A Comparative analysis of Wireless Sensor Network With Zigbee Transciever

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Abstract: In this paper we present the wireless Sensor network (WSN) for Monitoring a signal Continuously Using Zigbee. The output of a sensor has to be transmitted via Zigbee and the same has to be sent to the remote wireless monitor for acquiring the observed signal. Here we will mainly focus that how Zigbee is more useful than other WSN like Bluetooth & WLAN. this paper will also discuss about the basic architecture of Zigbee layer in transmission layer.

Keywords: - WSN, Zigbee, SimpliciTI, IEEE 802.15.4,

I. INTRODUCTION

At present, near field wireless communication technology has been used widely, especially Bluetooth, wireless local area network (WLAN), infrared, etc. But, they have a number of disadvantages, for example, complexity, large power dissipation, short distance, networking in small scale. In order to satisfy the demand of low power dissipation and low speed among wireless communication devices, a new type of wireless net technology-Zigbee emerges as the times require.

Zigbee Alliance was established in August, 2001,The ZigBee specification, officially named ZigBee 2007.It offers full wireless mesh networking capable of supporting more than 64,000 devices on a single network. It’s designed to connect the widest range of devices, in any industry, into a single control network.

Some of the characteristics of ZigBee include:

- Multiple star topology and inter-personal area network (PAN) communication
- Various transmission options including broadcast
- Security key generation mechanism

II. ZIGBEE VERSUS BLUETOOTH AND IEEE 802.11

Comparing the ZigBee standard with Bluetooth and IEEE 802.11 WLAN helps us understand how ZigBee differentiates itself from existing established standards. (A more comprehensive comparison is provided in Chapter 9.) Figure 1.1 summarizes the basic characteristics of these three standards.

Fig 1: Zigbee monitoring system

IEEE 802.11 is a family of standards; IEEE 802.11b is selected here because it operates in 2.4 GHz band, which is common with Bluetooth and ZigBee. IEEE 802.11b has a high data rate (up to 11 Mbps), and providing a wireless Internet connection is one of its typical applications. The indoor range of IEEE 802.11b is typically between 30 and 100 meters. Bluetooth, on the other hand, has a lower data rate (less than 3 Mbps) and its indoor range is typically 2–10
meters. One popular application of Bluetooth is in wireless communication between a mobile phone and a hands-free headset.

headsets, where Bluetooth provides the means for ZigBee has the lowest data rate and complexity among these three standards and provides significantly longer battery life.

<table>
<thead>
<tr>
<th>System</th>
<th>Zigbee</th>
<th>Bluetooth</th>
<th>Wi-fi</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application</td>
<td>Monitoring &amp; Control</td>
<td>Cable Replacement</td>
<td>Internet</td>
</tr>
<tr>
<td>System Resources</td>
<td>4-32 KB</td>
<td>250KB</td>
<td>1 MB+</td>
</tr>
<tr>
<td>Battery Life (Days)</td>
<td>100-1000</td>
<td>1-7</td>
<td>Hours</td>
</tr>
<tr>
<td>Nodes in Network</td>
<td>255/65K</td>
<td>7</td>
<td>32</td>
</tr>
<tr>
<td>Baseband</td>
<td>20-250Kbps</td>
<td>720Kbps</td>
<td>11 Mbps</td>
</tr>
<tr>
<td>Distance</td>
<td>1-100 m</td>
<td>1-10m</td>
<td>100m</td>
</tr>
</tbody>
</table>

Table 1: Comparison between different wireless networking technologies

III. IEEE 802.15.4 AND ZIGBEE WORKING MODEL

The IEEE 802.15.4 standard1 specifies the PHYsical (PHY) and Media Access Control (MAC) layers at the 868 MHz, 915 MHz and 2.4 GHz ISM bands, enabling global or regional deployment. The air interface is direct sequence spread spectrum (DSSS) using BPSK for 868 MHz and 915 MHz and O-QPSK for 2.4 GHz. The access method in IEEE 802.15.4-enabled networks is carrier sense multiple access with collision avoidance (CSMA-CA). The IEEE 802.15.4 PHY includes receiver energy detection (ED), link quality indication (LQI) and clear channel assessment (CCA). Both contention-based and contention-free channel access methods are supported. The IEEE 802.15.4 standard employs 64-bit IEEE and 16-bit short addresses to support theoretically more than 65,000 nodes per network.

The IEEE 802.15.4 MAC handles network association and disassociation, has an optional superframe structure with beacons for time synchronization, and a guaranteed time slot (GTS) mechanism for high-priority communications.

Fig 2: Zigbee Protocol Architecture
IV. APPLICATIONS

Any Bluetooth system has four basic parts: a radio (RF) that receives and transmits data and voice; a baseband or link control unit that processes the transmitted or received data; link management software that manages the transmission; supporting application software.

Using its properties we can use zigbee network in various applications like ‘Voice controlled smart home system’, ‘remote sensing & controlling of accident signal.’, temperature sensing network can also consider zigbee technology for further options.

V. CONCLUSION

This paper present the comparative analysis of Zigbee transceiver system with other networking technologies like Wi-fi & Bluetooth.

Also we discussed the working procedure of zigbee transceiver with the help of architecture model. This shows that this is most promising technology which provide low data rate with low power uses & large acquired area. So, this technology can be used for future Personal Area Network in general purpose application.

VI. REFERENCES


