

Review: Comparative Study of Gi-Fi Technology with Other Existing Technology

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Abstract: Today civilization is hugely dependent upon Electronic and Communication system. In this electronic world, different techniques are used for data transmission and communications many years ago cables are used for data transmission. But there are lots of difficulties in the installation of cables Networks and no of drawbacks, so we need to find an alternative to the cable network .Now a day's wireless technology is the most advanced technology used for data transmission and communications overcome the drawbacks related old techniques, but still man the continues search for the better. For speedy transformation, Wi-Fi is used and next to that Gi-Fi technology is generated in wireless technology that improves our own surrounding, either work or private, by means of networking or a variety of own and wearable devices within the space and with the outside world. For transferring large files audio as well as video with high speed within seconds. Gi-Fi played the main role with small size, less cost, and high security.

Keywords: Bluetooth, CMOS, Gi-Fi, Wi-Fi, Wi-Max.

I. INTRODUCTION

In Wi-Fi and Wi-max technology recently no improvement in faster bit rate. Newly introduced technique Gi-Fi offers some other advantages over a Wi-Fi or similar wireless technology as less power consumption, low cost for short range transmission etc. [1].

Gi-Fi is nothing but gigabit wireless. This technology is ten times faster than the other technology. This is the world's first transceiver integrated single chip with using a small antenna designed on the complementary metal-oxide-semiconductor (CMOS) which operates on at 60GHz [2][3]. For the PAN (personal area networking) Gi-Fi has the best solution. The HD data also transfers within seconds.

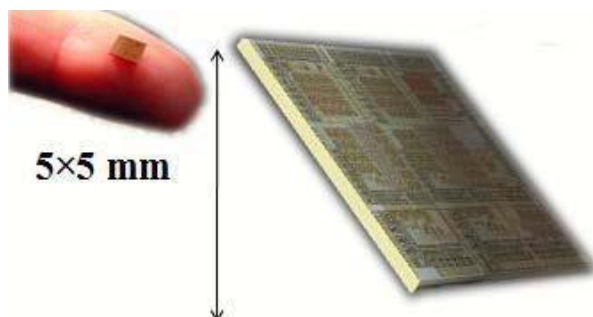


Fig. 1. Chip of Gi-Fi

In Melbourne University, Researchers proposed that in wireless technology high-speed short-range data transfers with a speed of up to 5Gbps within a radius of 10 meters named as Gi-Fi and works on the 60GHz frequency band, which is currently unused [4]. This chip is established by Australian researcher's measures 5mm square and using existing complementary metal-oxide-semiconductor (CMOS) technology. this technology works within ranges

from the 57-64GHz unlicensed frequency band, which is the millimeter-wave range of the spectrum makes possible nothing but high component on-chip integration but allowing for the integration of very small high gain arrays by NICTA researcher [5].

Professor skafids said, within a range of the 10 meters available 7GHz of spectrum results in high data rates, up to 5 gigabits per second to users with a low cost. This new gigabit wireless system provides Multi-gigabit wireless technology [5]. Using this new wireless technology will convert the home entertainments industry like videos or household gadgets talk to each other [6]. Gi-Fi similar and challenger to Bluetooth rather than Wi-Fi and could find applications ranging from mobile phones to customer electronics. the higher megapixel count on our cameras, improved bit rate on our music files, higher resolution of our video files. The communication needs of multiple customers withinsmall geographic region. This technology with gives a high level of frequency re-uses [6].

II. EVALUATION OF GI-FI

We always work for advanced in present techniques
There are the two techniques

- 1) Wired technology
- 2) Wireless technology

The development of wireless technology which will point to the Gi-Fi technology. The following Diagram will give the network evolution [4].

Wired technology

In this communication wire is used for data transmission. For example telephone networks, cable television or internet access, and fiber-optic communication

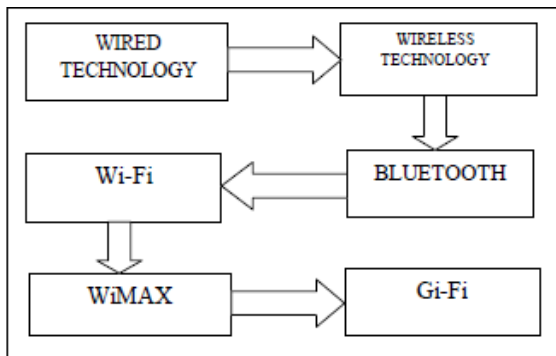


Fig. 2 Evolution of Gi-Fi

Wireless technology

In wireless technology, we do not use the cable for transmission of data instead of that we use different signals Such as Bluetooth Wi-Fi etc.

Bluetooth

Bluetooth IEEE 802.15.1 is the wireless technology. This transfers the files over a short distance using short-wavelength UHF radio waves in the ISM band from 2.4 to 2.485 GHz within personal area networks (PANs) the range of networking is 10 meters

Wi-max

Wi-max based on Wireless MAN technology i.e. Nothing but Worldwide Interoperability for Microwave Access.. this technology enabling the delivery of last mile wireless broadband access as an alternative to cable and DSL" Wi-max designed to provide 30 to 40 megabit-per-second data rates

Wi -Fi

Wi-Fi means the wireless fidelity. Uses radio waves to give wireless high-speed Internet as well as network connections. Mainly using the 2.4 gigahertz (12 cm) UHF and 5 gigahertz (6 cm) SHF ISM radio bands. And data transfer rate is 11 Mbps in 100-meter range.

Gi-Fi

Gi-Fi is integrated transceiver single chip. This chip is extremely small it can be embedded into devices. It uses a 5mm square chip and a 1mm wide antenna burning less than 2 milliwatts of power to transmit data wirelessly over short distances which are mounted on the roof similar to Bluetooth. [3] And it fabricated using the complementary metal oxide semiconductor (CMOS) process.



Fig.3. High- speed local data transmission

Need for Gi-Fi

The other existing technology such as Bluetooth and Wi-Fi has some drawbacks like slow rate, high power consumption, and low range of frequency operation. To overcome this problem, the solution is Gi-Fi technology. Also the Gi- Fi technology gives cost effective, small size, quick deployment, highly portable, high security, high mobility

Technologies Used

The new unlicensed band 57-64 GHz defined by FCC 47 CFR 15.255. In this band, mm-Wave will operate. The millimeter-wave WPAN will allow high coexistence (close physical spacing) with all other microwave systems in the 802.15 family of WPANs. [4] For help to realize GWLAN, there are two technologies that

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

III. WORKING PRINCIPLE USED IN GI-FI

For both transmission and receiver side, Time division duplex is used. By using two mixers data files are up converted from IF range to RF 60 GHz, and these waves feed to the power amplifier, to the millimeter wave antenna. After that to get the normal data ranges, the incoming RF signal is first down converted to an IF signal centered at 5 GHz. To avoid leakage due to direct conversion and due to the availability of 7 GHz spectrum the total data will be transferred within seconds and for that heterodyne construction is used.

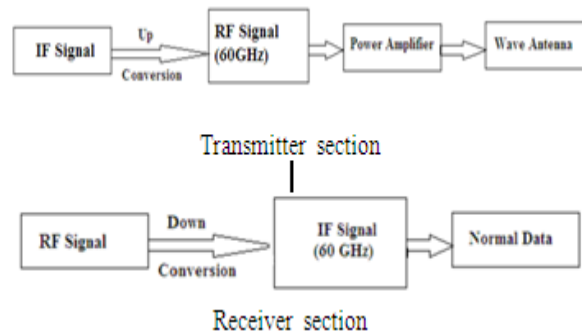


Fig.4. Block Diagram Gi-Fi

A. Time -Division Duplex

To separate outward and return signals time-division multiplexing uses Time-Division Duplex (TDD) application. It holds on full duplex communication over a half-duplex communication link. As uplink traffic grows, more channel capacity can dynamically be assigned to that, and as it decreases it can be taken away. Time division duplex (TDD) nothing but the duplex communication links where the uplink and downlink both are separated by the portion of different time slots in the similar frequency band. It is a transmission scheme that allows asymmetric flow for uplink as well as downlink data transmission. For uplink and downlink transmission, Users are allocated time slots. This method is extremely advantageous in case there is an asymmetry of uplink and downlink data rates.

TDD divides a data stream into frames and allocates different time slots to forward and reverse transmissions, thereby allowing both types of transmissions to share the similar transmission medium.

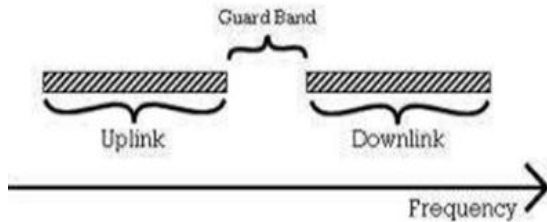


Fig5. Time division duplex

Why 60 GHz

The new unlicensed band 57-64 GHz defined by FCC 47 CFR 15.255 in this band; mm-Wave will work at 60 GHz. In this band get high data rates energy propagation and at 60GHz has many benefits such as excellent immunity to co-channel interference, high security, and frequency re-use. Many years for satellite-to-satellite communications Point-to-point wireless systems operating at 60 GHz have been used. This is because of high oxygen absorption at 60 GHz (10-15 dB/Km). for this absorption, 60 GHz signal is attenuated and that signal cannot travel far beyond their intended recipient. So that 60 GHz is the excellent choice for covert communication.

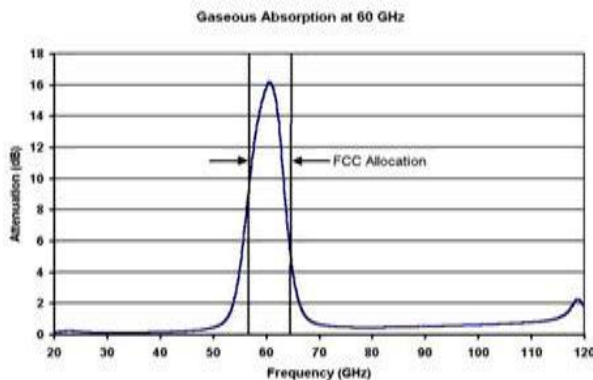


Fig 6. Oxygen Attenuation vs. Frequency

The intelligence community for high security communications and the military for satellite-to-satellite communications Point-to-point wireless systems operating at 60 GHz has been used for many years. In this main is the frequency band stems from a phenomenon of nature: at 60 GHz, oxygen molecule (O₂) absorbs electromagnetic energy like a piece of food in a microwave oven (see fig. 6) This absorption come about to a much higher degree at 60 GHz than at lower frequencies typically used for wireless communications. Signals cannot travel far beyond their intended recipient because absorption weakens (attenuates) 60 GHz signals over distance. For this reason, 60 GHz is a superb choice for covert satellite-to-satellite communications because the earth's atmosphere acts like a shield preventing earth-based eavesdropping. A wide variety of components and subassemblies for 60 GHz products are available today, Because of the rich legacy of applications in this band,

Another consequence of O₂ absorption is that radiation from one particular 60 GHz radio link is rapidly reduced to a level that will not interfere with other 60 GHz links operating in the same geographic area. This reduction facilitates higher "frequency reuse" – the ability for more 60 GHz links to operate in the similar geographic area than links with longer ranges. As an example, let's compare two dissimilar links, one operating near 60 GHz and the other at a frequency that is less affected by O₂ absorption. Another link could be operating at another unlicensed frequency such as 2.4 GHz or 24 GHz.

IV. ADVANTAGES

Alternative to wired technology

This is the main advantage because in wired technology for the faster bit rate and transmission optical fibers played dominant role but the in installation caused the greater difficulty, so that wireless technology is beneficial but in this also Wi-Fi, Bluetooth gives less speed than the Gi-Fi.

Privacy and security

About 70 per cent of firms have deployed their WLAN in a secure firewall zone but are still using the old WEP protocol, which does not keep safe the application layer effectively, so better encryption is urgently needed. Secure encryption technology in Gi-Fi ensures privacy and security of content

Simplicity

By using the Gi-Fi technology, it removes the wire connection and cables that causes complexity for connecting, Gi-Fi gives simple connection, improves the consumer experience. Also it is highly portable and can be constructed everywhere.

Inexpensive, Small size

The Gi-Fi integrated trance-receiver chip which is developed at the national ICT research center, Australia, this chip is very tiny 5 mm per side and 1mm antenna also uses the 60 Ghz 'millimeter wave spectrum'. Gi-Fi technology is cost effective because this technology is based on open, international standard. Mass adoption of the standard, and the use of low-cost, mass-produced chipsets, will drive low costs.

Portable

The chip of Gi-Fi is very tiny, its cost is less which has embedded in cell phones and other devices. So that this very portable

Faster than other technology

Data transfer rate of Gi-Fi is 5 gigabit per second which is higher than other technologies. Gi-Fi provides multigigabit wireless technology that is 100 times faster than current short range wireless technology such as Bluetooth, Wi-Fi.

Interference not occurred

To transmit the information or data it uses 60 GHz millimeter wave spectrum. It has advantage over Wi-Fi, Now days Wi-Fi gives slow speed because of sharing of

Wi-Fi spectrum increases. But the millimeter wave spectrum (30 to 300 GHz) is almost unoccupied

V. APPLICATION

Video Transformation

Years ago for video transmission take large time for transferring the video from one device to other device, but when using Gi-Fi technology this video transfer within a second, the speed is 5gigasbits/sec. so transferring the information Pc to mobile or vice versa is very simple and fast.

Office Appliances

In Offices there are many small as well as large files transferring one to other person or everyone. By using Gi-Fi technology this work made very easy and also provides high quality information from the internet.

Inter vehicle Communication

In vehicle to vehicle short distance spontaneously created So exchange the data between vehicles is made possible in ad hoc network so without any help of the infrastructure they can organize themselves.

In Sport Stadium Broadcasting Video Transmission

In sport stadium to distribute about the information or any advisements this is the easy and immediate construction of temporal broadband network.

Household Applications

Consumer could typically download a high definition movie within a second to music player or smart phones and having got home could play it on a home theatre system or store it on a home server for future viewing, again within a few seconds. High speed internet access, streaming content download (video on demand, HDTV, home theatre, etc.), real time streaming and wireless data bus for cable replacement. It makes the wireless home and office of the future

VI. RESULT

Here shows comparison between technologies and shows the better performance of the Gi-Fi in term of frequency, power consumption and the data transfer rate

TABLE I

Parameter	Bluetooth	Wi-Fi	Gi-Fi
Development date	1998	1990	2004
Specification authority	Bluetooth SIG	IEEE, WECA	NICTA
Frequency	2.4GHz	2.4GHz	57-64GHz
Range	10 meters	100 meters	10 meters
Data transfer rate	800Kbps	11Mbps	5 Gbps
Power consumption	5mw	10mw	< 2mw

Primary device	PDAs, cell phones, Consumer, Electronics office Industrial Automation Devices	Desktop, Notebook, Computers, Computer Servers	Mobile phones, PDAs, Consumer, Electronics office Industrial Automation Devices
Primary application	WPAN cable replacement	WLAN Ethernet	Embedded in devices
Primary uses	Travelling employees, electronics consumers, office and industrial workers	Corporate users	Wireless homes and office appliance, etc.
Usage location	Anywhere at least two Bluetooth devices exist ideal for rooming outside buildings	Within range of WLAN infrastructure, usually inside a buildings	WPAN networks

VII. CONCLUSION

Gi-Fi is the efficient technology than the other wireless technology like Wi-Fi, Wi-max in terms of speed for transferring the videos within a second, less power consumption, low cost, highly portable, small size and simplicity. For that within few years we expect that Gi-Fi to be a dominant technology.

If there is usage of Wi-Fi and Wi-max, Gi-Fi potentially brings wireless broadband to the enterprise in an entirely new way. Gi-Fi technology has to a great extent number of application can be used in many places and devices such as wireless PAN network media access control, smart phones and mm-wave video signals transmission system.

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