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Wireless Telecommunication Technologies: Li-Fi Vs. Wi-Fi Vs. Wi-Max Vs. Zigbee Vs. Bluetooth

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Abstract

In this paper we will discuss of wireless telecommunication technologies IEEE standards 802 and compare between this technologies in many Feature: light fidelity (Li-Fi) is a wireless optical networking technology that uses light-emitting diodes (LEDs) for data transmission. Worldwide Interoperability for Microwave Access (Wi-MAX) is a wireless communications standard designed to provide 30 to 40 megabit-per-second data rates, Wi-Fi is a local area wireless technology, which allows an electronic device to exchange data or connect to the internet using 2.4 GHz UHF and 5 GHz SHF radio waves .Bluetooth is wireless personal area network enables users to connect a wide range of computing and telecommunication devices without any additional or proprietary cables and ZigBee technology.

Keywords: *Li-Fi, Wi-Fi, WiMax, Zigbee, Bluetooth.*

1. Introduction

Several technical committees of IEEE are responsible for developing standards of the local area network (LAN), wireless local area network (WLAN), and wireless personal area network (WPAN). IEEE 802 refers to a family of IEEE standards dealing with local area networks and metropolitan area networks. Table 1 summarizes them.

Table 1: IEEE 802 Working Groups

	Working Group
802.1	Higher Layer LAN Protocol
802.2	Logical Link Control (LLC)
802.3	Ethernet
802.11	WLAN
802.15	WPAN
802.16	Broadband Wireless Access (BWA)

2. Comparison

Table 2: Comparison between Li-Fi and Wi-Fi and others

Feature	Li-Fi	Wi-Max	Wi-Fi	zigbee	bluetooth
1. IEEE standard	802.15.7	802.16	802.11	802.15.4	802.15.1
2. Band width	100 times of Tera HZ	2-11 GHz	2.4 -5GHz	868/915MHz - 2.4 GHz	2.4 GHz
3. Data rate	1-3.5 Gbps	54-250 Mbps	11-54 Mbps	250kbps	780kbps
4. Range	10 meters	30-100 meters	40kmeters	10-300 meters	10meters
5. Network Topology	Point-to-point	Point to-Multi point	Point- to-point	Peer-to-peer	Point-to-point
6. Data Transfer Medium	Light	Microwave	RF	RF	ISM band
7. Coverage	Indoor	Outdoor	Indoor	Indoor	Indoor
8. Security	High	Meduim	Meduim	Meduim	Low

3. Discussion

After review all technologies, we found:

1. Li-Fi is free band that does not need license , No more monthly broadband bills, solve issues such as shortage of radio frequency bandwidth and also allow the internet where the traditional radio based wireless isn't allowed such aircraft and hospitals and Internet anywhere , speed up to 1G but small coverage range 10m.

2. Wi-Max is very costly than Wi-Fi but the coverage range so far.

3. Wi-Fi is point to point Network Topology. It is having RF as Data Transfer Medium.

4. ZigBee technology is a low data rate, low power consumption, low cost; wireless networking protocol targeted toward automation and remote control applications. It is expected to provide low-cost and low-power connectivity for devices that need battery life as long as several months to several years but does not require data transfer rates as high as those enabled by Bluetooth. ZigBee can be implemented in mesh (peer- to-peer) networks larger than is possible with Bluetooth. ZigBee-compliant wireless devices are expected to transmit 10–75 minutes, depending on the RF environment and power output consumption required for a given application, and operate in the unlicensed RF worldwide (2.4 GHz global, 915 MHz America, or 868 MHz Europe) bands. The data rate is 250 kbps at 2.4 GHz, 40 kbps at 915 MHz, and 20 kbps at 868 MHz.

5. Bluetooth provides short-range, low-cost (_$10 per device) connectivity between portable devices. Bluetooth is limited in range (10 meters), low power, short range, medium transmission speed. The low power consumption makes Bluetooth ideal for small, battery-powered devices like mobile phones and pocket PCs, Bluetooth enables users to connect a wide range of computing and telecommunication devices easily and simply, without the need to buy additional or proprietary cables. The cable solution is complicated since it may require a cable specific to the device that is being connected. The infrared solution eliminates the cable, but requires line of sight. To solve all these problems the Bluetooth standard has been developed

4. Conclusions

We have already discussed wireless telecommunication technologies IEEE standards 802 and comparison between these technologies in many features: Li-Fi, Wi-Max, Wi-Fi, Zigbee, Bluetooth.

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