IEEE 802.15.4 Use as a Low Rate Wireless Personal Area Network

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***Abstract* - IEEE 802.15.4 is a standard of Zigbee. It is found by Zigbee union. the main purpose of Zigbee is monitoring and controlling device. in this paper I put a result how to message transfer between two Zigbees using point -point communication and we should also create different types of topologies such as star,tree,mesh etc**

Index Terms - Client Computer,Zigbee Coordinator, Zigbee End device,X-CTU,

I. INTRODUCTION

There are many wireless devices such as Zigbee, Bluetooth, Wi-Fi, UWB etc.all are less consumption power devices [1] but all of them Zigbee is very low power consumption device so there is a long battery life.normaly Zigbee work on three types of frequencies such as 868MHZ,915MHZ and 2.4GHZ.Zigbee is useful for short distance communication. We use the Arduino board which comes with AT mega 328 for easy interfacing with the ZigBee module and for easy programming (in C) of the microcontroller [2]. The Arduino boards come with a library for interfacing with Zigbee module and for dealing with analog or digital inputs and outputs. Zigbee is useful for many applications such as industrial system, medical system, and for home automation. In this paper detail study about peer to peer communication and one too many communication and measure real time parameters. during communication of two zigbee we remember about AT and API commands if PAN-ID(Personal Area Network-Identification Number) is same then zigbee is communicate with each other. If we checking the error we use X-CTU Software. II is explain about Zigbee. III is explain about Configuration of Zigbee.IV is explain about Hardware description. V is explain about Results and VI is explain about conclusion and feature scope.

II. ZIGBEE

In December 2000, Institute of Electrical and Electronics Engineers (IEEE) established IEEE802.15.4 subcommittee, who set out to develop ZigBee technology. In August 2001, USA's HONEYWELL and other companies sponsored and founded ZigBee Union. ZigBee is the product of the ZigBee Alliance, an organization of manufacturers dedicated to developing a networking technology for small, ISM-band radios that could welcome even the simplest industrial and home end devices into wireless connectivity[.[3][4][5] From then on, ZigBee technology has been confirmed as the criteria of IEEE802.15.4. Zigbee union is a global organization any one can join the group. Zigbee technology is a wireless communication technology characterized by short distance, low energy consumption, low cost, low speed and low complexity, which effectively makes up for the vacancy of wireless communication market. Zigbee has three frequency ranges: 868MHz, 915 MHz and 2.4GHz. By introducing 868MHz and 915 MHz frequency range, Zigbee effectively avoids interference of various kinds of signals near 2.4GHz. As for this high technology, IEEE802.15.4 workgroup and zigbee union jointly developed four layers of modules for communication in Zigbee protocol, where IEEE802.15.4 workgroup is responsible for physical layer and media access layer, and Zigbee union responsible for the development of application layer and network layer The network topological structure of Zigbee technology consists of: star type, tree type and network type, The three network structure is composed of two devices of zigbee: all purpose device FFD and semi-purpose device. The star type comprises a coordinating point and a multitude of terminal nodes. The coordinating point must be composed of FFD, while the terminal nodes can be formed by FFD or RFD. The tree type consists of a certain number of FFD. Generally, FFD that initiates to establish the network is considered as coordinating point. The tree type possesses automatic restoration capability, providing a variety of routes for data transmission. The network type offers a variety of routes for data transmission. Due to FFD that extends the network, the network type is applicable to the network with wider coverage. Zigbee technology possesses a lot of advantages, mainly including: low energy consumption two dry batteries can serve half a year to two years; low cost – each chip is worth only about USD 3; low speed – for three frequency r+9anges, the speed is 20kbps, 40kbps and 250kbps, respectively; short distance -10-100m, which can be extended to several kilometers by adding nodes; short time delay – quick response speed; high capacity – forming 65,000 nodes to the most; high security – three-grade security mode; license-free frequency range, to name a few[6].

III.ZIGBEE CONFIGURATION

Coordinator:- The Coordinator is the center of system. It collects sensor readings from the sensors back to the user. The function of the collector is divided into two parts: Web-Server and Zigbee Interface to the WSN.The flowchart of the coordinator is shown in above Figure.

End device: - The end Device is act as a RFD(reduce function device) of the system. Its function is collect data from the sensor and report back to coordinator.

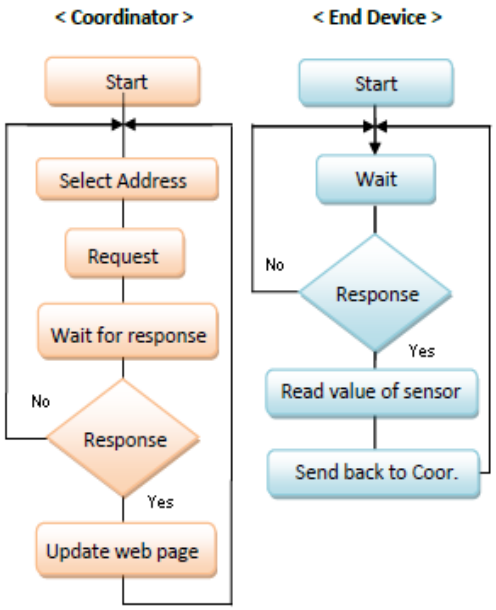

Figure 1:- Configuration of Zigbee

IV HARDWARE DESCRIPTION

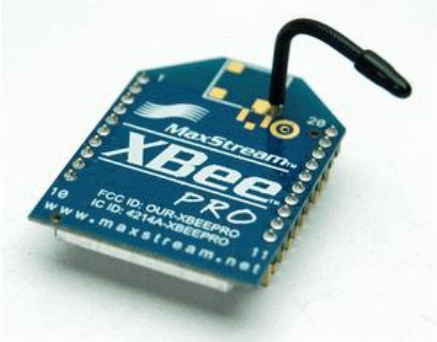

Figure 2:- Zigbee/Zigbee pro

Zigbee is configured using XCTU software It is configured by following steps:-

1) Point to point

First identify modem types XB24 or XBP24 For point to point communication

2) Baud rate should be match each other

3) PAN-ID

4) Channel

i) Select function set ZIGBEE COORDINATOR AT.

ii) Write Parameter and update firmware to one Zigbee Module.

iii) Select function set ZIGBEE ROUTER / END DEVICE AT.

Iv) Write Parameter and update firm ware to another Zigbee.

v) Go to Terminal, type in any word will transfer to the other wireless.

* The following AT commands are useful for my work.

AT commands

Send the 3-character command sequence "+++" and observe guard times before and after the command characters.

1. **PAN-ID:-**The ID command is used to set and read the PAN (Personal Area Network) ID of the RF module. Only modules with matching PAN IDs can communicate with each other.
2. **ND:-** The ND command is used to discover and report all modules on its current operating channel (CH parameter) and PAN ID (ID parameter). ND also accepts an NI (Node Identifier) value as a parameter.
3. **SH: -** The SH command is used to read the high 32 bits of the RF module's unique IEEE 64-bit address.
4. **SL: -** The SL command is used to read the low 32 bits of the RF module's unique IEEE 64-bit address.
5. **DH: -** The DH command is used to set and read the upper 32 bits of the RF module's 64-bit destination address. When combined with the DL (Destination Address Low) parameter, it defines the destination address used for transmission. An module will only communicate with other modules having the same channel (CH parameter), PAN ID (ID parameter) and destination address (DH + DL parameters).
6. **DL: -** The DL command is used to set and read the lower 32 bits of the RF module's 64-bit destination address.

V RESULTS

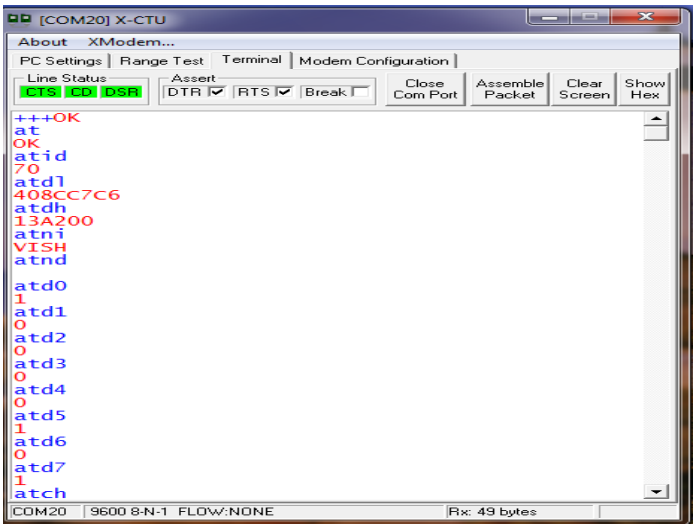

Figure 3:- Configuration of Coordinator

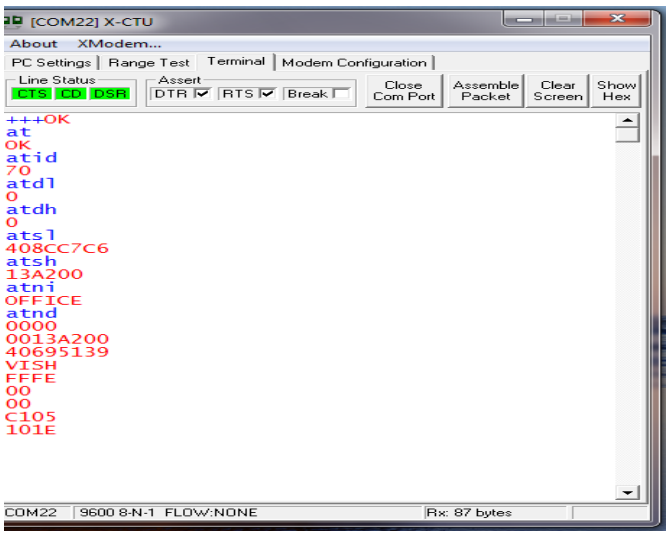

Figure 4:- Configuration of End device

AS shown in above figure I configured zigbee as a coordinator and end device if both Zigbee Pan-Id is same than communicate with each other. I mentioned some results below. in this paper I performed point to point communication between zigbee and end device

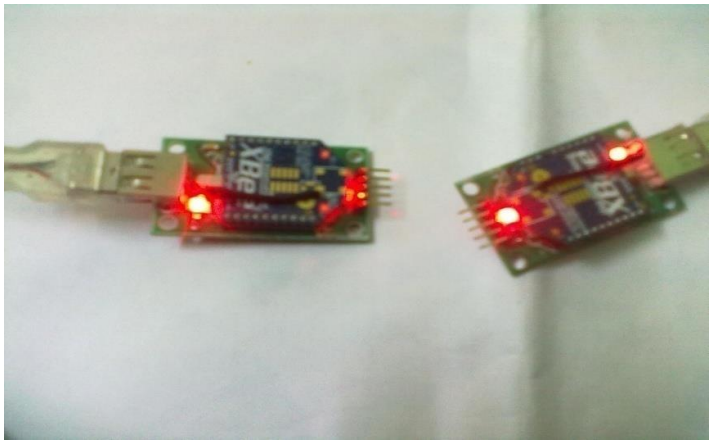

Figure 5:- Point to point communication

As shown in figure point to point communication between two zigbee when message is transfer from coordinator to end device red light is on for transmit a data and for receive a data. There are some results shown below.

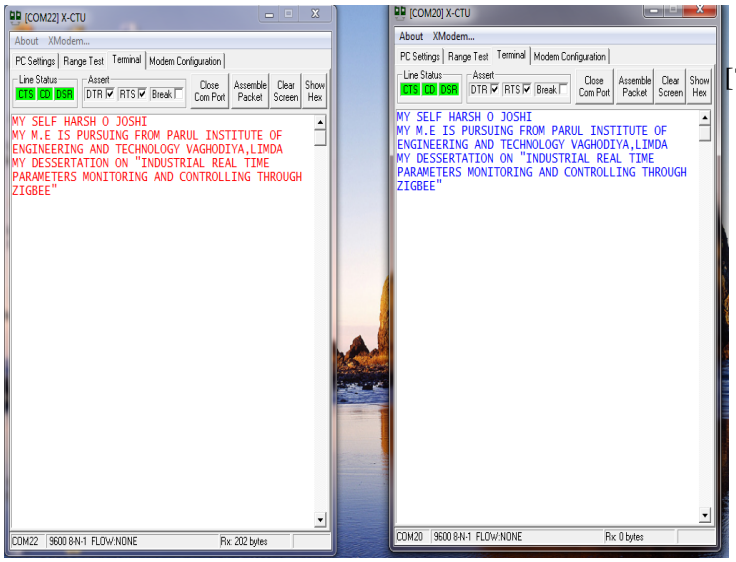

Figure 6:- message transfer between two zigbee

VI CONCLUSION AND FUTURE SCOPE

Zigbee is use as LR-WPAN it is flexible because as per user requirements change the configuration of zigbee. From this paper I reduce a number of microcontrollers which is big advantage so reduce my cost.

Extension of my current work is that increase number of zigbees and develops different types of topologies such as star, tree and mesh etc.

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