New Vintage to Networks

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Abstract: Today Technology and network are playing a vital role in the world. The size and compatibility of the devices is also becoming the point of concern. Understanding the practical prerequisites of today Gi-Fi has become imperative. Gi-Fi is a wireless device with high speed data transfer at very small size and cost effective. This paper presents a detailed information of Gi-Fi.

***Index Terms* - Gi-Fi, WiMAX, Wi-Fi, Bluetooth, Wireless access.**

I. INTRODUCTION

In ancient times Early humans invented wheels, but initially, the shape of the wheel was square, rectangle, triangle-shaped wheels. Which made the travel to be an adventurous experience and a bit difficult to move. When they saw logs rolling down at a faster speed with an almost smooth run, they started using logs for travel, later stones carved into circular shapes were used. By which the work was done an easy and faster way providing an efficient and comfortable trip. In similar lines the technology advanced in such a way that, today networking and communication technology have been advanced to a higher level making user-friendly, easy, efficient and faster. Firstly, Cables and Optical fibers have played a diligent and vigorous role in the site of networking and communication. Gradually it became difficult with these cables and optical fibers, because of their heavy installation process and low portability access which gave rise wireless transfer of data and other files at a faster rate wherein the installation process almost minimized and had higher portability, which is known as wireless technology. Wireless technology consists of Bluetooth, Wi-Fi, WiMAX. Bluetooth wireless access has a range of 9-10 meters and the rate of data transfer rate was 800kbps. Further, the range of Wi-Fi was increased to 91-100 meters and the rate of data transfer was11Mbps and similarly WiMAX had 50 Kilometers range with a transfer rate of 1Gbps. The transfer of data and video information at a faster rate, there needed a new technology as it is not supported by wireless technology. So, here comes the new technology for the fastest transfer of any type of file or information that is Gigabit Fidelity (Gi-Fi). It is advantageous for short-range transfer of any type of information, its rate of transfer is 5Gbps. This also provides high-speed broadband connections and high-speed data transfer within a few seconds at low cost with very less power consumption. Gi-Fi is preferred for usage at home and offices.

II. EVOLUTION OF NETWORK

At the foremost, there started a cable network that was used by computers for data transfer and communication between the devices. But the installation of cables was a greater difficulty and thus wireless access was started. In this wireless access the foremost one was Bluetooth and then the wireless fidelity (Wi-Fi).
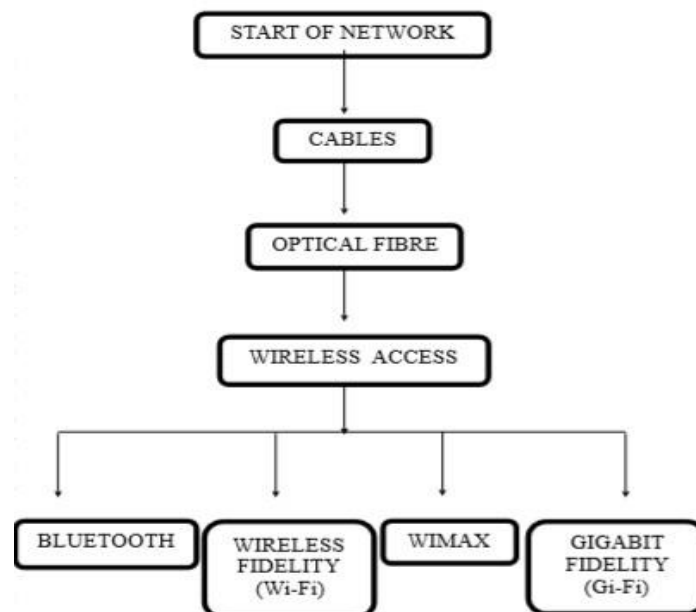

Figure 1. Evolution of Network

III. CABLES

Computer networks utilize cables as a physical medium for communication and data transfer between the devices. This cable is commonly used with LANs (Land Area Network). Cables are also used to connect two or more computers to share networks, printers, scanners, etc. Different types of network cables, such as coaxial cable, optical fiber cable, and twisted pair cables, are used depending on the network's physical layer, topology, and size.

IV. OPTICAL FIBER

An optical fiber is a networking cable used for long distance network sharing with high data working and in telecommunications. This optical fiber is made up of a glass core in the center which is surrounded by several layers of protective material and the outer part is made by Teflon or PVC to interference. These provide higher bandwidth and capable of carrying information at greater speeds than coaxial and twisted pair.

V. WIRELESS ACCESS

The wireless access consists of special points called wireless access points. These wireless access point (WAP) is a hardware device and a special purpose communication device of wireless local area networks (WLANs). And these access points act as a central transmitter and receiver of wireless radio signals. These also allow wireless devices and wired network to connect through a wireless standard including Bluetooth, Wi-Fi, etc.

VI. BLUETOOTH

Bluetooth is a wireless technology standard for exchanging data over short distances from fixed and mobile devices and building personal area networks (PANs). It is a wireless replacement of RS-232 data cables. It is based on low power consumption, short distance network. It operates a range of 2400–2483.5 MHz, 10 meters and uses a radio technology called frequency hopping spread spectrum (FHSS). Bluetooth technology was designed primarily to support networking of portable consumer devices and peripherals that run on batteries. Bluetooth exists in many products such as telephones, tablets, media players, robotics systems, handheld, laptops, Wireless keyboards, Printers, Computers, etc.

VII. WIRELESS FIDELITY(WI-FI)

Wi-Fi is a technology that uses wireless local area networking (WLAN) with devices based on the IEEE 802.11 standards. The main goal of Wi-Fi technology is to provide service for mobile computing devices like a laptop. This network uses radio waves to provide high-speed Internet and network connections. Its range is about 20 meters indoors and up to 100 meters outdoors. Its hotspot coverage is as small as a single room with walls that block radio waves and as large as many square kilometres achieved by using multiple overlapping access points. Devices that can use Wi-Fi technology are personal computers, phones and tablets, digital cameras, smart TVs, modern printers and etc.

VIII. WIMAX

Worldwide Interoperability for Microwave Access (WiMAX) is a wireless industry dedicated to the advancement of IEEE 802.16 standards for broadband wireless access (BWA) networks. WIMAX intended to provide high-speed data communications, i.e. initially provided 30 to 40 Megabits per-second data rates and it was updated up to 1 Gigabit-per-second in 2011. It is also a candidate for the 4G network, which competes with LTE advanced standards. But the only disadvantage is that the cost is high.

IX. Gi-Fi

Gigabit Fidelity is the world's first transceiver integrated on a single integrated circuit (chip) that is operated at 60 GHz on the CMOS (complementary metal oxide semiconductor) method. It allows wireless transfer of audio and video data at up to 5 gigabits per second, which is ten times the current wireless transfer rate, at one-tenth the cost. The available 7 GHz 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 meters. It is a square chip of 5mm and a 1mm wide antenna. It consumes less than 2 watts of power to transfer data and information.
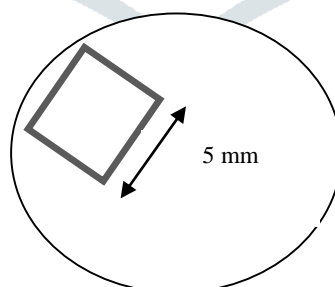

Figure 2. Gi-Fi Chip

Table 1. Comparison between Bluetooth, Wi-Fi, Wi-Max, Gi-Fi

Characteristics	Gi-Fi	Wi-Max	Wi-Fi	Bluetooth
Data Transfer Rate	5 Gbps	1 Gbps	11 Mbps	800 Kbps
Range	10 Meters	50Kilometers	100 meters	10meters
Frequency	2400–2483.5 MHz	2.3-3.5GHz	2.4 GHz	7 GHz
Power consumption	Less than 2 Milliwatts	Less than 5 Milliwatts	10 Milliwatts	5 Milliwatts
IEEE standards	IEEE 802.15.3	IEEE 802.16	IEEE 802.11	IEEE 802.15

X. WORKING of Gi-Fi

Gi-Fi technology uses the time division duplex (TDD) method for both transmission and receiving data. Time-Division Duplex (TDD) is the application of time-division multiplexing to separate outward and return signals. Data files are converted from IF range to RF 60Ghz range by using 2 mixers. The output is fed into a power amplifier, which feeds a millimetre wave antenna. The incoming RF signal is first converted to an IF signal centred at 5 GHz and then to normal data ranges. We use heterodyne construction to avoid leakages due to direct conversion. Due to the availability of the 7GHz spectrum, the total data will be transferred within seconds.
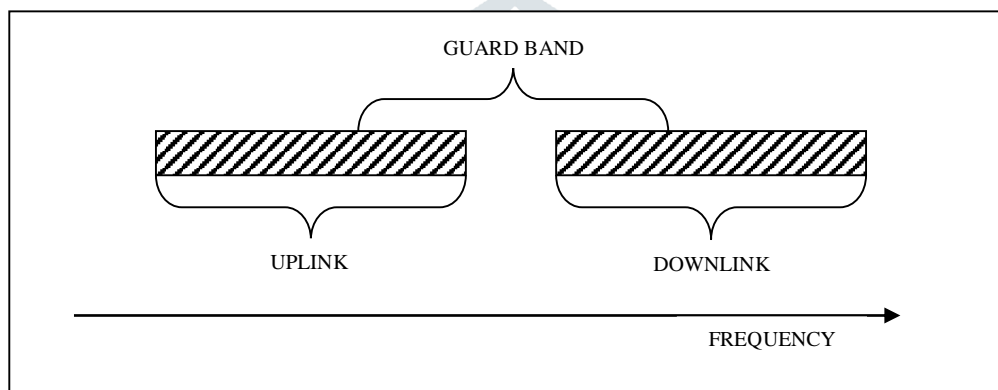

Figure 3. TIME DIVISION DUPLEX

XI. FEATURES of GI-FI

- High frequency for communication with multiple customers within a small range.
- It is a portable technology.
- It allows the line of sight operation having only a shorter coverage area.
- Operates over a range of 10 meters without interference.
- The entire transmission system can be built on a cost-effective single silicon chip.

XII. ADVANTAGES OF GI-FI

- Removing Cables: From many years cables and optical fibers played a dominant role in the world, for its higher bit rates and faster transmission. But the installation of cables caused greater difficulty and thus led to wireless access. Gi-Fi technology removes cables to connect consumer electronics devices and all the devices in the range of 10 meters can be connected in order to transmit the data wirelessly.
- Low-Cost Chip: Gi-Fi chip uses the only one-millimetre-wide antenna and less than 2mili watts of power. The low-cost chip allows technology to be readily incorporated into multiple devices. The chip in Gi-fi would likely cost about $10 or less to build. This is a small design that allows cell phones and other small devices to add technology without significantly driving up the price.
- Security: About 70 percent of firms have made their own WLAN in a secure firewall zone but they are still using the old WEP protocol, which does not protect the application layer effectively, so for better encryption a new technology is needed urgently. Secure encryption technology in Gi-Fi ensures privacy and security of content.
- Simplicity: One of the problems with wire connections and cables is complexity for connecting, but in the Gigabit wireless technology simplicity is one of the features. A simple connection improves the consumer experience.
- High Mobility: Gi-Fi offers high mobility and portability, it provides a better coverage area that allows this technology to go higher and it provides better data rates at a higher speed.

XIII. APPLICATIONS OF GI-FI TECHNOLOGY

Gi-Fi offers a wide number of applications in today's life.

- Household devices,
- Inter-vehicle communication,
- Wireless pan networks,
- Broadcasting Video Signal Transmission System in Sports Stadium,

- Office Appliances,
- Video Information Transfer,
- Inter-Vehicle Communication System,
- Gi-Fi technology is used in Media Access Control (MAC), etc.

XIV. CONCLUSION

Gi-Fi will be a dominant technology for the coming years to come. By providing high broadband access at low cost, with very high speed resulting in efficient transferring of all types of data and also swapping of large files within seconds. As the integrated transceiver is extremely small, it can be embedded into any size of devices thus having portability and compatibility. The breakthrough will mean that the networking of office and home equipment without wires will finally become a reality. Tomorrow one can see wire free homes and offices with Gi-Fi a smart technology providing the ease and comfort of any type of data transfer with no time.

XV. ACKNOWLEDGMENT

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