An Introduction to Wireless USB Flash Devices

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Abstract— **We all know that USB flash devices like pen drives are meant for storing the data. Data reading and writing in USB flash devices is only possible by using USB cables and USB ports of PC. This paper explains an innovative idea of Wireless USB Flash devices in which data can be read and write without using USB cables and ports of PC.**

Keywords— **Wireless USB Flash Devices, Pen drives, PAN.**

I. INTRODUCTION

The Wireless USB Flash Devices are almost same as that of normal USB Flash Devices but some additional features are added to support the Wireless data transmition and reception.

II. WIRELESS TECHNOLOGIES

There are various standards for supporting Wireless technologies. Some wireless PAN technologies that can be used here are Bluetooth, Wi-Fi, Zigbee, Home RF, WirelessUSB (Cypress Standard) and Certified WirelessUSB.

A. Wi-Fi (IEEE 802.11b) [1]

WiFi, widely used for connecting personal computers in internet, is based on carrier sense multiple access with collision avoidance (CSMA/CA) with a Direct Sequence Spread Spectrum (DSSS) Technique.

B. Bluetooth (IEEE 802.15.1) [2]

Bluetooth is mainly used for devices that have regular charge (e.g. mobile phones). Bluetooth operates under a Time Division Duplex (TDD) polling scheme with a Frequency Hopping Spread Spectrum (FHSS) technique, with Gaussian frequency shift keying (GFSK) modulation. The nominal data rate is 1 Mb/s using a 1-MHz channel, while the effective maximum data rate is 721kb/s, with a range between 10 to 100 m.

C. HomeRF [3]

HomeRF is similar to Bluetooth; it also uses FHSS access technique but with less hopping rate. The channel band width is 5 MHz for a higher data rate of 5 Mb/s.

D. ZigBee (IEEE 802.15.4) [4]

The ZigBee standard has been developed specifically for remote monitoring and control. ZigBee networks are designed to save the power of the slave nodes. For most of the time, a slave device is in deep-sleep mode and wakes up only for a fraction of time to confirm its presence in the network. The targets of ZigBee are low cost applications where the battery cannot be changed (battery life time of 1-2 years) with limited requirements of bandwidth. The maximum packet size is 133 bytes, but only 102 bytes can be used for data transmission. The supported nominal data rates are 250kbps, and the effective date rate is about 190 kbps.

E. WirelessUSB [5]

WirelessUSB is a trademark of Cypress designed for short-range wireless connectivity. WirelessUSB enables PC peripherals and point-to-point or multipoint-to-point applications with the ability to replace the USB wire with a low-cost, 2.4-GHz wireless solution. The WirelessUSB system acts as a USB human interface device (HID)-class device, so the wireless connectivity is transparent to the designer at the operating system level. WirelessUSB also operates as a simple, cost-effective wireless link in a host of other applications (non-USB). Cypress developed three classes of devices: WirelessUSB LP, WirelessUSB LR, WirelessUSB LS. WirelessUSB LP has been designed for low power, long range (10m+), high data rate (1Mbps-GFSK or 250Kbps-DSSS) for applications like appliances, lighting, automotive. WirelessUSB LS is a 10-meter transceiver with applications like thermostats, switches and WirelessUSB LR is a 50-meter transceiver widely used for keybord and mouse. The device considered in this work is the CYWM6935, of the LR class. The module uses the ISM 2,4 GHz band and DSSS (Direct Sequence Spread Spectrum) technology to improve the immunity to the interferences, with GFSK modulation, with a maximum bit rate of 62,5 Kbps.

F. Certified WirelessUSB [6]

Certified USB does not use the 2.4 GHz band, but we reported a short description of the standard to avoid confusion with the WirelessUSB of Cypress. In 2004, Intel Corporation and other technology industry leaders announced the formation of the Wireless USB Promoter Group for the development of the "Certified Wireless USB" standard. The name "Certified Wireless USB" has been used to differentiate from WirelessUSB developed by Cypress. Wireless USB is based on Ultra-WideBand (UWB) radio platform, which is capable of sending 480 Mbit/s at distances up to 3 meters and 110 Mbit/s at up to 10 meters.

III. ANALYSIS

On comparing wireless PAN technologies table was drawn in the below.

TABLE I
VARIOUS WIRELESS PAN TECHNOLOGIES

S.No.	PAN Technology	Range	Frequency Band	Data rates
1	Bluetooth	10-100 m	1 MHz	1Mbps
2	WirelessUSB	10-50 m	3.1- 10.6GHz	110Mbps - 480Mbps
3	Wi-Fi	20 -50 m	2.4 or 5 GHz	54 Mbps
4	HomeRF	50 m	5 MHz	10 Mbps
5	Zigbee	30-100 m	2.4 GHz	20Kbps - 250 Kbps
6	Certified WirelessUSB	3-10 m	2.4 GHz	110Mbps - 480Mbps

Any of the protocol can be used for supporting wireless data transmition based on the user requirements. As most of the people are very much familiar with Bluetooth it's better to have one of the options. Finally 2 of the PAN technologies were used for better usage of the device.

IV. ADDITIONAL FEATURES

Display unit is interfaced to display the data present in the device at the same time to display the amount of data that is transferring. Keyboard is also interfaced for selecting the contents present in the device. Controller unit plays major role that is driving all the interfaced devices.

Data protection can be achieved as only authorized persons or authorized PCs can exchange data with these types of devices. Storage capacity can be expandable. Data can be exchanged in two ways (wired and wireless).

V. DEPLOYMENT ARCHITECTURE OF THE SYSTEM

Fig. 1 Deployment Architecture of Wireless USB Flash Devices.

The above figure shows the deployment Architecture of the Wireless USB flash devices. From one USB flash device to other USB flash device data can be exchanged directly without using the USB cable and USB ports of PC.

CONCLUSIONS

This paper describes how to send and receive data from one USB flash device to Other USB flash device without using the USB cables and USB ports of PC. At the same time security is provided to the data in the device as this device can exchange data only with authorized persons or authorized PCs.

Finally we can conclude that the devices which don't have USB ports like cellular phones can directly transmit/receive data to/from these types of wireless USB flash devices.

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