ZIGBEE BASED WEATHER MONITORING SYSYTEM

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ABSTRACT

The nature of wireless sensor networks (WSN) offers several advantages on monitoring and controlling applications over other traditional technologies including self healing, self-organization, and flexibility. Zigbee is an IEEE 802.15.4 standard for data communication with business and consumer device. The technology behind Zigbee specification is intended to be simpler and less expensive than WPANs, such as bluetooth and wi-fi. The main objective of this project is to derive the statistical information about the abnormal geological and atmospheric conditions and send data to weather stations. The IEEE 802.15.4 covers the physical layer and the MAC layer of low-rate WPAN.

Keywords : Characteristics, Mesh Topology, Weather Monitoring.

I. INTRODUCTION

In an industry during certain hazards it will be very difficult to monitor the parameter through wires and analog devices such as transducers. To overcome this problem we use wireless device to monitor the parameters so that we can take certain steps even in worst case. The main use of this module helps in an industry during the worst cases as the analog devices may be damaged may be during the fire accidents,etc.But with the wireless transmission we do not have an accurate data but when compared to the analog failure the errors are very minimum so we use wireless to monitor the parameter in industry where their is no means of human operator to monitor the parameters.It leads to the cheap wireless technology so it can be used for the low rate data transfer. The zigbee technology is widely used for home and industrial automation.

II. ZIGBEE CHARACTERISTICS

- *2.4GHz and 868/915 MHz dual PHY modes*. This represents three license-free bands: 2.4-2.4835GHz, 868-870 MHz and 902-928 MHz. The number of channels allotted to each frequency band is fixed at sixteen (numbered 11-26), one(numbered 0) and ten (numbered 1-10)respectively. The higher frequency band is applicable worldwide, and the lower band in the areas of North America, Europe, Australia and New Zealand .

- Low power consumption, with battery life ranging from months to years. Considering the number of devices with remotes in use at present, it is easy to see that more numbers of batteries need to be provisioned every so often, entailing regular(as well as timely), recurring expenditure. In the ZigBee standard, longer battery life is achievable by either of two means: continuous network connection and slow but sure battery drain, orintermittent connection and even slower battery drain.
- Maximum data rates allowed for each of these frequency bands are fixed as 250 kbps @2.4 GHz,40 kbps @ 915 MHz, and 20 kbps @868 MHz.
- High throughput and low latency for low dutycycle applications (<0.1%)
- Channel access using Carrier Sense Multiple Access with Collision Avoidance (CSMA - CA)
- Addressing space of up to 64 bit IEEE address devices, 65,535 networks.

III. WEATHER MONITORING USING ZIGBEE

System consists of two parts one is transmitter and another is receiver part and both can be any number. Transmitter consists of weather sensors, microcontroller and zigbee and the receiver part consist of PC interfaced with zigbee through PC serial port. Here we monitor temperature, humidity and light with the help of respective sensors. The data from the sensors are collected by microcontroller and transmitted to the receiver section through wireless medium. All the parameters are viewed by the PC using visual basic program at the receiver side.

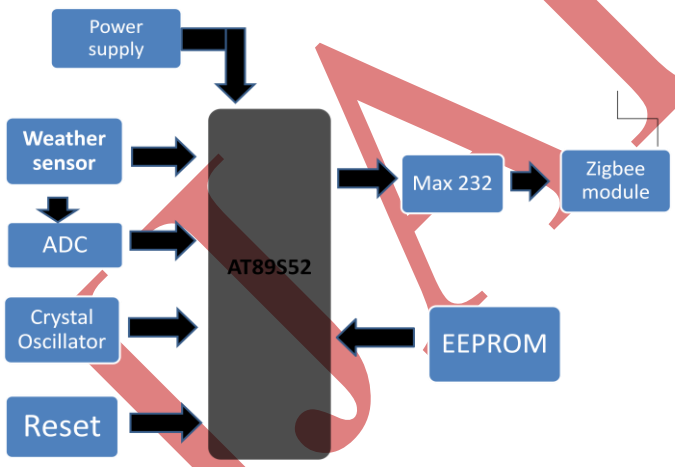

Fig 1. Transmitter Section Of Zigbee

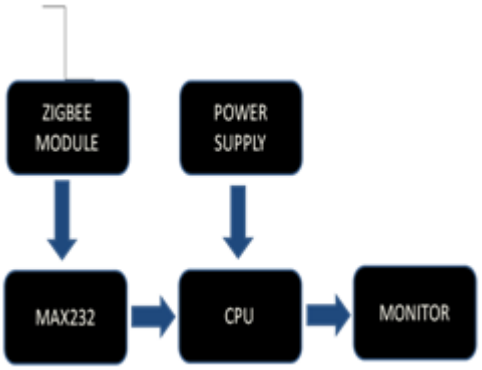

Fig 2.Receiver Section of Zigbee

IV. MESH TOPOLOGY

In mesh topology, every device has a dedicated point to point link to every other device. The term dedicated means that the link carries traffic only between two devices it connects. The capability of a mesh network to create and modify routes dynamically increases the reliability of the wireless connections. If, for any reason, the source device cannot communicate with the destination device using a previously established route, the routing-

capable devices in the network can cooperate to find an alternative path from the source device to the destination device. Any device in a mesh topology is allowed to attempt to contact any other device either directly or by taking advantage of routing-capable devices to relay the message on behalf of the message originator. In mesh topology, the route from the source device to the destination is created on demand and can be modified if the environment changes.

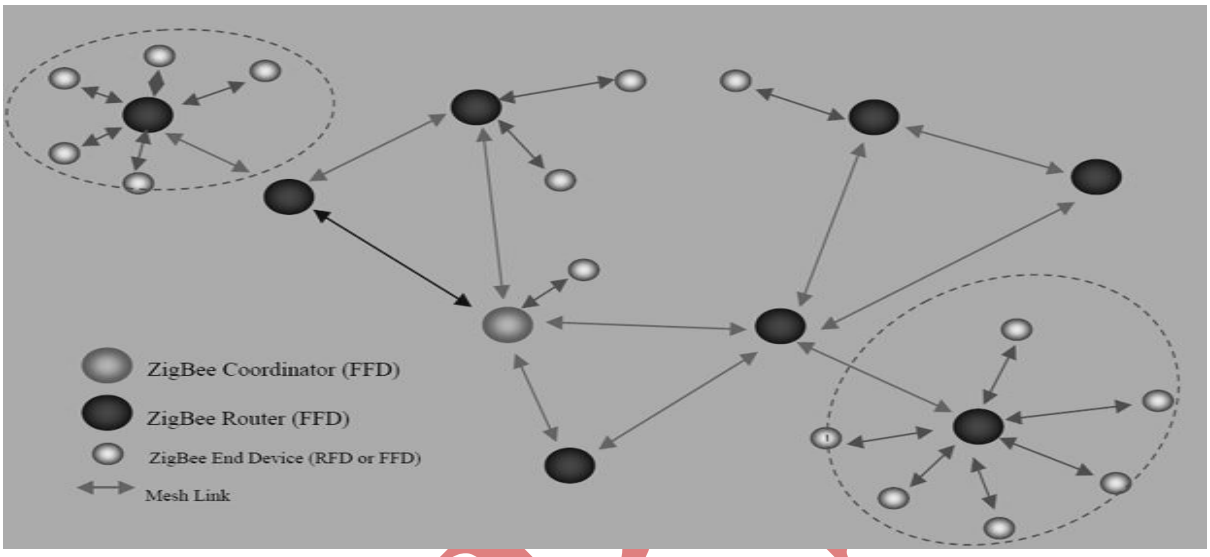

Fig 3.Mesh Topology

V. APPLICATIONS

- Desktop PCs and Home Entertainment Systems (Home Theatre TV)
- Video conference equipment
- Remote Control
- Video gaming equipment
- Remote controls for audio and video equipment
- In-room coverage
- Home+yard coverage

VI. CONCLUSION

It is feasible to construct a WSN for emergency response notification using IEEE 802.15.4 and Zigbee. Moreover there is a range of sensing applications which can be develop ed using 802.15.4 MAC and PHY along with ZigBee stack. This system has the potential to reduce the response time in a cost effective way. The system is robust and efficient method scan be incorporated to validate the threat by adding some additional options to the sensors, such as image processing and multiple sensors. This can help reduce false positives. This system at the moment will be focusing on one aspect of the emergency detection which is fire which occurs mostly in

many campuses across the states. The system can be further developed to detect other emergencies such as gas leaks, gunman on campus and severe weather changes .As ZigBee is a very fast growing technology.

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