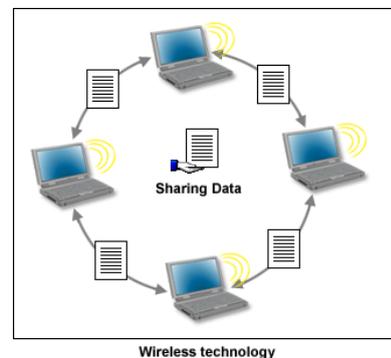


Fig. 17 Show sharing data between computers

b. Comatibility

Following standards is the best way of ensuring compatibility. Wireless networks follow the IEEE 802.11b standard to describe how certain networks should operate. The advantages that 802.11b provides are high connection speed of 11Mbps, support for 128 client devices, advanced security features the network should support, and industry wide support. To promote the IEEE 802.11b standard, network vendors formed the Wireless Ethernet Compatibility Alliance (WECA). Wireless products that meet the 82.11b standard are certified by WECA with the Wi-Fi logo.

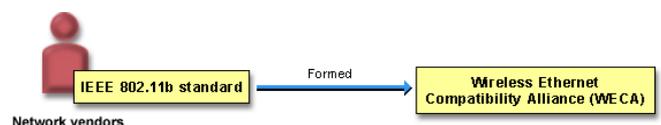


Fig. 18 Show ensuring compatibility

c. *Reliable Network Connection*

Access points automatically adjust the connection speed in accordance to the environment in which the network is to be used. It alters the connection speed to compensate for any interfering radio frequencies, thus ensuring reliable network access even at long range or in electromagnetic environments. Some access points automatically assign IP addresses to wireless clients so that you do not need have to manually reconfigure your laptops even if you roam from one access point to another. Wireless networks are a solution for cable failures, which is perhaps the most common form of error that occurs in a network.



Fig. 6 Reliable network access

d. *Exceptional Security*

Wireless networks support various data encryption schemes, such as 64-bit Wireless Ethernet Protocol (WEP) or 128-bit encryption. However, recipients of encrypted data must have specific keys to the decrypt data. Wireless networks also use dynamic security link technology that automatically generates a 128-bit encryption key for each session. This provides a higher level of security than a static key, and eliminates the need of entering encryption keys manually.



Fig. 19 data encryption schemes

e. *Total Cost of Ownership (TCO)*

The initial cost incurred to set up a wireless network is higher than a traditional wired network because the cost of wireless components is higher. However, a wireless network has a very low maintenance and expansion cost compared to a wired network. However, this increased cost of set up is a temporary phenomenon.

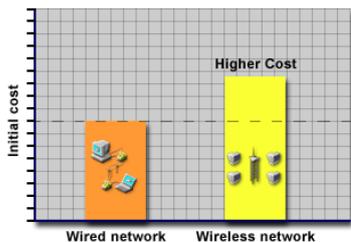


Fig. 20 Show initial cost of wireless network is higher than traditional wired network

With the increased demand and popularity of wireless networks, the production of such equipment is also on the rise and an increased supply of such equipment could result in reduced costs in the future, thus making the pricing comparable to that of the wired network.

f. *Simple to Install and Maintain*

Setting up a wireless network primarily includes setting up access points. Access points can be set up quickly, and then you just need to plug the access points into a power source. The wireless network clients then automatically detect the access points and configure their IP addresses. However, configuration of IP address manually or automatically is a matter of corporate policy and not a factor of whether it is through an access point or not. An access point extends the access to a Dynamic Host Configuration Protocol (DHCP) server without the requirement of wires. After the network is installed, the web-management software monitors and adjusts the network performance. The software helps you to determine the number and location of the access points needed for sufficient bandwidth coverage [5].

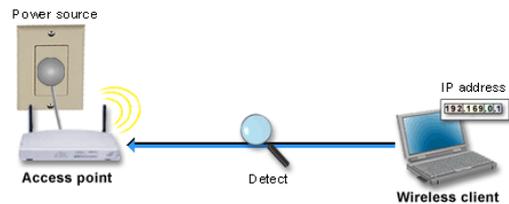


Fig. 21 show easily to install and maintenance

CONCLUSION

Wireless technology allows us to set up networks that do not require any form of wiring. It uses the IEEE 802.11b standard to communicate. A wireless network is beneficial for small business offices that change their place of work frequently. A wireless network is easy to setup and has a low cost of ownership. Wireless technology also uses enhanced data encryption schemes for providing better security to a network. Wireless technology uses software that automatically adjusts the network settings to enhance the network performance.

ACKNOWLEDGMENT

This work is funded by grants from the International Scientific and Technological Cooperation Projects of China (Grant number: 2011DFA62380). National and International Scientific and Technological Cooperation Projects of China (Grant number: 2011DFA60460).

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