

GI-FI Wireless Transmission

Dr.Ifath Nazia Ghori

**Coordinator,
Department of CS & IS,
Community College,
Jazan University, KSA.**

Mr.Fahad Bin Awad Quraishi

**M.Tech,
Department of CSE
Jawaharlal Nehru Technological University,
Hyderabad.**

Abstract:

As the name Gi-Fi indicates Gigabit. Gi-Fi is the wireless transmission system which is 10 times faster than the other technology and transfers the data within a short range with in a local environment. The Gi-Fi which will be operated on approximately 60GHz frequency band . When Gi-Fi technology is compared with the some of existing technologies Gi-Fi is very high speed with large data files transfers within a seconds , so Gi-Fi is to be the preferred in wireless technology. Generally the wireless technology is based on infrared transmission which was a very slow and further inventions were done to make in the wireless technology for a better communication which resulted in the invention of Bluetooth.

Keywords:

Gi-Fi, Bluetooth, Wireless Network, 5MM Micro Chip.

1. INTRODUCTION:

Wi-Fi

Wi-Fi is one of the most famous wireless communication standards in the current market. This technology was almost solely used to wirelessly connect laptop computers to the Internet via Local Area Networks (LANs).Wi-Fi technology is now found in a host of non-computer electronic devices as well, such as home theatre receivers, video game consoles, Blue-ray players, digital cameras, and even GPS devices. The Wi-Fi Alliance tests and certifies 802.11 based wireless equipment.

WiMax:

WiMax is a wireless Metropolitan Area Network (MAN) technology.

WiMax has a range of 50 km with data rates of 70 Mbps. typical cell has a shorter range. The original 802.16 standard operated in the 10-66 GHz frequency bands with line of sight environments. The newly completed 802.16a standard operates between 2 and 11 GHz and does not need line of sight. Delays in regulatory approval in Europe due to issues regarding the use of the spectrums in the 2.8 GHz and 3.4 GHz range. Researchers has come up with a wireless technology which promises a high speed short range data transfers with a speed of up to 5Gbps within a distance of 10 meters. The new wireless technology is named as Gi-Fi which is currently mostly used. The Gi-Fi Chip developed by the Australian researcher's measures 5mm square and is manufactured using existing complementary metal-oxide semiconductor (CMOS) technology.

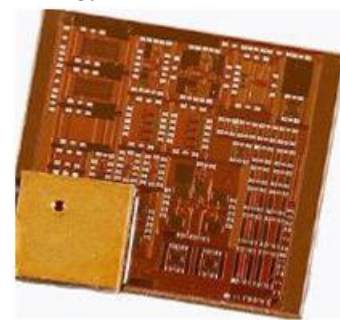


Fig. 5mm Gi-Fi Chip

Gi-Fi technology is used because to overcome the slow data rate, high power consumption, low range of frequency operations of earlier technologies i.e. Bluetooth and Wi-Fi. Comparison between three other wireless technologies used in communication.

Bluetooth:

Bluetooth wireless technology is geared towards voice and data applications.

Bluetooth wireless technology operates in the unlicensed 2.4 GHz spectrum. Bluetooth wireless technology can operate over a distance of 10 meters depending on the Bluetooth device class. Bluetooth wireless technology is able to penetrate solid objects; it is the main advantage of this technology. Bluetooth technology is Omni-directional and does not require line-of-sight positioning of connected devices. Security has always been and continues to be a priority in the development of the Bluetooth specification. The Bluetooth also provide security.

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 process. It will allow wireless transfer of audio and video data at up to 5 gigabits per second [6], ten times the current maximum wireless transfer rate, at one-tenth the cost. NICTA researchers have chosen to develop this technology in the 57-64GHz unlicensed frequency band as the millimetre-wave range of the spectrum makes possible high component on-chip integration as well as allowing for the integration of very small high gain arrays. The available 7GHz of spectrum results in very high data rates, up to 5 gigabits per second to users within an indoor environment, usually within a range of 10 metres. It satisfies the standards of IEEE 802.15.3C

Comparison : Bluetooth Vs Wi-Fi Vs Gi-Fi

Characteristic	Bluetooth	Wi-Fi	Gi-Fi
Frequency	2.4 GHz	2.4 GHz	7GHz
Range	10 Meters	100 Meters	10 Meters
Primary application	WPAN: Cable replacement	WLAN: Ethernet	Wireless PAN
Data transfer rate	800 Kbps	11 MBPS	5 GBPS
Power consumption	Low	Medium	Very Low
Specification authority	Bluetooth SIG	IEEE, WECA	IEEE

2. HARDWARE REQUIRED:

Gi-Fi or gigabit wireless is the world’s first transceiver integrated on a single chip that operates at 60GHz on the CMOS process.

It will allow wireless transfer of audio and video data at up to 5 gigabits per second, ten times the current maximum wireless transfer rate, at 1/10 th of original cost. NICTA researchers develop this technology in the 57-64GHz unlicensed frequency band as the millimeter-wave range of the spectrum makes possible high component on-chip integration as well as it allows for the integration of very small high gain arrays. A silicon chip developed in Melbourne is estimated to reform the way household gadgets like televisions, phones and DVD players. The thin 5mm chip can transmit data through a wireless connection at a breakthrough 5 gbps per second over distances of up to 10 meters. high-definition 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.

The "Gi-Fi" was unveiled today at the Melbourne University-based laboratories of NICTA, the national information and communications technology research centre. Short-range wireless technology is a challenged area ,with research teams around the world racing to be the first to launch such a product. professor Skafiadass said his team was the first to demonstrate a working transceiver-on-a-chip that uses CMOS (complementary metal-oxide-semiconductor) technology - the cheap, ubiquitous technique that prints silicon chips. this chip uses only a tiny one-millimeter-wide antenna and less than two watts of power. Wi-Fi's part of the spectrum is increasingly crowded, sharing the waves with devices such as cordless phones, which leads to interference and slower speeds. But the millimeter wave spectrum is almost unoccupied, and the new chip is potentially hundreds of times faster than the average home Wi-Fi unit. Wi-Fi still gain from being able to provide wireless coverage over a greater distance.

3. TECHNOLOGIES USED

3.1 TECHNOLOGIES USED:

This WPAN will operate in the new and clear band which will use frequency of 57-64 GHz unlicensed band.

The millimeter-wave WPAN will allow high close physical spacing with all other microwave systems in the 802.15 family of WPANs. The Two Technologies that helps in realizing the GWLAN are :

1. Multiple Input Multiple Output (MIMO)
2. System-On-Package (SOP)

3.2 MULTIPLE INPUT MULTIPLE OUTPUT:

Multiple Input Multiple Output wireless which will be emerging the cost effective technology that offers in making 1Gbps wireless link. We can use the principle which will meet the 1Gbps data rate requirement if the product of bandwidth which is measured in Hz and spectral efficiency measured in bps/Hz. □

- MIMO wireless constitutes a technological breakthrough that will allow Gbps speeds in NLOS wireless networks. □

The performance improvements resulting from the use of MIMO systems are due to

1. Array gain
2. Diversity gain
3. Spatial Multiplexing Gain
4. Interference Reduction

3.2 SYSTEM-ON-A-PACKAGE:

System On Package provides for the next-generation wireless solution has a more feasible option than SOC.

- Recent development of materials, processes in packaging area makes it possible to bring the concept of SOP into the RF world to meet the stringent needs in wireless communication area. □
- Wireless devices implements the complex functionality that require a large amount of circuitry and consequently, require a large conventional package or MCM real estate. □
- SOP provides Multi Chip Module (MCM) by enhancing the overall performances. □

4. WORKING PRINCIPLE USED IN GI-FI:

GI-FI will work based on the principle of time division duplex for both transmission and receiving the data. In this the data files are converted from IF range to RF 60 GHz in which GI-Fi is operated range by using 2 mixers and we will feed this to an power amplifier, which feeds millimeter wave antenna. The incoming RF signal which will converted to an IF signal centered at 5 GHz and then to which normal data ranges. In these we will use heterodyne construction for this to avoid leakages due to direct conversion and due to availability of 7GHz spectrum the total data will be transferred within a seconds.

Time -Division Duplex:

We use the Time-Division Duplex (TDD) is the application of Gi-Fi the time-division multiplexing is used to separate outward and return signals. It emulates the full duplex communication over the half duplex communication link. Time division duplex has a strong advantage in the where the asymmetry of the uplink and downlink data speed is variable. As uplink traffic increases, more channel capacity can dynamically be allocated to that, and as it shrinks it can be taken.

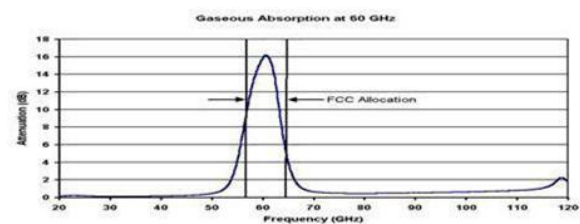


Fig. FREQUENCY OF OPERATION

Operation at 60 GHz:

We use the Point-to-point wireless communication system which will be operated at 60 GHz which have been used for many years . This is because of the high oxygen absorption at 60 GHz. So that signals cannot travel far beyond their intended recipient. So this is the reason why we use, 60GHz in Gi-Fi which is an excellent choice for covert communication.

Ultra wide band frequency usage:

In this project we use UWB, a technology with high bit rate with high security and faster data transmission. It is a zero carrier technique with low coverage area. So we have low power consumption. UWB which is used for technology for transmitting the information over a large bandwidth which should be greater than 500GHz and which should be able to share the spectrum with the other users. FCC are intended to provide an efficient use of the radio bandwidth while enabling both the high data rate wireless connectivity and longer-range, low data rate applications as well as radar and imaging system.

5. APPLICATIONS:

There are many usage scenarios that can be addressed by Gi-Fi. The following are some applications of Gi-Fi

1. 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.
2. 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.
3. 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.
4. 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.

Gi-Fi Access Devices:



Gi-fi Access Devices:

Some of the Gi-Fi access devices are shown in the above figure. These access devices include termination units, internal radio modules, network interface cards, printers, PC's, and all household electronic appliances. There are many usage scenarios that can be addressed by Gi-Fi. The following are some mobility usage applications of Gi-Fi.

6. CONCLUSION:

Within few years, we can expect Gi-Fi to be the dominant technology for wireless networking. By that time it will be able to provide services with the low-cost, high broadband access, and with very high speed data rates transferred within a seconds. If the success of Wi-Fi and the imminent wide usage of Wi-MAX is any indication, Gi-Fi potentially can bring wireless broadband to the enterprise in a completely new way

References:

1. <http://ijcsn.org/IJCSN-2013>
2. <http://www.slipperybrick.com/2008/02/gifi-chip>
3. <http://www.mobilemag.com/2008/02/22/forget-wifi-get-5gps-speeds-with-gifi-wireless>
4. <http://www.yuvaengineers.com/?p=570>
5. <https://en.wikipedia.org/wiki/Gi-Fi>