

## Design of Embedded Network Communication Module

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**Abstract.** Taking the network communication of smart home as an example, and based on the current market conditions and technical standards, this paper makes a comprehensive research on the embedded network communication module. Compared with products with simple functions and low interaction level, we propose and implement a network communication scheme with high reliability, high cost performance and convenient operation. The embedded network communication module based on TCP/IP protocol external hardware protocol stack and all over the world telephone network communications, using 485 bus structure form, so it can realize the remote communication and to facilitate foreign expansion of the characteristics, finally, to achieve the purpose of intelligent control connected objects.

### Introduction

In the 21st century, with the rapid development of information technology and Internet, highly networked, intelligent residential become the focus in improving quality of our life. Smart home network system<sup>[1]</sup> means that a family in various household life related communications equipment, household appliances and home security Settings and so on various subsystems, use of advanced computer technology, network communication technology and the comprehensive wiring technology, connected to a home intelligence system, in order to realize the monitoring and control, make household life more comfortable, safe and convenient.

In recent years, many large international companies put forward the corresponding solution, but so far, the international standard of this field is not yet ripe for it. Domestic at present but there is no uniform standard, currently visible to the most in order to achieve the system of single function, such as water, electricity, gas three table copy system, alarm system. Therefore, how to build a high efficiency and low cost smart home network system has become a hot issue in today's world.

This system centered on the network intelligent control data terminal products of a plan, because the product focused security, disaster prevention, for help, three table control functions such as copy, information release and home appliance, so the system has high integration, design is simplified, the cost is greatly reduced, with high cost performance.

### System Scheme

**Selected and Design.** At present, the main ways to realize communication system in the intelligent residential areas are: (1) Ethernet; (2) CATV network; (3) ADSL or ISDN; (4) Power carrier; (5) The telephone network. This in several ways, considering the system's foresightedness and pervasive, Ethernet and telephone network are the best choice. The overall structure diagram is as Fig.1:

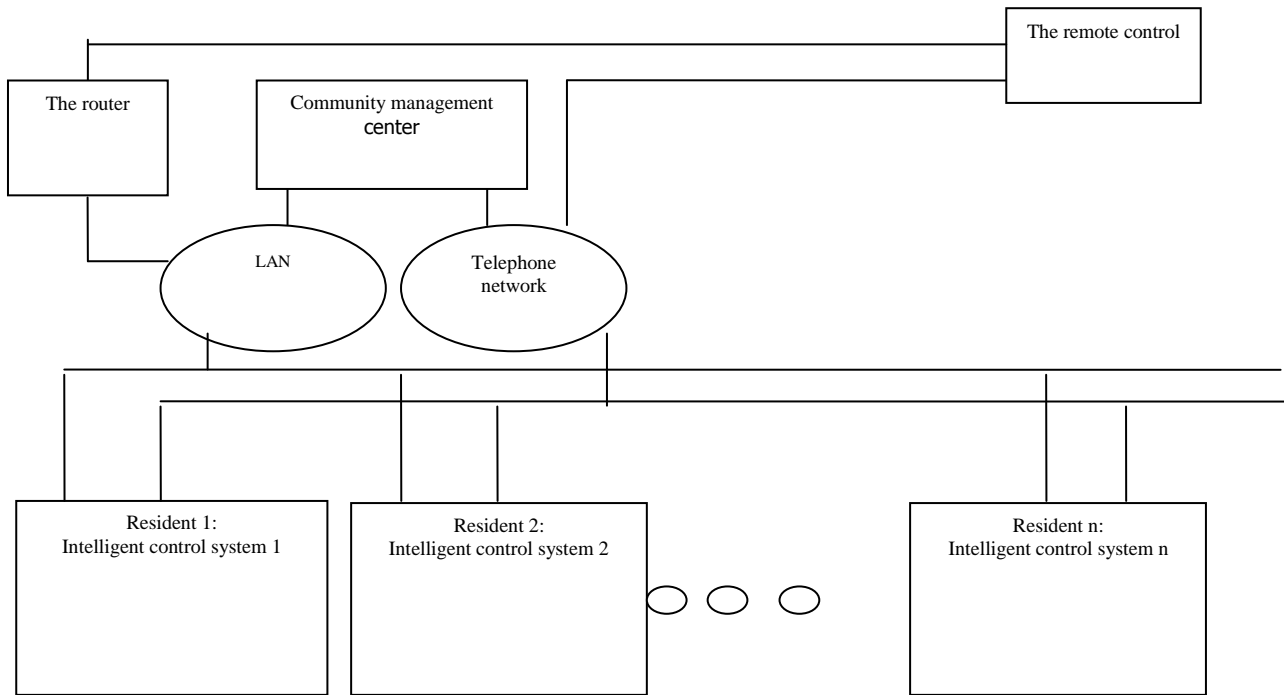


Figure 1. The overall structure diagram

Network module of intelligent control system adopts single-chip microcomputer system based on TCP/IP protocol<sup>[2]</sup>, direct access to the Internet and man, only need on each home to install the control system and can realize remote Internet control.

**Functions and Processes.** This system can through the communication module realize the household electric equipment, have been supervised by cable or infrared switch, communication control block diagram is as Fig.2:

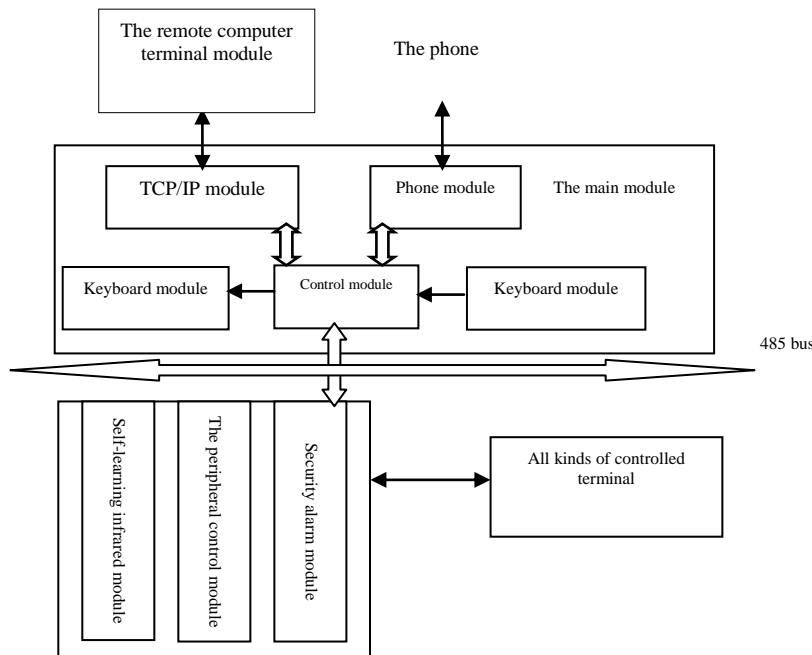


Figure 2. Communication control block diagram

After the system is powered on, initialized for each module, main control module is in standby state,. The working process of the whole system as shown in the Fig.3:

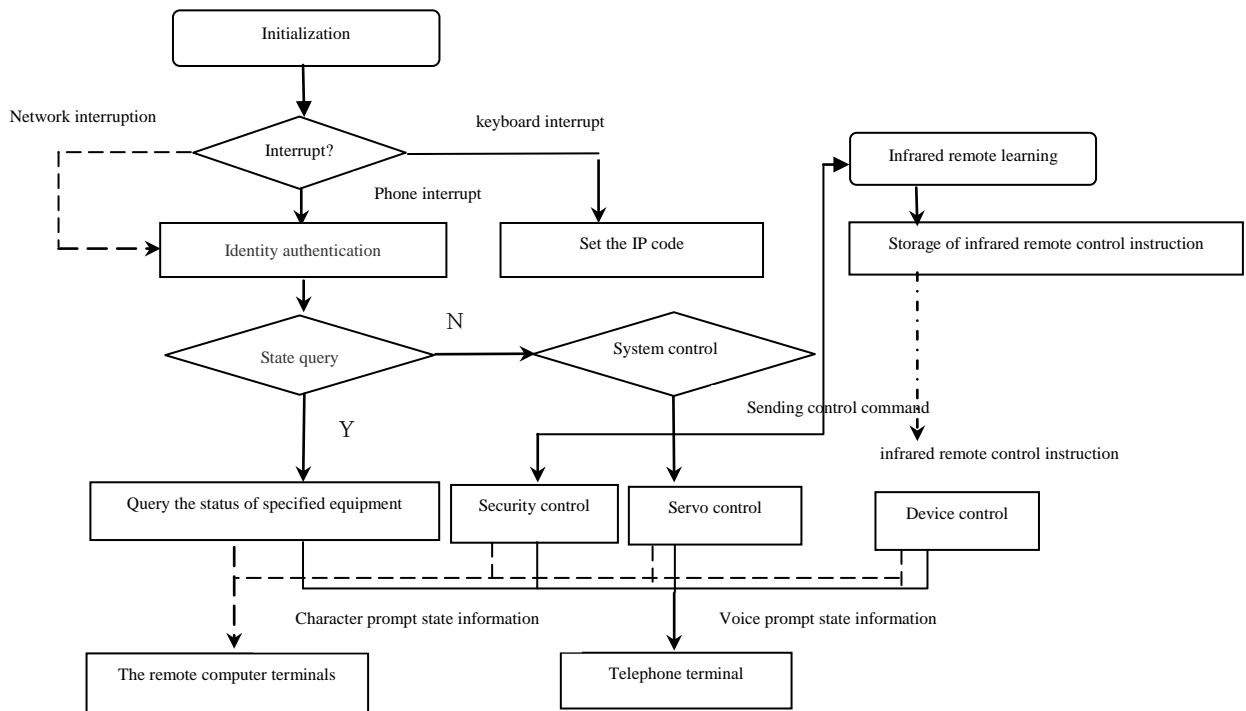


Figure 3. Work flow chart

**Plan Implementation**

**The Phone Module.** This module uses a decoding chip MT8880 by telephone, voice recording circuit. The decoding circuit is shown in the Fig.4:

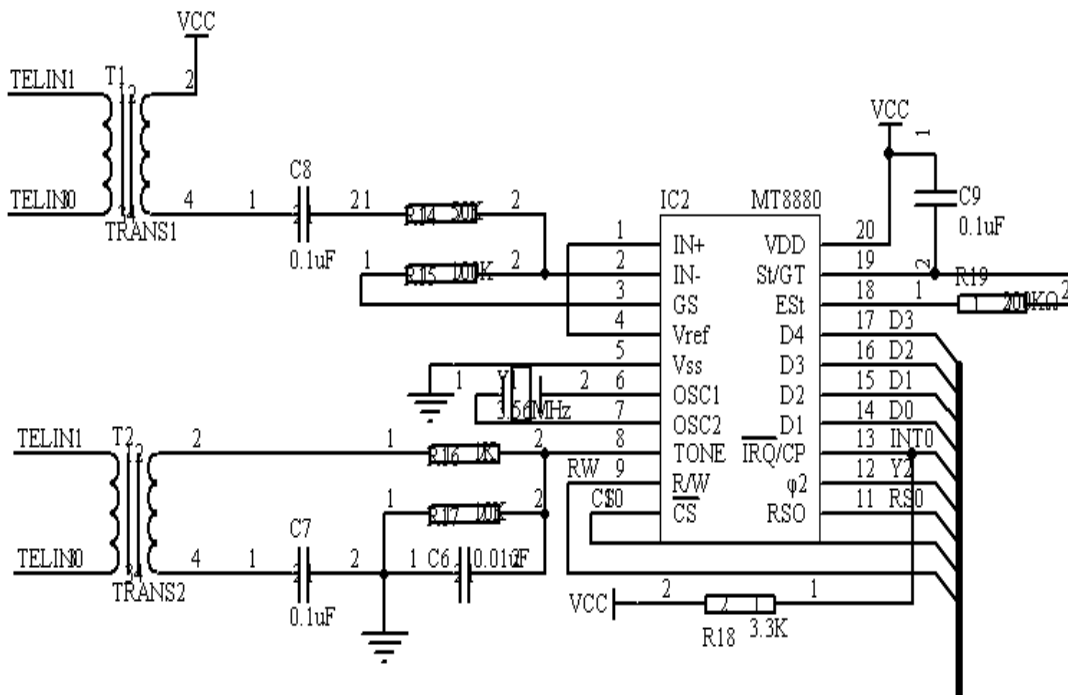


Figure 4. The circuit of phone decoding

**TCP/IP Network Module.** The module built in the TCP/IP service program<sup>[3]</sup>. After initialization of the system is powered on, the module work in service mode, moment to listen to a

request from the remote computer communication program, according to the remote customer requirements through the main control module query or send control commands and to get the return information<sup>[4]</sup>, functional block diagram shown in the Fig.5:

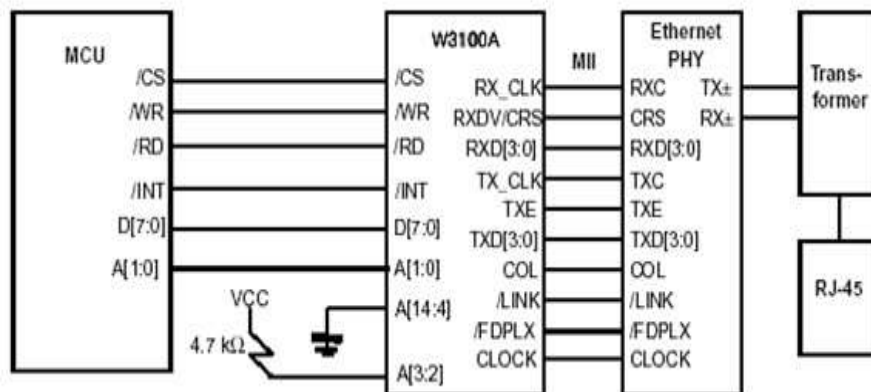


Figure 5. The network principle block diagram

**The Infrared Receiving Module.** This scheme uses PIC16F877 single chip microcomputer realization of infrared remote control signal forward self learning and reduction. All kinds of infrared remote control devices, such as: digital projector, DVD, VCD, VCR, TV, etc., due to various equipment comes with remote control, and followed by the different device of infrared transmission protocols are also different, manipulation of these equipment have to use a variety of remote control, bring much inconvenience to users.

## Conclusion

This system adopts the telephone network and Internet network two kinds of different control mode, in order to satisfy different users use habits, and improve the reliability of the system control<sup>[5]</sup>.

The project for the provincial department of scientific research subject, through the selected scheme, the hardware design, software debugging, finally indicated that the system reliable operation It will not only bring ordinary residents family lifestyle changes, and can be applied to industrial control, environmental testing.

## References

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