

# Wireless technology

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## ABSTRACT

The wireless technology is designed as a short-range connectivity solution for personal, portable, and handheld electronic devices. Since May 1998 the Bluetooth has steered the development of the technology through the development of an open industry specification, including both protocols and application scenarios, and a qualification program designed to assure end-user value for Bluetooth products. Wireless technology has been regarded as a paradigm shifter in the process industry. With the success of wireless technologies in consumer electronics, standard wireless technologies are envisioned for the deployment in industrial environments as well. Industrial applications involving mobile subsystems or just the desire to save cabling make wireless technologies attractive.

**Keywords:** *Bluetooth, Open Systems, Local Area Networks, Protocols, Consumer Electronics.*

## 1. INTRODUCTION

The development of mobile wireless technologies has generated a considerable amount of excitement among practitioners and academics because it results in shifting the academic environment from traditional settings to mobile learning settings. Increasing numbers of institutions of higher education offer courses using mobile wireless technologies as alternative teaching and learning tools.

Understanding technology capabilities and application requirements is important when selecting a wireless technology for your application. You need to consider three key factors when evaluating wireless technologies: bandwidth, range, and power requirements.

## 2. Literature Survey

### Wireless Network

- The difference between wired and wireless is the physical layer and the data link layer.
- Wired network technology is based on wires or fibers.
- Data transmission in wireless networks take place using electromagnetic waves

which propagates through space (scattered, reflected, attenuated)

- Data are modulated onto carrier frequencies (amplitude, frequency)
- The data link layer (accessing the medium, Multiplexing, error correction, synchronization) requires more complex mechanisms.

## 2. 1 Bluetooth

**Bluetooth** is a wireless technology standard for exchanging data over short distances (using short-wavelength radio transmissions in the ISM band from 2400–2480 MHz) from fixed and mobile devices, creating personal area network(PANs) with high levels of security. Created by telecom vendor Ericsson in 1994 it was originally conceived as a wireless alternative to data cables. It can connect several devices, overcoming problems of synchronization.

### A standard permitting wireless connection of:

- Personal computers
- Printers
- Mobile phones
- Handsfree headsets
- LCD projectors
- Modems
- Wireless LAN devices

- Notebooks
- Desktop PCs
- PDAs

## Bluetooth Characteristics

The short-range wireless technology known as Bluetooth was devised to replace cables and other means of electronic connectors when transmitting information, usually voice or data, from one device to another. Used widely in the cell phone industry (particularly for earpieces that enable hands-free calling), Bluetooth technology functions by employing radio waves and is commonly used for connecting computers to printers, keyboards and fax machines and in other situations in which two devices are relatively close to each other.



Earpieces like these rely on Bluetooth wireless technology.

### 1. Strength

- Although industrial class 3 Bluetooth radios can be used to cover distances as large as 300 feet, the class 2 radios used with cell phones and other mobile devices have a range of up to 33 feet. To avoid interference, Bluetooth has further developed and made use of adaptive frequency hopping (AFH), which detects other wireless equipment using the same spectrum and avoids those frequencies.

### 2. Energy Consumption

- In addition to a low-power design, Bluetooth devices power off when they're not active. Very low energy consumption is important to Bluetooth users because of its popularity with cell phones. If a wireless device drains your battery and your phone constantly has to be recharged, the accessory might not seem worth the trouble. A special low-energy technology option offers maximized battery life by using 1/2 to 1/100 of the power used by standard Bluetooth devices, but the data transfer rate is slower, according to the technology website Bluetooth.

### 3. Cost

- Because Bluetooth technology is inexpensive for manufacturers, the cost for consumers is also low. The total cost includes no royalties or specification patents, and the technology is designed for mass production. And as more and more devices employing Bluetooth continue to sell in huge numbers, the cost will continue to decrease.

## 2.2 Wi-Fi

Wi-Fi is the name of a popular wireless networking technology that uses radio waves to provide wireless high-speed internet and network connections. A common misconception is that the term Wi-Fi is short for "wireless fidelity," however this is not the case. Wi-Fi is simply a trademarked term meaning IEEE 802.11x.

The Wi-Fi Alliance, the organization that owns the Wi-Fi (registered trademark) term specifically defines Wi-Fi as any "wireless local area network (WLAN) products that are based on the Institute of Electrical and Electronics Engineers' (IEEE) 802.11 standards."

Initially, Wi-Fi was used in place of only the 2.4GHz 802.11b standard, however the Wi-Fi Alliance, has expanded the generic use of the Wi-Fi term to include any type of network or WLAN product based on any of the 802.11 standards, including 802.11b, 802.11a, dual-band, and so on, in

an attempt to stop confusion about wireless LAN interoperability.

## How Wi-Fi Works

Wi-Fi works with no physical wired connection between sender and receiver by using radio frequency technology, a frequency within the electromagnetic spectrum associated with radio wave propagation. When an RF current is supplied to an antenna, an electromagnetic field is created that then is able to propagate through space. The cornerstone of any wireless network is an access point. The primary job of an access point is to broadcast a wireless signal that computers can detect and "tune" into. In order to connect to an access point and join a wireless network, computers and devices must be equipped with wireless network adapters

## Wi-Fi Support

Wi-Fi is supported by many applications and devices including video game consoles, home networks, PDAs, mobile phones, major operating systems, and other types of consumer electronics. Any products that are tested and approved as "Wi-Fi Certified" (a registered trademark) by the Wi-Fi Alliance are certified as interoperable with each other, even if they are from different manufacturers. For example, a user with a Wi-Fi Certified product can use any brand of access point with any other brand of client hardware that also is also "Wi-Fi Certified". Products that pass this certification are required to carry an identifying seal on their packaging that states "Wi-Fi Certified" and indicates the radio frequency band used.

## 2.3 What Is a Wireless Network?: The Benefits

Small businesses can experience many benefits from a wireless network, including:

- Convenience. Access your network resources from any location within your

wireless network's coverage area or from any WiFi hotspot.

- Mobility. You're no longer tied to your desk, as you were with a wired connection. You and your employees can go online in conference room meetings, for example.
- Productivity. Wireless access to the Internet and to your company's key applications and resources helps your staff get the job done and encourages collaboration.
- Easy setup. You don't have to string cables, so installation can be quick and cost-effective.
- Expandable. You can easily expand wireless networks with existing equipment, while a wired network might require additional wiring.
- Security. Advances in wireless networks provide robust security protections.
- Cost. Because wireless networks eliminate or reduce wiring costs, they can cost less to operate than wired networks.

## 2.4 Wireless Networks usage

As we know that Wireless network is usually related with a telecommunications that works between nodes and executed without the use of wires. The usage of wireless networking increasing day by day because it has influenced significant impact on the world therefore its uses have appreciably grown-up.

- Radio frequency signals used in a wireless network therefore you can move about and get admittance to the network while you are working an outdoor location.
- Through Wireless Networks you can send information over the world using satellites and other signals.
- Now days wireless networks used in emergency services like police department where wireless network utilize to commune significant information speedily.
- The growth of wireless network increasing both in people and businesses to send and share data

swiftly It doesn't matter be in a small office or across the world.

- Another vital exercise for wireless networks is as a cheap and fast way to be linked to the Internet in regions especially where telecom transportation is meager and no source for communication.
- To make use of Wireless Networks you can get access to other network resources like Library Online System because to move your laptop anywhere is not enough difficult now. Wireless networks make easy of file sharing, the use of printer and other documents with high security.

## 2.5 Types of Wireless Networks

Many types of wireless communication systems exist, but a distinguishing attribute of a wireless network is that communication takes place between computer devices. These devices include personal digital assistants (PDAs), laptops, personal computers (PCs), servers, and printers. Computer devices have processors, memory, and a means of interfacing with a particular type of network. Traditional cell phones don't fall within the definition of a computer device; however, newer phones and even audio headsets are beginning to incorporate computing power and network adapters. Eventually, most electronics will offer wireless network connections.

As with networks based on wire, or optical fiber, wireless networks convey information between computer devices. The information can take the form of e-mail messages, web pages, database records, streaming video or voice. In most cases, wireless networks transfer data, such as e-mail messages and files, but advancements in the performance of wireless networks is enabling support for video and voice communications as well.

## WLANS: Wireless Local Area Networks

WLANS allow users in a local area, such as a university campus or library, to form a network or gain access to the internet. A temporary network can be formed by a small number of users without the need of an access point; given that they do not need access to network resources.

## WPANS: Wireless Personal Area Networks

The two current technologies for wireless personal area networks are Infra Red (IR) and Bluetooth (IEEE 802.15). These will allow the connectivity of personal devices within an area of about 30 feet. However, IR requires a direct line of site and the range is less.

## WMANS: Wireless Metropolitan Area Networks

This technology allows the connection of multiple networks in a metropolitan area such as different buildings in a city, which can be an alternative or backup to laying copper or fiber cabling.

## WWANS: Wireless Wide Area Networks

These types of networks can be maintained over large areas, such as cities or countries, via multiple satellite systems or antenna sites looked after by an ISP. These types of systems are referred to as 2G (2nd Generation) systems.

## 2.6 Basic Components of a Wireless Network

The basic devices in a wireless network are:

- The Wired Network
- Access Point or Wireless Router
- Client Device
- Client Bridge
- Repeater

Each component has a specific function, and while some devices can operate in more than one function, they often have specific attributes that best suit them for a given function. Here are the details on each device/function:

### The Wired Network

While the wired network isn't a simple "device", it is critical to the wireless network; because without it there is really no function to the wireless portion. The wired network can provide several functions:

- Internet connectivity – Your ISP likely provides you with an Ethernet connection to their router or modem, so your wireless network will need to connect to that. Ethernet is a common network standard used in homes and businesses, it generally uses CAT5, CAT5e, or CAT6 cables for connectivity in the LAN (Local Area



Network).

- Connection to a server – If you use a media server or file server at home you probably need to connect to it via Ethernet.
- Connection to other network devices – You might have other computers at home or other network devices to connect to.

### Access Point or Wireless Router

Both of these devices perform the **same** *wireless* functions, however their *network* functions are different. We'll get into the network differences in a future article, for now lets talk about the wireless function. The point of the AP (Access Point) or Router is to authorize and **control the access** that Client Devices have to the wireless network, and to

connect those client devices to the **wired network**.

It controls the speed, security requirements, allowed devices, and many other functions of the wireless network. It's the "center" of your WiFi network.

### Client Device

Client devices are really anything that *wirelessly* connects to the AP or wireless router. These can be anything from an Apple or Dell laptop, to your iPhone, even your refrigerator. The other devices below (client bridge and repeater) are also client devices, just unique ones.

The client devices have the same wireless systems built into them as an AP or wireless router, they just use them in a different way. There can even be client-device to client-device networks that operate without an AP or router, these are called "ad-hoc" networks. Since they're unique (and rare) we'll talk about ad-hoc networks in some other articles.

### Client Bridge

A client bridge is a type of client device that bridges the wireless network with the wired network. It's basically like a reverse AP. The function of the AP is to bridge the wired network onto a wireless network, and the client bridge takes that and re-reverses into another wired segment. This can be useful if you have a device such as a printer or Xbox that doesn't support wireless, but you want to connect it to the network without using CAT5 Ethernet cable. You simply get a client bridge device, connect it to the wireless network, then connect the wired device to the bridge. Ta-da, instant wired network connectivity over wireless.

### Repeater

Repeaters are often a barely-necessary evil. I think of them as a "hack", something that sort-of does the job, but doesn't do it well. Repeaters act sort-of like a client bridge, but instead of bridging the wireless network to a wired network segment, they bridge it to another area of the wireless network. This extends the range of the wireless network to devices that are near the repeater, but it does it at the cost of bandwidth and speed. The repeater uses up twice

the bandwidth of a normal client device because it has to capture information then re-send it back out on the same channel that it just received it on.

### 2.7 Some of the main reasons which make the wireless network interface popular include:

i) Convenience as you can use this network interface at home, the office or anywhere else without hassle.

ii) WLANs are available anywhere in the world at an affordable cost.

iii) If you are moving to a new location, you can transfer the interface and install it at your new location easily.

iv) There is no need for an Ethernet cable to connect computers to each other.

### 2.8 Benefits

The popularity of wireless LANs is a testament primarily to their convenience, cost efficiency, and ease of integration with other networks and network components. The majority of computers sold to consumers today come pre-equipped with all necessary wireless LAN technology.

- **Convenience** – The wireless nature of such networks allows users to access network resources from nearly any convenient location within their primary networking environment (a home or office). With the increasing saturation of laptop-style computers, this is particularly relevant.
- **Mobility** – With the emergence of public wireless networks, users can access the internet even outside their normal work environment. Most chain coffee shops, for example, offer their

customers a wireless connection to the internet at little or no cost.

- **Productivity** – Users connected to a wireless network can maintain a nearly constant affiliation with their desired network as they move from place to place. For a business, this implies that an employee can potentially be more productive as his or her work can be accomplished from any convenient location.
- **Deployment** – Initial setup of an infrastructure-based wireless network requires little more than a single access point. Wired networks, on the other hand, have the additional cost and complexity of actual physical cables being run to numerous locations (which can even be impossible for hard-to-reach locations within a building).
- **Expandability** – Wireless networks can serve a suddenly-increased number of clients with the existing equipment. In a wired network, additional clients would require additional wiring.
- **Cost** – Wireless networking hardware is at worst a modest increase from wired counterparts. This potentially increased cost is almost always more than outweighed by the savings in cost and labor associated to running physical cables.

### 2.9 Disadvantages

For a given networking situation, wireless LANs may not be desirable for a number of reasons. Most of these have to do with the inherent limitations of the technology.

- **Security** – To combat this consideration, wireless networks may choose to utilize some of the various encryption technologies available. Some of the more commonly utilized encryption methods, however, are

known to have weaknesses that a dedicated adversary can compromise.

- **Range** – The typical range of a common 802.11g network with standard equipment is on the order of tens of meters. While sufficient for a typical home, it will be insufficient in a larger structure. To obtain additional range, repeaters or additional access points will have to be purchased. Costs for these items can add up quickly.
- **Reliability** – Like any radio frequency transmission, wireless networking signals are subject to a wide variety of interference, as well as complex propagation effects that are beyond the control of the network administrator.
- **Speed** – The speed on most wireless networks (typically 1-54 Mbps) is far slower than even the slowest common wired networks (100Mbps up to several Gbps). However, in specialized environments, the throughput of a wired network might be necessary.

### 3. RESULTS AND DISCUSSIONS

Organizations all over the world are beginning to understand their corporate social responsibility toward the environment. Most companies now believe in conserving energy and power and using environmentally friendly products that help in reducing their carbon footprint. In fact, in many organizations, the

need for green computing is put at the top of the agenda. Nowadays, it is imperative for all sized organizations to implement aspects of green computing in their daily workings.

Organizations must follow these simple steps for creating the green computing awareness in their workplaces.

- Announcing green intentions to all employees.
- Setting up a committee to form a green IT plan.
- Centralization of all desktops.
- Using efficient computer applications.
- Power management tactics.
- Business performance enhancement.

### 4. CONCLUSION

Wireless technology has completely revolutionized the way we communicate with one another. Cell phones have become an absolute necessity. Wireless Internet has allowed us to access information from the web in a matter of seconds. It puts the wide array of resources that the World Wide Web has to offer at our very fingertips. People can now check their stocks or the news while sipping coffee at Starbucks. Wireless computing has become a trend to say the least. The better technology, namely Wi-Fi, has made wireless technology fast and easy. Though the cost may be more than some people are willing to pay, the features and the experience of it are well worth it. Wireless technology is ever-changing and improving, in the future it will be more fool-proof and it will expand to newer devices, and have more advanced capabilities. Wireless technology represents the future, and better things to come.

<b>Comparison of Wireless Network</b>				
<b>Types</b>				
<b>Type</b>	<b>Coverage</b>	<b>Performance</b>	<b>Standards</b>	<b>Applications</b>
Wireless PAN	Within reach of a person	Moderate	Wireless PAN Within reach of a person Moderate Bluetooth, IEEE 802.15, and IrDa Cable replacement for peripherals	Cable replacement for peripherals
Wireless LAN	Within a building or campus	High	IEEE 802.11, Wi-Fi, and HiperLAN	Mobile extension of wired networks
Wireless MAN	Within a city	High	Proprietary, IEEE 802.16, and WIMAX	Fixed wireless between homes and businesses and the Internet
Wireless WAN	Worldwide	Low	CDPD and Cellular 2G, 2.5G, and 3G	Mobile access to the Internet from outdoor areas

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