

# GiFi (Gigabit Fidelity) Technology

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## ABSTRACT

In this paper, brief information about GiFi ( Gigabit Fidelity ) Technology is there. So first what is GiFi Technology? GiFi or Gigabit Fidelity or Gigabit Wireless is the world's first transceiver integrated on a single chip that operates at 60 GHz frequency band. GiFi has the data transfer speed upto 5 Gbps. The Man behind GiFi evolution is Stan Skafidis. In this paper, the brief introduction and evolution of GiFi is there. It also helps to know the architecture and working of GiFi. The readers would come across the features and advantages of GiFi. It also contains the advantages of GiFi over Bluetooth and WiFi. The best part about the GiFi Technology is its power consumption, it consumes only 2watts of power for its operation with antenna (1mm). One of the important part of GiFi technology is its cost effectiveness, it is cheap in cost. It is small in size, Highly portable and it provides High security. In addition, the readers would get know the various applications of GiFi such as in Office Appliances, Wireless PAN, etc. The evolution of GiFi came into existence due to the need of Higher data transfer rate and Lower power consumption.

## Keywords

GIFI, Bluetooth, Wireless PAN.

## 1. INTRODUCTION

Gigabit Wireless is the world's first transceiver integrated on a single chip that operates at 60GHz on the CMOS (complementary metal-oxide-semiconductor) process. It will allow wireless transfer of audio and video data upto 5 gigabits per second, ten times the current Maximum wireless transfer rate, at one-tenth of the cost, usually within a range of 10 meters. This technology provides a high broadband access, high speed transfer of data within seconds and a low cost one. It is require that Gi-Fi to be preferred next generation wireless technology used in home and offices. We would also get to study about Gi-Fi we look about the conventional wireless technology like cables, optical fiber, Bluetooth etc. Gi-Fi technology provides various different features like High speed of data transfer, Low power consumption, High security, Cost effective, Small size, Quick deployment, Highly portable, high mobility etc.

## 2. NETWORK EVOLUTION

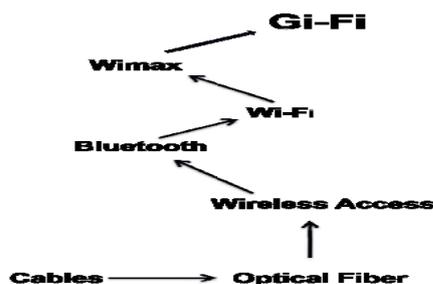


Figure 1: Evolution of Gi-Fi

The installation of cables caused a grater difficulty and thus led to wireless access, the foremost of this is Bluetooth which covers 9-10 meters. Wi-Fi (Wireless Fidelity) followed coverage area of 91 meters. The evolution of wireless networks is shown in figure1.

## 2.1 Cables

In wireless technologies many computer networks utilizes cables as a physical medium for communication and data transfer between the devices. This cable which is commonly used with LANs (Land Area Network) as shown in figure2. The type of cable chosen for a network is related to the network's topology, protocol, and size[2].



Figure 2: Cables

## 2.2 Optical Fiber

Fiber optic cable has the ability to transmit signals over much longer distances than coaxial and twisted pair. It also has the capability to carry information at vastly greater speeds. The cost of fiber optic cabling is comparable to copper cabling; however, it is more difficult to install and modify. The center core of fiber cables is made from glass or plastic fibers as shown in figure 3. Most telephone company long-distance lines are now made of optical fiber. Transmission over an optical fiber cable requires repeaters at distance intervals.



Figure3: Optical fiber

## 2.3 Wireless Access

Wireless access points are special-purpose communication devices on wireless local area networks (WLANs). Access points act as a central transmitter and receiver of wireless radio signals. It is enable so-called Wi-Fi infrastructure mode networking. Although WiFi connections do not technically require the use of access points as shown in figure4[3].

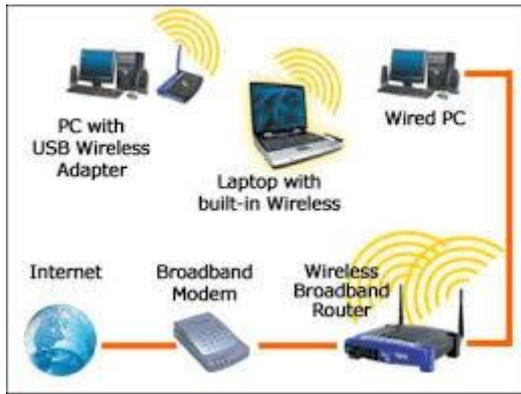


Figure 4: Wireless Access

## 2.4 Bluetooth

Bluetooth is a standard wire-replacement communications protocol primarily designed for lowpowerconsumption, with a short range based on lowcost transceiver. It operates in the range of 2400–2483.5 MHz and uses a radio technology called frequency-hopping spread spectrum (FHSS). Bluetooth exists in many products such as telephones, tablets, media players, and robotics systems, handheld, laptops etc.The indication of Bluetooth is shown in figure 5.



Figure 5: Bluetooth

## 2.5 Wi-Fi

Wi-Fi is based on the IEEE 802.11 wireless local area network (WLAN) specification. Actually it was designed to be used indoors at close range for example home user and office environment. The main goal of Wi-Fi technology is to provide service for mobile computing device like laptop.Wi-Fi is shown in Figure 6[8].



Figure 6: Wi-Fi

## 2.6 WiMAX

IEEE standard 802.16, also known as WiMAX, is a technology for last-mile wireless broadband as an alternative to cable and DSLand where the cost is high. It is intended to deliver high speed data communication.The current WiMAX revision provides up to 40 Mbit per second with the IEEE 802.16m update and expected to offer up to 1 Gbit/s fixed communication speeds[5].

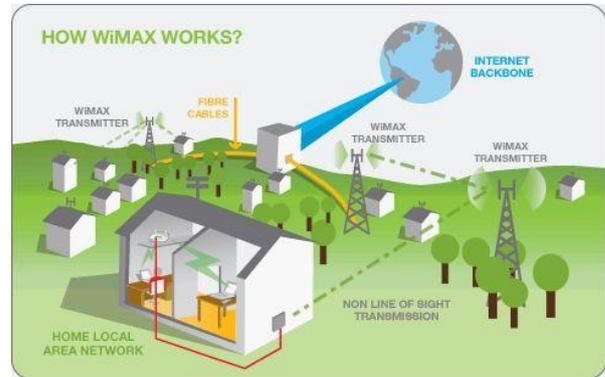


Figure 7: WiMAX

## 2.7 Gi-Fi

Gi-Fi or gigabit wireless is the world's first transceiver integrated on a single chip that operates at 60GHz on the CMOS. Gi-Fi is ten times faster than Wi-Fi and allows the wireless transfer of audio and video data up to 5 gigabits per second at low power consumption within range of 10 meters[8]. This technology provides a high broadband access, high speed transfer of data within seconds and a low cost one.



Figure 8: GiFi

## 3. ARCHITECTURE OF GI-FI:

The main and important component of a Gi-Fi system is its subscriber station which is available to several access points. It supports standard of IEEE 802.15.3C which uses small antenna at the subscriber station.. For the communication among different computer devices, which includes telephones and PDA, it supports millimeter-wave wireless PAN network. In this network, the antenna is mounted on the roof and it supports Line Of Sight (LOS) operation[3].

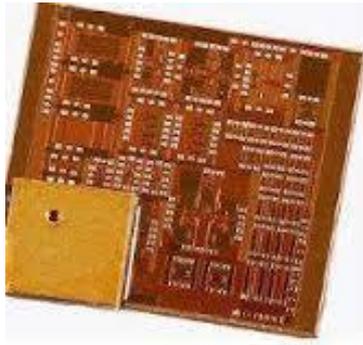


Figure 9: Architecture of Gi-Fi

#### 4. WORKING

There is use of time division duplex for both transmission and receiving. Data files are up converted from IF range to RF 60GHz range by using 2 mixers. The output will fed be into to a power amplifier, which feeds millimeter wave antenna.

The incoming RF signal is first down converted to an IF signal centered at 5 GHz and then to normal data ranges. We use heterodyne construction for this process to avoid leakages due to direct conversion. Due to availability of 7GHz spectrum, the total data will be transferred within seconds[4].

#### 5. COMPARISON BETWEEN DIFFERENT WIRELESS TECHNOLOGIES

Table 1 : Comparison Between Wireless Technologies

CHARACTERISTICS	BLUETOOTH	WI-FI	GI-FI
Specification Authority	Bluetooth SIG	IEEE, WECA	NICTA
Development Start date	1998	1990	2004
Primary device	Mobile phones, PDAs, Consumer, Electronics office, Industrial Automation Devices	Notebook, Computers, Desktop, Computer servers	Mobile phones, Home devices, PDAs, Consumer, Electronics office, Industrial Automation Devices
Power consumption	5mw	10mw	< 2mw
Data transfer rate	800Kbps	11Mbps	5 Gbps
Range	10 meters	100 meters	10 meters
Frequency	2.4GHz	2.4GHz	57-64GHz

#### 6. FEATURES OF GI-FI

##### 6.1 Capacity of High Speed Data Transfer

The data transfer rate of Gigabit wireless technology is in Gigabits per second. Speed of Gi-Fi is 5 Gbps; which is 10 times the data transfer of the existing technologies. Providing higher data transfer rate is the main invention of Gi-Fi. An entire High-Definition (HD) movie could be transmitted to a mobile phone in a few seconds, and the phone could then upload the movie to a home computer or screen at the same speed[3].

##### 6.2 Small in size

The size of the Gi-Fi chip is 5×5 millimetre and can be placed in different devices such as mobile phones. The chip has a tiny 1mm antenna and uses the 60GHz “millimetre-wave” spectrum[6].

##### 6.3 Low Power Consumption

As the large amount of information transfer it utilizes milli-watts of power only. Power consumption of the present technologies such as Wi-Fi and Bluetooth are 5mili watts and 10mili watts but chip of Gi-Fi uses a tiny onemillimetre-wide antenna and it has less than 2mili watts of power consumption that in compare to the current technologies is very less[7].

##### 6.4 Cost-effective

Gi-Fi is based on an open, international standard. Mass adoption of the standard, and the use of low-cost, mass-produced chipsets, will drive costs down dramatically, and the resultant integrated wireless transceiver chip which transfers data at high speed, low power at low price \$10 only, which is very less As compare to present systems. As development goes on, the price will be decreased[1].

##### 6.5 High Security

As the IEEE 802.15.3C provides more security, it provides link level and service level security, where these features are optional. Point-to-point wireless systems operating at 60 GHz have been used for many years by the intelligence community for high security communications and by the military for satellite-to satellite communications.

#### 7. APPLICATIONS OF GI-FI

1. This technology can be effectively used in wireless pan networks, Inter-vehicle communication systems, Ad-hoc information distribution with Point-to-Point network extension, media access control (MAC), imaging and other applications.
2. Gi-Fi technology also can be used in broadcasting video signal transmission system in sports stadiums and mm-Wave video video-signals transmission systems. The technology could also be used for beaming full HD video in real-time and could be used by notebooks and other computers to wirelessly connect virtually all the expansion needed for a docking station, including a secondary display and storage.
3. Gi-Fi technology has many attractive features that make it suitable for use in many places and devices. Gi-Fi technology offering reduced the chip size and power consumption, can be used to send and receive large amounts of data in a variety of applications For example, it is intended for use in a wide range of devices including personal computers, tablets, and smart phones. The technology’s fast data-synchronization rates enable the rapid transfer of video, bringing the wireless office closer to reality[4].
4. Gi-Fi technology is able to transfer gigabits of data within seconds and therefore it can be used for huge data file transmission and it is expected that this chipset replaces HDMI cables and could develop wireless home and office of future.

#### 8. CONCLUSION

Gi-Fi has given and it is conspicuous that more research should be done in the field of this new wireless technology and its applications. The Bluetooth which covers 9-10mts

range and wi-fi followed 91mts. No doubt introduction of wi-fi wireless network has proved a revolutionary solution to bluetooth problem. The standard original limitations for data exchange rate and range, number of chances, high cost of infrastructure have not yet possible for wi-fi to become a power network, then towards this problem the better technology despite the advantages of rate present technologies led to the introduction of new, more up to date for data exchange that is GI-FI. The comparison is performed between Gi-Fi and existing wireless technologies in this paper shows that these features along with some other benefits that make it suitable to replace the existing wireless technologies.

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