

Abstract

Zigbee Wireless Network system is widely used in various fields for its low power consumption, high stability, and low bit error rate. With the arrival of the 5G era, the idea of the wireless Internet of all things has become more and more real. In this work, the Zigbee Wireless Network is used in the electrical power system. We designed a customer electricity information acquisition system based on the Zigbee Wireless Network. This work use the STM32 chip as processor terminal. This system designed in this work has the advantages of low power consumption, strong stability and high security.

Introduction

Communication system networking Zigbee technology is a new type of wireless communication technology, which is suitable for a short transmission range of low data transmission rate between electronic components and equipment. Zigbee wireless communication technology enables thousands of tiny sensors to communicate with each other based on specialized radio standards. This communication technology is characterized by low energy consumption, low research and development cost and high security and reliability. Zigbee wireless communication technology is very suitable for power systems.

Zigbee Structure

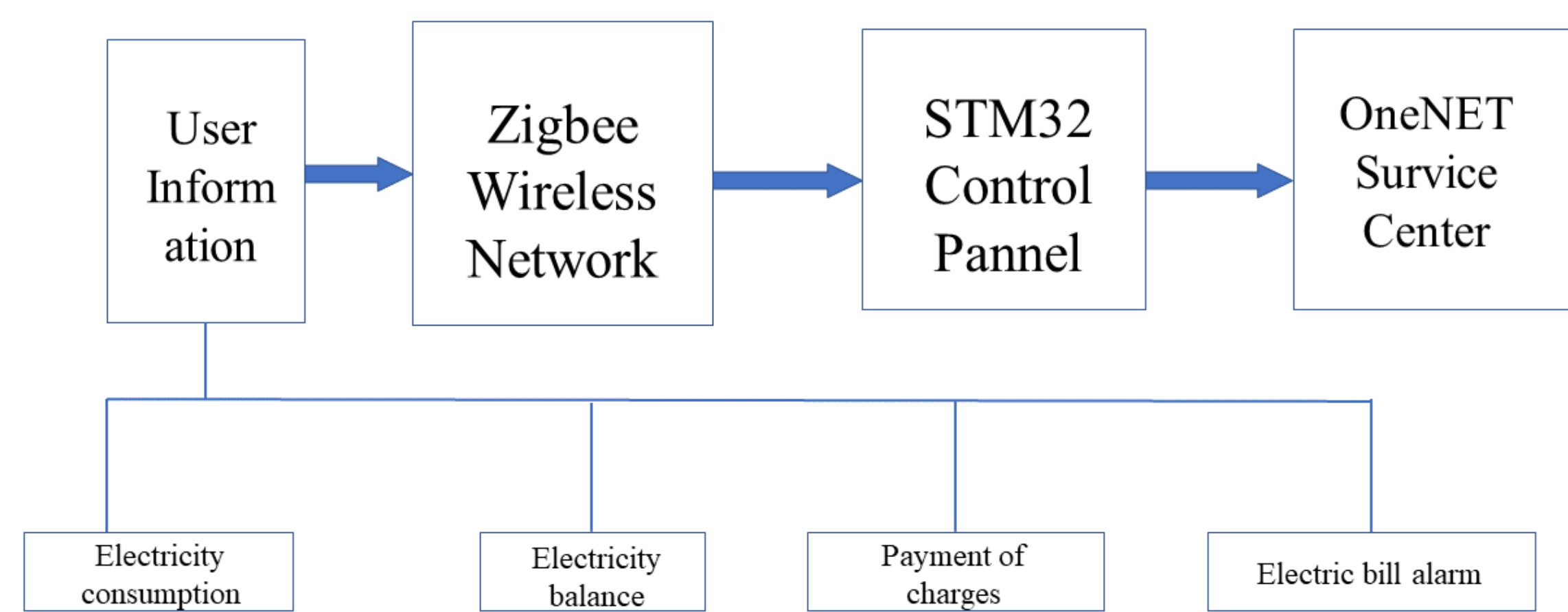


Fig. 1. The whole structure of the wireless IoT communication system.

As shown in Figure 1, the electricity consumption information of users in each area is collected by the electricity meter set at users' places in the cell, which is firstly summarized to the user electricity consumption information terminal in each cell for classification and storage. The electricity information of the user includes the electricity consumption of the user, the balance of the electricity bill, the payment of the electricity bill and the abnormal alarm of the user. After classified processing and storage, user information is transmitted to the Zigbee Internet of Things system at the next level. The information collected by each user terminal in Zigbee Internet of Things is transmitted to the coordinator through the router, and then to the next level. The information through Zigbee network is first transmitted to STM32 control center, which analyzes and processes the collected information. Finally, the processing results are transmitted to the server headquarters, which issue corresponding instructions according to the obtained information and processing results.

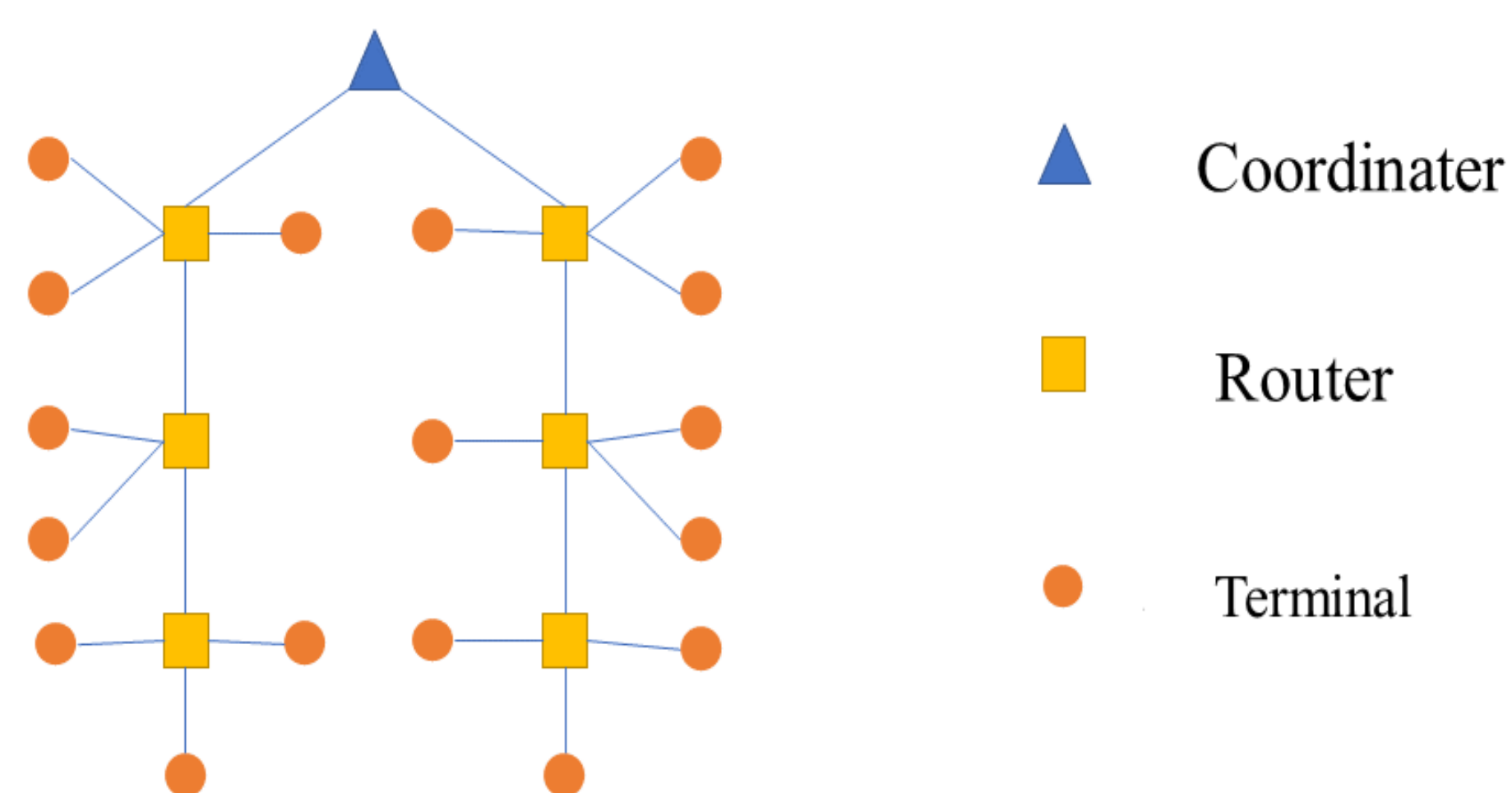


Fig. 2. The specific structure of the Zigbee Network

Figure 2 shows the structure of Zigbee network. As shown in the figure, the network adopts a tree distribution structure, which is different from the star structure and network structure. There are multiple routers in the tree structure, which are usually independent of each other. The failure of any one router will not cause the paralysis of the whole system. At the same time, the structure is relatively simple and easy to design and optimize compared with the mesh structure.

Simulation Result

In the network simulation, all have good performance. It can keep low energy consumption of the whole communication system can maintain a good channel utilization rate, in the Network simulation, Zigbee Network can realize high efficiency wireless communication over long distance. It can be seen that the Zigbee network-based user information collection system designed in this work can be applied to remote power systems in the Internet of Things.

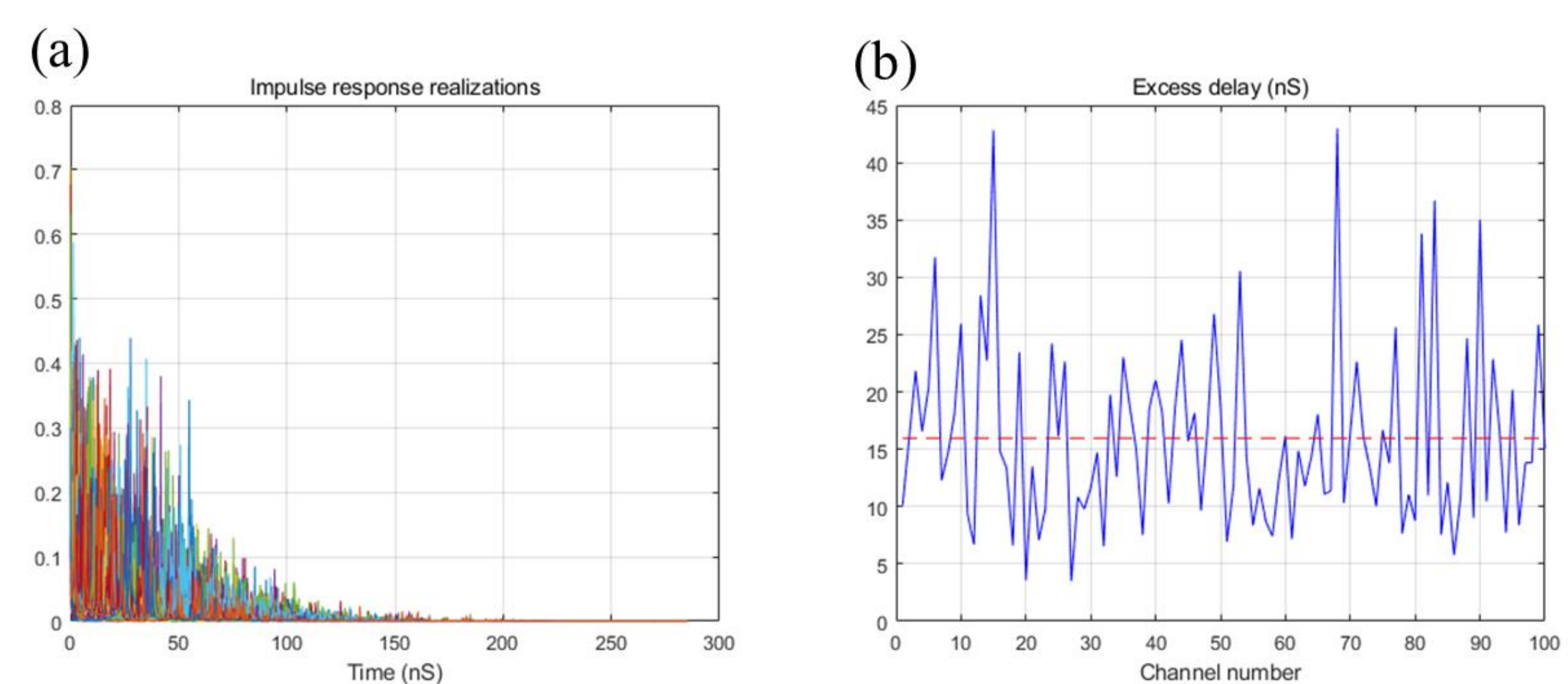


Fig. 3. Simulation result of the Zigbee network,(a) impulse response realization;(b) excess delay.

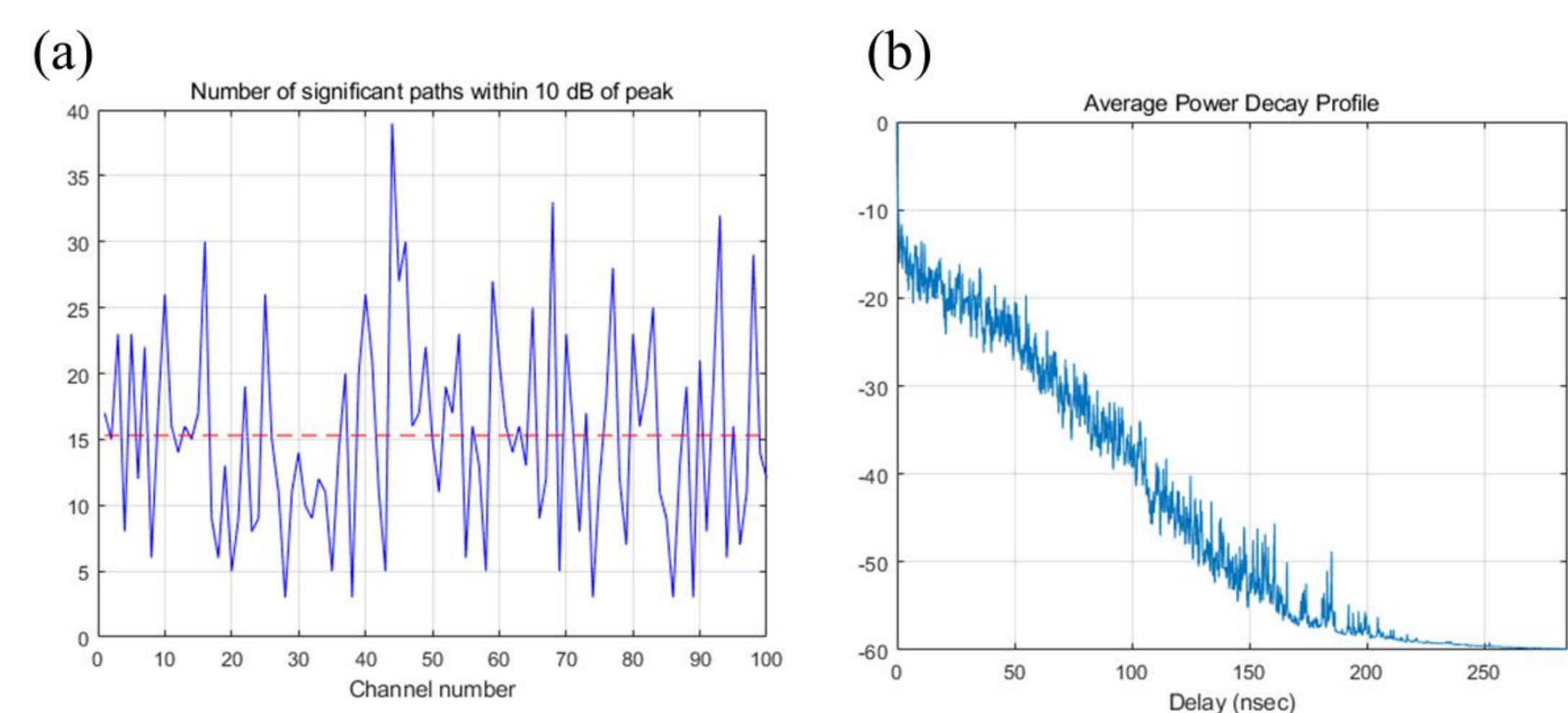


Fig. 4. The channel performance of the Zigbee network.(a) number of significant paths within 10dB of peak; (b) average power decay profile.

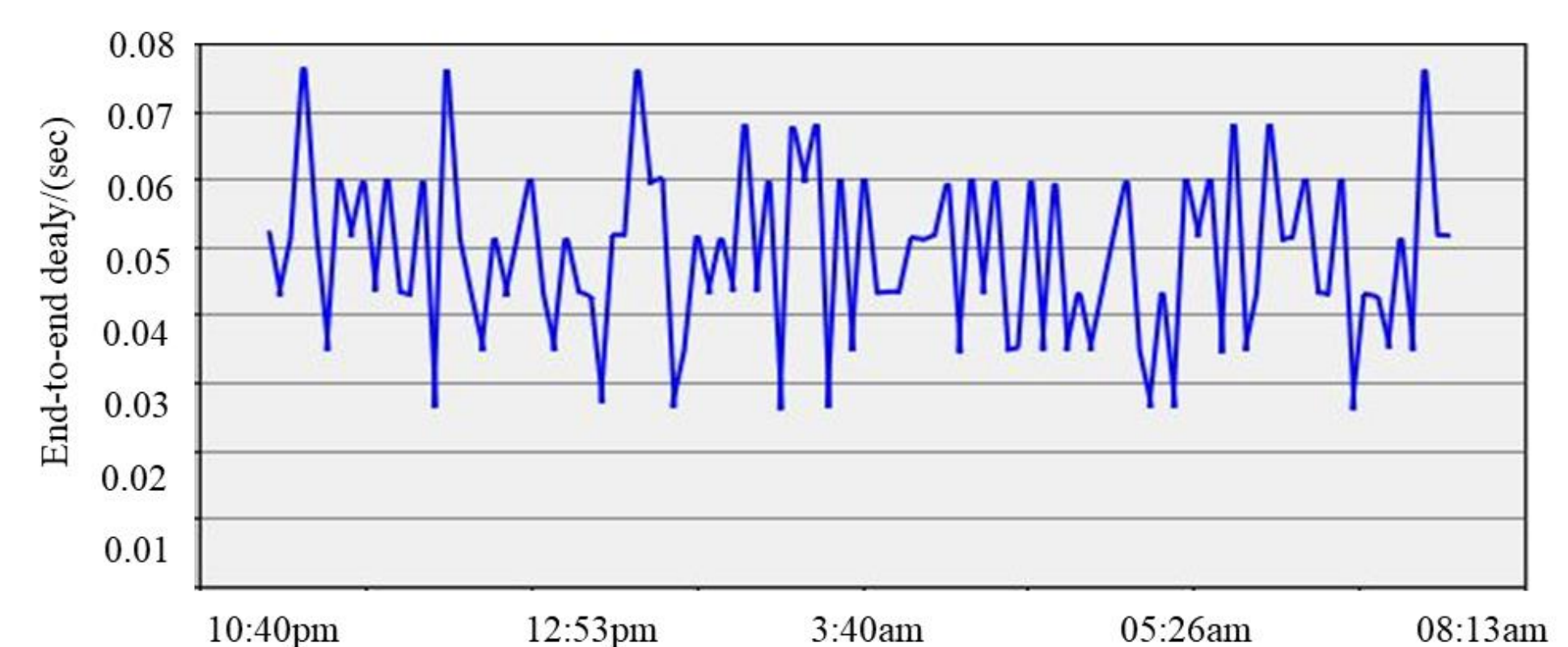


Fig. 5. Zigbee Application End-to-end delay.

Conclusion

➤ In this work, a user information collection system in electronic power system is designed and analysed. This system is based on the Zigbee network. Zigbee network has gradually become the mainstream of current wireless communication system with its low energy consumption, low ber and high stability. We use the mathematical simulation software MATLAB to simulate the Zigbee network channel. The simulation results show that the Zigbee network can provide wireless communication network with high stability in electronic power system.

References

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