GB

NATIONAL STANDARD OF THE

PEOPLE'S REPUBLIC OF CHINA

ICS 35.240

L 73

GB/T 39190-2020

Smart home for internet of things - Design content and requirements

物联网智能家居 设计内容及要求

Issued on: October 11, 2020 **Implemented on: May 01, 2021**

Issued by: State Administration for Market Regulation;
Standardization Administration of the People's Republic of China.

Table of Contents

Smart home for internet of things - Design content and requirements

1 Scope

This Standard specifies the structure and functional requirements, system configuration and operation of the system of smart home for Internet of things.

This Standard applies to information equipment integration, home service information systems and similar application scenarios that are related to home life.

2 Normative references

The following documents are indispensable for the application of this document. For dated references, only the dated version applies to this document. For undated references, the latest edition (including all amendments) applies to this document.

GB 16808, Combustible gas alarm control units

GB/T 35134, Smart home for Internet of things - Device description method

GB 50394, Code of design for intrusion alarm systems engineering

GB 50395, Code of design for video monitoring system

3 Terms and definitions

The following terms and definitions are applicable to this document.

3.1 System of smart home

A smart home grid, that can be controlled and managed interactively, which is connected by smart home devices through a certain network communication protocol.

[GB/T 34043-2017, Definition 3.3]

3.2 Home intelligent terminal

5 System structure and functional requirements

5.1 Overview

The system of smart home for Internet of things connects devices, such as information equipment, communication equipment, household appliances, energy (water, gas, heat) meters, lighting equipment, and safety equipment, in the home category with home intelligent terminals through various methods, to form an information application system with data collection, control and network service functions. The main functions include:

a) Monitor home devices in the system;

b) Connect to the community public service network or the Internet through the IoT home intelligent terminal, to share network information resources and to enjoy network services;

c) Realize the automation and intelligence of home devices, to provide a secure, efficient, comfortable and convenient home environment;

d) Realize remote communication, monitoring, collection and management, to become an integral part of the smart community public service system;

e) Select various transmission media, network topologies, communication protocols, access control methods for separate combination and design.

5.2 Overall structure

The system of smart home for Internet of things is a multi-layered structure. Each device in the system can use different communication protocols. Its system structure is shown in Figure 1; it shall also meet the following requirements:

a) The smart home net, device and its subsystems can be connected to the community through the IoT home intelligent terminal or its own network function, to form a community information management network, with the community integrated service platform;

b) After the functional parameters and service information of the smart home devices for Internet of Things are transmitted to the home intelligent terminal via the network, they are stored in the database as device registration information.

d) Security service function: it shall provide functions such as user management, access control, event alarm and intrusion prevention processing;

e) Management service function: It shall provide functions such as fault diagnosis, system optimization, accounting management and online payment.

5.3.2 Extended functions

The smart home for Internet of things shall include the following extended functions:

a) Remote networking service: Access to the community local area network and the Internet, to share networking services;

b) Automatic control: Perform automatic control of smart home devices for Internet of things

c) Intelligent update of traditional household appliances: Traditional household appliances without network interface use infrared control, which cannot be directly operated by intelligent control. After using equipment compatible data converters, it can realize the intelligent control transformation of traditional household appliances.

6 System configuration and operation

6.1 Overview

The system of smart home for Internet of things is mainly composed of IoT home intelligent terminals, smart home devices for Internet of things, and communication networks. The IoT home intelligent terminal is the core of the entire system of smart home for Internet of things. External devices are connected to the IoT home intelligent terminal through the public communication network, so as to realize the control operation of the smart home devices for Internet of things. Within the scope of home, the IoT home intelligent terminal is also the main controller of the system; it controls and operates various smart home devices for Internet of things through standard communication interfaces.

6.2 Key devices

6.2.1 IoT home intelligent terminal

6.2.1.1 Basic requirements

6) Perform identity authentication, password protection and other security identification.

c) It shall have the functions of Web server and database, and the following functions:

1) Monitor on the two ports of the external network and the internal network; respond to remote and local requests for access at any time;

2) Use TCP/IP protocol and HTTP-based protocol to process requests and transmit device status information, including transmission to remote (Ethernet port) and local (home network port);

3) When the device status information changes, it can actively send real-time status information to the connected IoT home intelligent terminal.

6.2.1.2 Hardware design requirements

The hardware of the IoT home intelligent terminal shall meet the following design requirements:

a) It shall support the operation of embedded operating system;

b) It shall have a remote (Ethernet) port and a local (home network) port; reserve a spare port;

c) It shall have a browser operation mode, and realize centralized control of the entire household equipment through the local operation interface;

d) It shall have the display function or voice function;

e) It shall be able support wired or wireless way to form a smart home net, and be compatible with various fieldbus, Ethernet, ZigBee protocols and other radio frequency networks;

f) It shall be able to upgrade the system, and has expansibility, to add smart home devices for Internet of things at any time without additional expenses.

6.2.1.3 Software design requirements

The software design requirements shall include the following functions:

a) Initialization and self-check functions, including CPU chip, smart home net communication, Ethernet communication and other module initialization functions;

a) It shall have a communication interface of smart home net communication protocol, that is, it shall have the smart home net communication protocol function;

b) It shall have the device description file of all its own functions and services, which shall meet the requirements of GB/T 35134;

c) The informatization and intellectualized reconstruction of traditional home devices is to embed the communication interface of the smart home net communication protocol, and to generate the "function table" (or "operation table") of the home device into “device description file” according to the format requirements of GB/T 35134.

6.2.4 Device compatible data converter

The device compatible data converter is a smart home device for Internet of things. Traditional household appliances without a smart home net communication interface are controlled by infrared, which cannot be directly operated by intelligent control. The device compatible data converter obtains device information by inter-converting the infrared signal and the RF signal and connecting to the control terminal, to realize the intelligent control of traditional household appliances. It is the device middleware of the smart home net and shall meet the following basic technical requirements:

a) The device compatible data converter can be a wireless/infrared converter. As a sub-device of the control terminal of smart home for Internet of things, it shall clarify its control object in the system application;

b) After the system is started, the control terminal of the smart home for Internet of things identifies the compatible data converter-controlled object, and uses the communication protocol to transmit the device description file to the control terminal of the smart home for Internet of things. The control terminal of the smart home for Internet of things analyzes the device description text and assigns addresses to the controlled object (sub-device), to complete the self-organized network of the device;

c) After the device compatible data converter receives the radio frequency control signal that is sent by the home intelligent terminal or control terminal of the Internet of Things, it converts it into an infrared signal, to complete the intelligent control operation of the infrared household appliance.

6.3 System composition

6.3.1 Basic subsystem

6.3.1.1 Smart home appliance system

Provide background music, short films of music, players and other audio-visual environments that make the home living environment comfortable, and have convenient and quick control operations.

6.3.2 Extended subsystem

6.3.2.1 Medical inspection system

It obtains the human physiological indicators and health parameters through health indicator detectors, portable medical terminals and wearable health testing equipment, transmits to the community health service center, and stores in the home care service information database.

6.3.2.2 Public service system

The public service system includes: information announcement, commercial services, smart medical care, smart property, remote scene sensing and control services, intelligent life, payment service system, remote education and other public services.

6.3.2.3 Other systems

Other systems that are expanded according to needs and technological development.

6.3.3 Application platform of smart home

6.3.3.1 Overview

The application platform of smart home supports Internet protocols and browser functions, accepts information from the Internet and IoT home intelligent terminals, realizes automatic management of home devices through the IoT home intelligent terminals, and remotely accesses smart home net, community network and Internet applications through the Internet, provides various household appliances, security, indoor lighting and other household equipment configuration and maintenance through Web services.

6.3.3.2 Working mode

The application platform of smart home for Internet of things provides a set of equipment-oriented service functions; the equipment automatically provides service items when connected to the network and automatically organizes the network. Collect physical nodes as network servers; register and store the service items of the smart home devices for Internet of things; publish the service content to the upper network and users in the browser mode; update the status content of smart home devices for Internet of things in the database in real time.

a) After the networked intelligent terminal receives the network access request command from the device, it divides a part of the time in each period to jump back to the public channel to send the network command. After the networked device receives the network command, it sends the ID to the intelligent terminal, until the intelligent terminal responds and assigns a network address;

b) Add new smart home devices for Internet of things to the network according to the first networking method, to complete the network access of newly-added devices;

c) For the network access of smart home devices for Internet of things that have joined other networks, first manually clear the previous networking records; then, connect to the network by adding new devices to the network.

6.4.2.3 First networking of wireless network

The first networking of wireless network shall comply with the following requirements:

a) After both the IoT home intelligent terminal and the smart home device for Internet of things are powered on and initiated, the first networking of wireless network can be determined by manual selection of the IoT home intelligent terminal;

b) Each device to be connected to the network sends its ID to the IoT home intelligent terminal after receiving the networking instruction. The IoT home intelligent terminal sends a pairing instruction to the device; the device responds and sends device-related information to the IoT home intelligent terminal, until the IoT home intelligent terminal is confirmed to be successfully networked.

6.4.3 System operation

6.4.3.1 Start the IoT home intelligent terminal

The user turns on the power of the IoT home intelligent terminal. The IoT home intelligent terminal first initializes the gateway internally, then starts to register the smart home device for Internet of things, to complete the networking process of smart home net.

6.4.3.2 Start the device

When the user turns on the power of the smart home device for Internet of things, the smart home device for Internet of things communicates with the IoT home intelligent terminal, to complete the registration of the smart home net.

This is an excerpt of the PDF (Some pages are marked off intentionally)

------ The End ------