# WiFi Communication System

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***Abstract*- The purpose of this paper is to give a brief idea about the Wi-Fi communication system. It is also to give an idea about the historic and technological information about the Wi-Fi communication system.**

## I. INTRODUCTION

A Wi-Fi enabled devices such as a PC, game console, mobile phone, MP3 player or PDA can connect to the Internet within the range of a wireless network. Wi-Fi also allows connectivity in peer-to-peer (wireless ad-hoc network) mode, which enables devices to connect directly with each other. Wi-Fi allows local area networks (LANs) to be deployed without cabling for client devices, typically reducing the costs of network deployment and expansion. Spaces where cables cannot be run, such as outdoor areas and historical buildings, can host wireless LANs.[1]

## II. Historic

The term "Wi-Fi" is abbreviation of "Wireless Fidelity". This term is comparing with the long-established audio recording term "High Fidelity" or "Hi-Fi"."Wireless Fidelity" has often been used in an informal way, even by the Wi-Fi Alliance itself, but officially the term does not indicate anything. The term "Wi-Fi", first used commercially in August 1999, was coined by a brand consulting firm called Interbrand Corporation that had been hired by the Alliance to determine a name that was "a little catchier than 'IEEE 802.11b Direct Sequence'."Interbrand invented "Wi-Fi" as simply a play-on-words with "Hi-Fi". In figure 1, there are several types of devices and applications that supported to use Wi-Fi network. [1]


Figure 1: Computer Devices for Wireless Networks Satisfy Different Applications [3]

## III. Wi-Fi Communication System

Wi Fi network adapters are now built into most laptops. The price of chipsets for Wi-Fi continues is so sheep, making it an economical networking option included in even more devices. Wi-Fi networks have limited range. A typical Wi-Fi home router using 802.11b or 802.11g with a stock antenna might have a range of 32 m (120 ft) indoors and 95 m (300 ft) outdoors. Range also varies with frequency band. Wi-Fi in the 2.4 GHz frequency block has slightly better range than Wi-Fi in the 5 GHz frequency block. Outdoor range with improved (directional) antennas can be several kilometers or more with line-of-sight. Because of the very limited practical range of Wi-Fi, mobile use is essentially confined to such applications as inventory taking machines in warehouses or retail spaces, barcode reading devices at check-out stands or receiving / shipping stations. Mobile use of Wi-Fi over wider ranges is limited to move, use, move, as for instance in an automobile moving from one hotspot to another. Other wireless technologies are more suitable as illustrated in figure 2. [1]

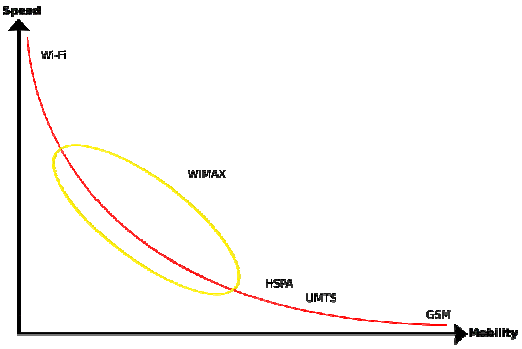


Figure 2: Speed vs. Mobility of wireless systems: Wi-Fi, HSPA, UMTS, GSM [1]

## IV. Wi-Fi Technologies

Wi-Fi networks use radio technologies called IEEE 802.11 to provide secure, reliable, fast wireless connectivity. A typical Wi-Fi set-up includes one or more access points (APs) and one or more clients. An AP broadcasts its SSID (service set identifier, or "network name") via packets that are called beacons, which are usually broadcast every 100 ms. The beacons are transmitted at 1 Mbit/s, and are of relatively short duration and therefore do not have a significant effect on performance. Since 1 Mbit/s is the lowest rate of Wi-Fi it assures that the client that receives the beacon can communicate at at least 1 Mbit/s. Based on the settings, the client may decide whether to connect to an AP. If two APs of the same SSID are in range of the client, the client firmware might use signal strength to decide with which of the two APs to make a connection. Wi-Fi networks operate in the unlicensed 2.4 GHz (802.11b/g/n) and 5 GHz (802.11a/n) radio bands, with an 11 Mbit/s (802.11b) or 54 Mbit/s (802.11a or g) data rate. They can provide real-world performance similar to that of the basic 10BASE-T wired Ethernet networks. WLAN standards that are currently supported by major vendors were developed by the working group 11 of the Institute of Electrical and Electronics Engineers (IEEE) 802 committee. The most common standards are shown in Table 1.

| 802.11 Protoco | Release | Freq. (GHz) | Typ throughput (Mbit/s) | Max net bitrate (Mbit/s) |
|---|---|---|---|---|
| – | 1997 | 2.4 | 0.9 | 2 |
| A | 1999 | 5 | 23 | 54 |
| B | 1999 | 2.4 | 4.3 | 11 |
| G | 2003 | 2.4 | 19 | 54 |
| N | Expected January 2010 | 2.4<br>5 | 74 | 600 |
| y | 2008 | 3.7 | 23 | 54 |

**Table 1: Wireless local area network standards [2]**

The 802.11a standard operates in the unlicensed 5-GHz band, which makes the transmission vulnerable to interference from microwave ovens and cordless phones. The strength of 802.11b and 802.11g signals, which operate in the 2.4-GHz band, is affected negatively by water, metal, and thick walls.The 802.11b and 802.11g standards divide the 2.4 GHz into 14 overlapping individual channels. Channels 1, 6, and 11 do not overlap and therefore can be used to set up multiple networks. The 802.11a standard is an amendment to the original standard. The advantage of using 802.11a is that it suffers less from interference, but its use is restricted to almost line of sight, thus requiring the installation of more access points than 802.11b to cover the same area. The medium access method of the 802.11 standards, called the Distribution Coordination Method, is similar to the carrier sense multiple access collision detect (CSMA/CD) mechanism of Ethernet. [4]

## REFERENCES

[1] http://en.wikipedia.org/wiki/Wi-Fi
[2] http://en.wikipedia.org/wiki/Wi-Fi_technical_information
[3] http://www.ciscopress.com/articles/article.asp?p=344242
[4] http://www.ciscopress.com/articles/article.asp?p=469624