

Review of Gi-Fi Technology

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Abstract - Gi-Fi or Gigabit Wireless means wireless communication with a data rate of over a billion bits (Gigabit) per second. Ten times faster than other technologies. Its chip offers a data transfer rate of several gigabits in a local environment with speeds of up to 5 Gbit / s in a range of 10 meters. It is the world's first transceiver integrated on a single CMOS chip and operating in the currently largely unused 60 GHz frequency band. It uses a 5mm square chip with a 1mm antenna that uses less than twice the power to transmit data at high speed over short distances, just like Bluetooth. The exciting features and benefits of this new technology can impact the most anticipated technology with a huge global market to revolutionize the high speed transfer of large files in nanoseconds. It should be the preferred key wireless technology that will enable the digital economy of the future. Gi-Fi accelerates wireless communication.

Keywords: Gi-Fi, ZigBee, Bluetooth, Wi-Fi, wireless.

I. INTRODUCTION

Gi-Fi is the technology that uses an extremely high frequency of 60 GHz for data transmission. Mixing and filtering the signals increases the signal strength with minimal losses in the medium. Like Bluetooth, this technology uses short-range wireless communication. Wi-Fi (IEee-802.11b) and Wi-Max (IEee-802.16e) caught our attention. Since there has been no recent development to transmit data faster, the transmission of video information is time consuming. This leads to the introduction of technology Gi-Fi. It offers several advantages over Wi-Fi, a similar wireless technology. As a result, it offers faster information throughput in Gbit / s, lower power consumption, and reduced costs for short distance transmissions. Gi-Fi, which was developed on an integrated radio transceiver chip. In which a small antenna is used and the two transceivers are integrated on a single chip, which is manufactured using the CMOS (Complementary Metal Oxide Semiconductor) process. Thanks to Gi-Fi transmission of large videos, files are available in seconds. Theoretically, this technology would transfer gigabytes of our favorite high definition movies in seconds. For example, Gi-Fi can be seen as an opponent of Bluetooth rather than Wi-Fi, and can find applications that range from new cell phones to consumer electronics.



Figure 1: Local data transmission through Gi-Fi

Gi-Fi allows the transfer of full length HD movies between two devices in seconds. This corresponds to the higher megapixel number of our cameras, the higher bit rate of our music files, the higher resolution of our video files, etc. Promise within 10 meters. The new radio technology is called Gi-Fi and operates in the 60 GHz frequency band, which is currently largely unused. The Gi-Fi chip, developed by the Australian researcher, measures 5 mm² and is manufactured using existing CMOS technology which is currently used to print silicon chips. The best thing about this neoteric technology is its cost effectiveness and low power consumption. It only consumes 2 watts to operate with a 1mm antenna and the development of the Gi-Fi chip costs around AUD 10 (INR 484).

II. NETWORK EVOLUTION (HISTORY)

As we can see in Figure 2 in the 19th century, fiberglass was first developed in the 1970s. Optical fiber was replaced by wireless access in the 1980s. Wireless, Bluetooth was first introduced in 1989. After Bluetooth, Wi-Fi is used for Internet access. After Wi-Fi, WiMAX is used for fast Internet access. According to WiMAX, Gi-Fi can be used for fast Internet access. The change in social paradigm can lead to diverse communication technologies. Therefore, technical "seeds" must be promoted to meet these needs. This includes building an infrastructure for communication technologies for users. We can see important developments in transmission systems in which the properties of technological "seeds" in optical transmission, wireless transmission, Bluetooth, Wi-Fi, Wi-Max and now Gi-Fi meet these requirements. In addition, by modifying the evolution of the network, the communication network infrastructure should become more reliable and contain more intelligent functionalities. Bluetooth is a wireless technology standard for exchanging data over short distances.

❖ HISTORY

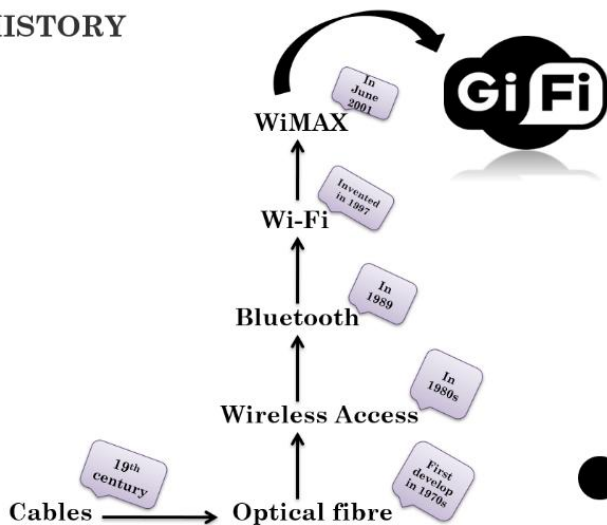


Figure 2: Network Evolution (History)

ZigBee is a specification for a number of high-level communication protocols used to create personal networks made up of small, low-power digital radios. ZigBee is based on an IEEE 802.15.4 standard. Due to the low power consumption, the transmission distances are limited to a range of 10 to 100 meters depending on the output power and environmental properties. Wi-Fi is a local wireless technology that allows an electronic device to participate in computer networks on the 2.4 GHz UHF and 5 GHz SHF ISM bands. The IEEE standardized by Wi-Fi is 802.11. Many devices can use Wi-Fi, such as PCs, video game consoles, smartphones, digital cameras and digital audio players. Global interoperability for microwave access (WiMAX) is the common name for the IEEE 802.16a standards. These standards were published by the IEEE 802.16 subgroup, which originally covered wireless local loop (WLL) technologies with radio frequencies from 10 to 66 GHz. The specifications have recently been extended below 10 GHz. Harmonize standards and certify interoperability between devices from different manufacturers. Standardized interoperable solutions lead to massive volumes and lower costs, promote and establish a brand for the technology. Wi-Fi access is limited to a radius of 4 to 6 miles (maybe 25 square miles or 65 square kilometers, which is comparable to the range of a cell phone area). With stronger line of sight antennas, the Wi-MAX transmitter would send data to Wi-MAX compatible computers or routers installed within 30 miles (3600 square miles or 9300 square kilometers of range) of the transmitter. As a result, Wi-MAX reaches its maximum range.

Gi-Fi or Gigabit-Wireless is the world's first transceiver integrated on a single chip and operating in the CMOS process at 60 GHz. It enables wireless transmission of audio and video data at speeds of up to 5 gigabits per second, ten times the current maximum wireless transmission rate.

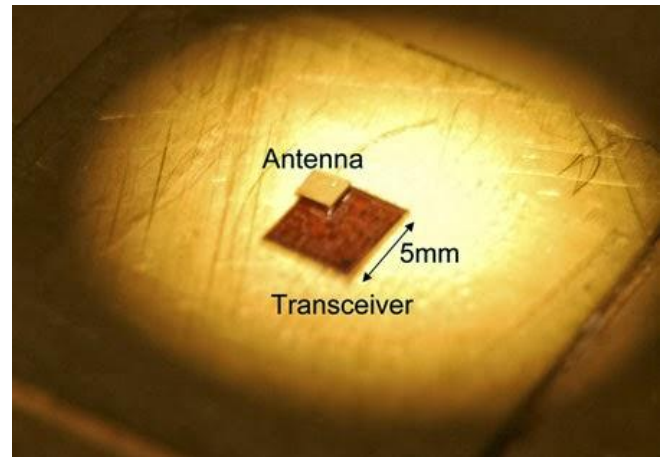


Figure 3(a): Gi-Fi chip

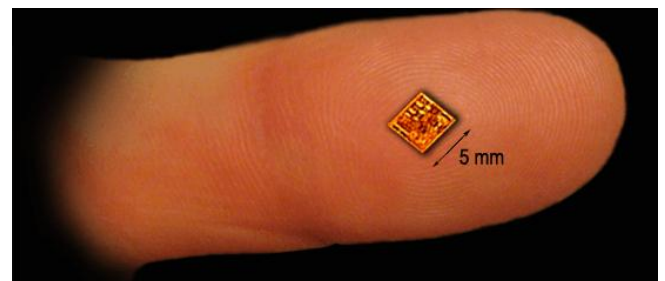


Figure 3(b): Gi-Fi chip

A new silicon chip developed in Melbourne will revolutionize the way household appliances such as televisions, phones and DVD players communicate with each other. The small 5 millimeter side chip can transmit data at a speed of 5 gigabits per second over distances of up to 10 meters via a wireless connection. An entire HD movie can be transferred to a cell phone in seconds, and the phone can then download the movie to a computer or screen at the same speed.

III. WORKING PRINCIPLE OF Gi-Fi

In this example, time duplexing is used for sending and receiving. Here, the data files are converted from the IF zone to the RF60GHz zone using two mixers. This data is transmitted to a power amplifier which feeds a millimeter wave antenna.

3.1 Transmission

The time division duplex is used for both transmission and receiving of data during transmission. The file with the frequency goes through the mixer 1 and the mixer 2, which are connected to the local oscillator 1 and to the oscillator 2, respectively.

V. COMPARISON OF Gi-Fi WITH BLUETOOTH AND Wi-Fi

| Characteristics | Bluetooth | Wi-Fi | Gi-Fi |
|---------------------|---|--|---|
| Frequency | 24Ghz | 24Ghz | 60Ghz |
| Range | 10 meter | 100 meter | 10 meter |
| Primary application | WPAN Cable replacement | WLAN Ethernet | Embedded in devices |
| Data transfer rate | 800 kbps | 11 mbps | 5 gbps |
| Power consumption | 5mw | 10mw | 2mw |
| Primary devices | <ul style="list-style-type: none"> • Mobile phones • Consumer • Electronic office and industrial devices | <ul style="list-style-type: none"> • Notebook • Desktop computer | <ul style="list-style-type: none"> • Fax • Printer • Cellular phones |

Here we have a comparison table of Gi-Fi with Bluetooth and Wi-Fi. The table contains various properties, which are given below.

- **Frequency:** Bluetooth and Wi-Fi has 24Ghz while Gi-fi has 60Ghz so Gi-Fi is better than both Bluetooth and Wi-fi.
- **Range:** The range of Bluetooth is 10m where Wi-Fi has higher range i.e. 100m and Gi-Fi has lower range i.e. 10m. so here we found Wi-fi has higher range as compare to Gi-fi and Bluetooth.
- **Primary Applications:** The primary applications of Bluetooth is WPAN Cable replacement where the primary application of Wi-Fi is ethernet and the Primary applications of Gi-Fi is embedded in devices
- **Data Transfer Rate:** The data transfer rate of Bluetooth is 800kbps, data transfer rate of Wi-Fi is 11mbps, Gi-Fi has more data transfer rate of 5gbps.
- **Power Consumption:** Power Consumption of Bluetooth 5mw, power consumption of Wi-fi is 10mw and Gi-fi has low power consumption which has 2mw. Now here we can do more work with the help of Gi-Fi at low power consumption.
- **Primary Devices:** A primary device of Bluetooth is Mobile phone, Consumer, Electronic and Office device. Primary device of Wi-Fi is Notebook, Desktop computer etc. And the primary devices of Gi-Fi are Fax, Cellular phone, Printer etc.

VI. ADVANTAGES OF Gi-Fi

- **High speed of data transfer:** Wi-Fi Gi-Fi or Gigabit can transmit data at 5 Gbit / s. Gi-Fi technology No cables are needed to connect consumer electronics. All devices with a range of 10 meters can be connected to transmit data wirelessly.

- **Low Power consumption:** Gi-Fi uses very little energy to transfer data from one system to another. It only uses 2 MW of electricity to do its job.
- **High Security:** Large amounts of data can be transferred in seconds. Therefore, transmission among the factors that have hindered acceptance of wireless LANs outside of the company's green locations, compared to wired Ethernet, is dangerous and poor performance. About 70% of companies have deployed their WLAN in a secure firewall area, but still use the old WEP protocol, which does not effectively protect the application layer. Better encryption is therefore urgently required. GI-FI's secure encryption technology guarantees data protection and content security.
- **Cost Effectiveness:** The best thing about this new technology is its profitability and energy consumption. It consumes only 2 watts of energy to operate with the included antenna (1 mm), and the development of the GI-FI chip costs around \$ 10 (380 rupees) to manufacture. GI-FI is based on an open international standard. Mass adoption of the standard and the use of inexpensive, mass-produced chipsets will significantly reduce costs, which is far less than current technologies.
- **Small Size:** The size of the GI-FI chip is 5 × 5 millimeters and can be adapted to various devices such as mobile phones.
- **High Portable and High Mobility:** As we can from above the size of Gi-Fi is very small so we can easily carry it from one place to another place.

VII. DISADVANTAGE OF Gi-Fi

As we can see from figure 9, the main disadvantage of Gi-Fi is it works on short distance i.e. 10m only.



Figure 9: Gi-Fi works on short distance

VIII. FUTURE SCOPE

A fully integrated single chip transceiver was manufactured, tested and demonstrated in the GI-FI chip, and a transceiver with an integrated phase array antenna based on 65 nm CMOS technology was sent for manufacture. GI-FI technology introduces the world's first fully integrated transceiver with CMOS technology at 60 GHz and offers new technology for the integration of antennas in CMOS. The GI-FI team is looking for partners interested in the marketing of their 60 GHz chips. Given the growing acceptance of high definition (HD) televisions, inexpensive chips and other attractive features of this new technology, it can be assumed that the expected global market for this technology is enormous. We expect GI-FI to be the dominant technology for wireless networks in the coming years. Providing low-cost, high-speed broadband access and sharing large files in seconds could develop the home and wireless office of the future.

IX. CONCLUSION

Gi-Fi technology enables wireless transmission of audio and video data at speeds of up to 5 gigabits per second, ten times the current maximum wireless transmission rate, at one-tenth of the cost, usually in the range of 10 60 GHz meters in the CMOS process. This technology has been eliminating cables that have been wound around the world for many years and provides a high speed data transfer rate. The comparison made in this document between GI-FI and existing wireless technologies shows that these functionalities as well as other advantages, such as: A low cost chip, without frequency interference, low power consumption and high security,

explained in detail in this document, is suitable to replace existing radio technologies for data transmission between devices that are installed at short distances from each other. GI-FI technology is versatile and can be used in many places and on many devices, e.g. B. in smartphones, wireless panoramic networks, and media access control and millimeter wave video signal transmission systems. This chip could also replace HDMI cables and develop the wireless home and office of the future. Finally, some of the future work related to GI-FI was presented and it is striking to see that more research should be done on this new wireless technology and its applications.

REFERENCES

- [1] Ross, John,- The Book of Wireless: A Painless Guide to Wi-Fi and Broadband Wireless, *Second Edition*, San Francisco, CA: No Starch Press, 2008.
- [2] Gowtham S Shetty, - Gi-Fi: Next Generation Wireless Technology, *Visvesvaraya Technological University Belgaum*, 2011.
- [3] Srikanth P, - Innovative with GI-FI Technology, *Prist university Pondicherry, India, IJARCSST*, vol.2 Issue 1 ,2014.
- [4] Rfglobalnet.com-Fixed wireless communication at 60 Ghz <http://www.rfglobalnet.com/doc/fixed-wirelesscommunications-at-60ghz-unique-0001>
- [5] Scholar.lib.vt.edu-Analysis of atmospheric effects, <http://scholar.lib.vt.edu/theses/available/etd09302001-191841>, 2010.
- [6] Upena dalal – The book of Wireless communication, *Oxford Higher Educations, Seventh Edition*, 2014.

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