

ZigBee management system framework design of wireless sensor network

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Keywords: ZigBee; wireless sensor network; management system; framework design

Abstract: A management system according to ZigBee requirements of wireless sensor networks and wireless sensor network ZigBee system with heterogeneous node method, the general structure of the ZigBee wireless sensor network management system is designed.

Introduction

ZigBee is a wireless network technology of a transmission distance of new short, low transmission rate, which is between RFID and Bluetooth, and also can be used for indoor positioning. The technical characteristics of ZigBee the most significant is its low power consumption and low cost, it has its own radio standards, in thousands of tiny sensors to achieve coordinated communication positioning. These sensors require very little energy, a way to relay the data through radio waves from one sensor to another sensor, so their communication efficiency is very high.

ZigBee protocol stack architecture

The complete ZigBee protocol stack from top to bottom by the application layer, application convergence layer, network layer, data link layer and physical layer, as shown in figure 1.

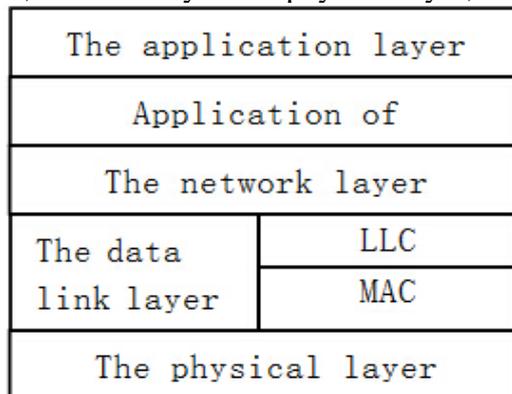


Figure 1 architecture of ZigBee protocol stack

Application layer defines the application services of various types, is the top user protocol stack.

With the main function of aggregation layer is responsible for the different application mapping to the ZigBee network layer, including security and sign right, a plurality of service convergence of data flows, device discovery and service discovery.

The main function of network including security management, topology management, MAC management, routing management.[1]

The data link layer can also be divided into logical link control sublayer and medium access control layer, IEEE802.15.4 LLC sub layer and IEEE802.2 the same function mainly includes the transmission packet fragmentation and reorganization, the order of the packets transmission and reliability guarantee. The IEEE802.15.4MAC sub layer through the SSCS protocol can support a variety of LLC standard, the function mainly includes the establishment and the wireless link between equipment maintenance and dismantling, confirm the frame transmission mode and

receiving, channel access control, frame check, broadcast information management, slot reservation management etc.

The physical layer is adopted, the direct sequence spread spectrum technology, defines three flow level: when the frequency of using 2.4GHz, the use of 16 channel, can provide the transmission rate of 250Kb/s; when using 915MHz, using the 10 channel, can provide the transmission frequency of 40Kb/s; when using 868MHz, using single channel can provide the transmission rate of 20Kb/s.[2]

The overall structure of the ZigBee network management system

According to the management system of ZigBee wireless sensor network requirements, set up ZigBee wireless sensor network system using the node heterogeneous manner, the nodes are divided into three categories: Gateway , a router node, terminal device nodes (sensor nodes), three types of nodes work together, common completion of monitoring tasks. The gateway node is a bridge network communication of PC and ZigBee, there is a strong need of data transmitting and processing capacity, will consume more energy, do not usually powered by batteries, but through the serial port to connect directly in PC. Network management, the gateway will host machine issued by the command sent to the router node and the sensor node, but also can node and the sensor node data receiving routing. The gateway can not communicate directly with the sensor node, the router node as an intermediary to complete the gateway and sensor node communication function. The sensor node completes the control and data acquisition of equipment, including the lamp control, temperature, light intensity data etc.. The overall development of schematic diagram shown in figure 2.

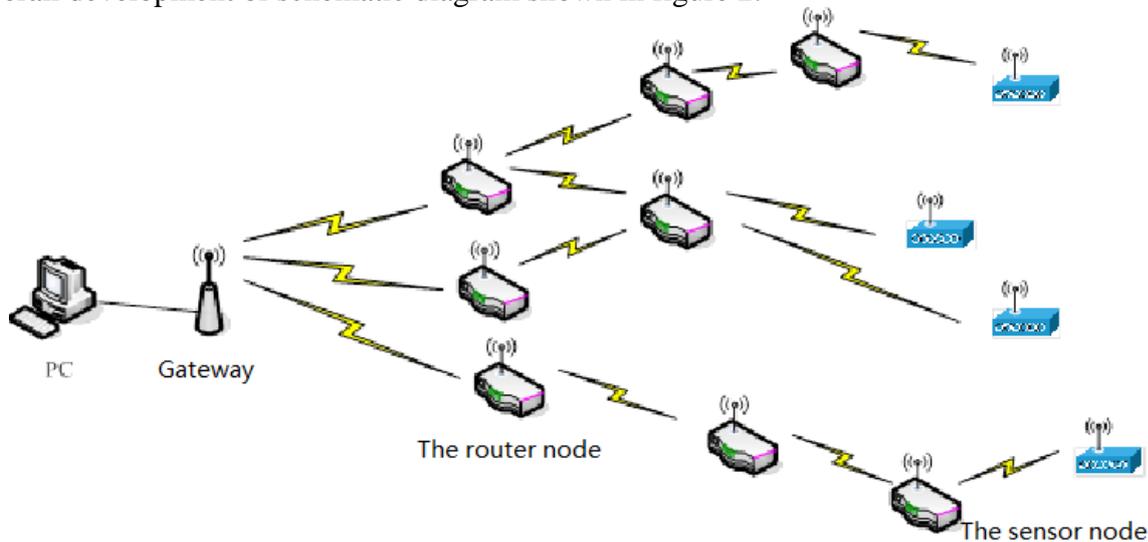


Figure 2

Composition of ZigBee wireless sensor network management system

Analyzed in the overall structure of the ZigBee wireless sensor network management system according to the structure, management system, will be divided into the following three subsystem: user management subsystem, the coordinator subsystem and terminal / routing node subsystem.[3] The data stream as shown in figure 3.

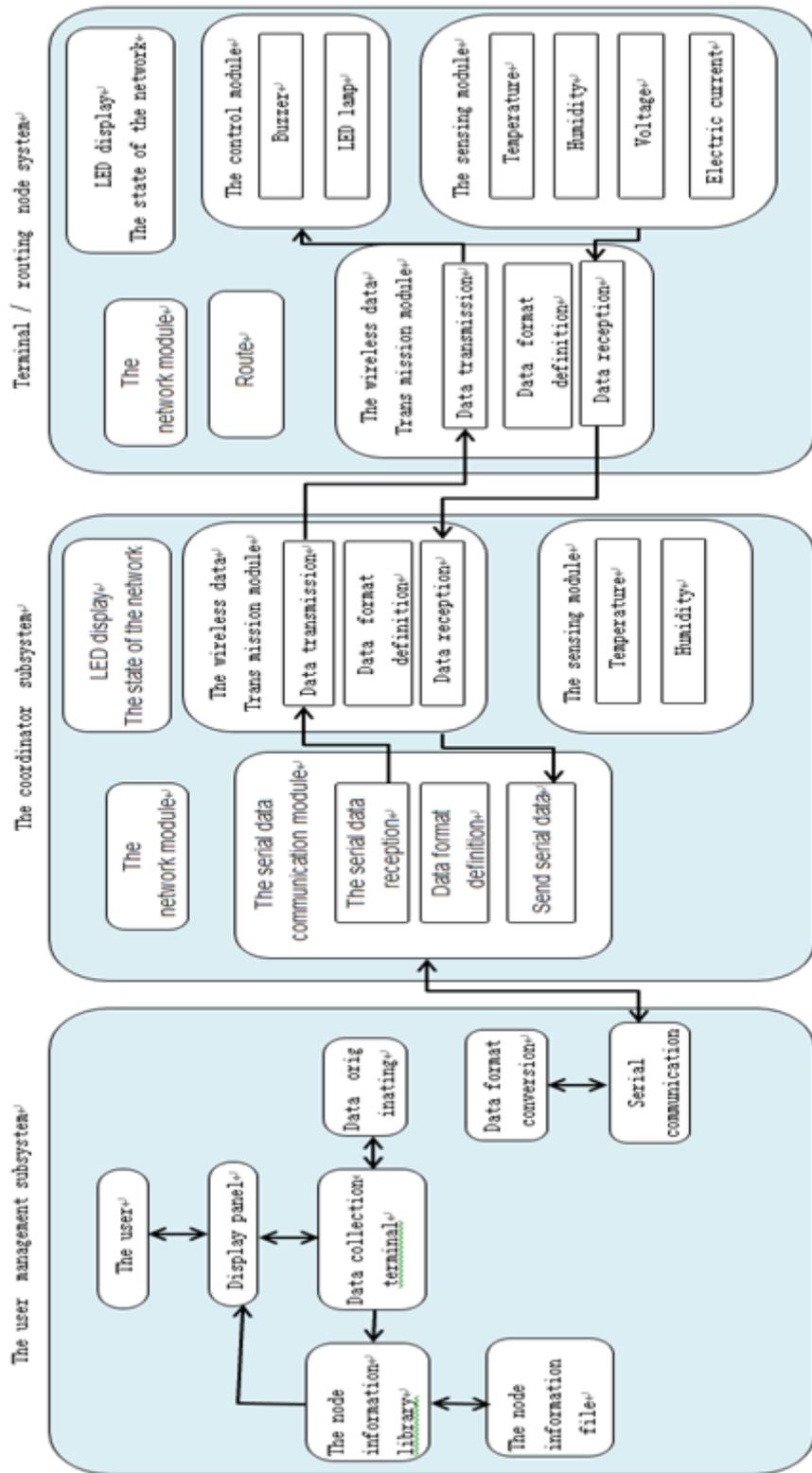


Figure 3 the system data flow diagram

The user management subsystem

User management subsystem management system ZigBee in wireless sensor networks is to realize the man-machine communication. The user through it to friendly implementation of wireless sensor network management, including access to sensor network state information, the node configuration information and state information acquisition, node parameters change and other functions. Generally speaking, the user management subsystem shall have the following functions:

1 through the serial communication mode and gateway nodes to communicate, to the net send user joint point management command.

2 to complete the communication between the wired network and wireless sensor network, both the message format conversion.

3 data receiving and display function. Network management software should be able to come over from the transmission of wireless sensor networks and node state information acquisition information dynamically in the graphical interface display. Among them, the network topology display is the basic function.

The coordinator subsystem

The coordinator subsystem is the core of the whole ZigBee network, its main function is:

1. Select a relatively free channel, forming a network number (PAN_ID) to start the network.
2. The relevant responsible for network configuration.
3. Assist to establish binding security layer and application layer network.
4. Complete the receiving and sending message serial communication and wireless data transmission module in the.

Terminal / routing node subsystem

Wireless sensor network ZigBee is often a lot of terminal nodes and routing node, each node between each layer through the SAP for data transmission and management services, coordination between network management tasks between the internal nodes and each layer through the.

The main function of it is:

1. Response to commands. Response to commands, parameters, return the corresponding.
2. Forwarding a request. Continue to the managed nodes forwarding the query, set the request.
3. To provide a unified network management interface to the coordinator subsystem.
4. Through the layers of the IB library, the maintenance of information structure of managed node.

Fund Project: Gansu national normal college fund project, serial number: 11-16;
Gansu Youth Science and technology plan project number: 1007tjyp001

Author brief introduction

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