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**Digital technique application of building and
residence community - Technical requirements for
intelligent hardware**

建筑及居住区数字化技术应用 智能硬件技术要求

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Digital technique application of building and residence community - Technical requirements for intelligent hardware

1 Scope

This Standard specifies the application scenarios, function requirements, interface requirements, security requirements, operation and maintenance requirements of intelligent hardware of building and residence community.

This Standard applies to the intelligent hardware design, research and development, and application under application scenarios of building and residence community.

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/T 17626.1, Electromagnetic compatibility - Testing and measurement techniques - Overview of immunity tests

GB/T 25056, Information security technology - Specifications of cryptograph and related security technology for certificate authentication system

GB/T 25058, Information security technology - Implementation guide for classified protection of cybersecurity

GB/T 29262-2012, Information technology - Service Oriented Architecture (SOA) - Terminology

GB/T 35134-2017, Smart home for Internet of things - Device description method

3 Terms and definitions

Terms and definitions determined by GB/T 35134-2017, GB/T 29262-2012 and the following ones are applicable to this document. For ease of use, some of

4.2 Typical application scenarios

4.2.1 Smart home application

The requirements for smart home application are as follows:

- a) The smart home system shall be composed of hardware terminal device, intelligent gateway and smart home cloud platform;
- b) The hardware terminal device shall include common smart home appliances, access control, alarm, health device, etc., which needs to be connected to the intelligent gateway through wired or wireless means to complete access to other terminals and cloud platforms;
- c) Users shall access the smart home cloud service platform to obtain services through web pages (WEB) or mobile phone applications (APP).

4.2.2 Application of public service system of residence community

The requirements for the application of public service system of residence community are as follows:

- a) The public service system of residence community shall be composed of multiple hardware terminal device, intelligent gateway of residence community, and information management platform of residence community;
- b) Intelligent building device, security device, energy device and the like shall be integrated into the management platform through an intelligent gateway;
- c) Users shall access the management platform to obtain services through web pages or mobile phone applications.

5 Function requirements

5.1 Overview

The intelligent hardware shall be connected to the intelligent system control network through the communication interface module, and provide users with automated and intelligent function services through the release and analysis of device description files, which includes the following:

- a) Use all its own functions to generate device description files according to the standardized device description method; register in the intelligent gateway (management service device, server) through the communication interface, which can realize interconnection and

- c) WEB service technology and SOA (service-oriented architecture) application technology shall be adopted.

5.3.3 Interconnection

Intelligent hardware shall generate a unified device description file according to the device description method that is specified in GB/T 35134-2017, and form a corresponding application layer protocol according to a unified data format, so as to achieve data interconnection between devices.

The application layer content that is formed by the standardized data format of the device description file and the control instruction method shall be independent of the physical details of the bottom layer of the network. It is a completely open network system; its application information can be transmitted through various physical media and network access methods.

5.3.4 Self-organized network

The intelligent hardware shall support the self-organized network function. The requirements of the networking process are as follows:

- a) The intelligent hardware shall write the corresponding communication program in its nonvolatile memory, so as to achieve normal information transmission and reception with the interface module, to be able to identify the frame structure that is specified in the standard, and to obtain valid information from the complete frame structure;
- b) The intelligent hardware shall use the communication protocol to transfer the device description file to the intelligent gateway; the gateway analyzes the device description file to assign addresses to the hardware terminals, and completes the self-organized network of the intelligent gateway to the intelligent hardware;
- c) The intelligent gateway shall report the device information of the completed networking to the server and perform authentication and registration, to complete the networking process between the intelligent gateway and the server.

5.4 Background support function

5.4.1 Service discovery

The service discovery function of intelligent hardware is shown in Figure 3; the specific requirements are as follows:

- a) The intelligent hardware shall have a service discovery function, which reports the functions and attributes of the intelligent hardware to the

intelligent hardware, and control the services of other intelligent hardware in the communication network;

- c) The intelligent gateway shall manage the intelligent hardware in the communication network, complete the identification and networking of the intelligent hardware through the intelligent hardware description file, and record the operation and maintenance status of the online intelligent hardware.

5.4.3 Remote service

The intelligent hardware should have service functions such as remote operation control, status query, fault diagnosis, remote setting and software update, which should include the following specific contents:

- a) User authentication: only after registration authentication, it can legally obtain the remote service function, and manage the user's use authority, and user's logout;
- b) Device management: it can add and delete intelligent hardware devices, to perform device settings and system function configuration operations;
- c) Running record: it records the operation actions and running status of the intelligent hardware device in real time in the background for query;
- d) Real-time data: it can obtain real-time data of intelligent hardware remotely;
- e) Control operation: it can remotely control the function of intelligent hardware, and return the result status information of operation control in real time;
- f) Data storage: the background has intelligent hardware historical data storage function;
- g) Data analysis: the background has data processing and data analysis functions; it provides users with intelligent and humanized functional services through self-learning and big data analysis;
- h) Remote update: it supports remote online software update.

5.5 Human-computer interaction function

5.5.1 Overview

The intelligent hardware shall have the human-computer interaction function; the interaction mode is diversified; different human-computer interaction modes can be used collaboratively; the WEB service technology and SOA application technology should be adopted.

Appendix B. The communication program shall include the following subprograms:

- a) program initialization;
- b) interface module soft reset;
- c) read interface status register;
- d) write interface control register;
- e) read interface ID register;
- f) write interface ID register;
- g) transmit information frame;
- h) transmit broadcast frame;
- i) calculate the checksum of the transmit frame and the received frame;
- j) send error response frame;
- k) received frame processing;
- l) frame receive timeout detection;
- m) data frame receives;
- n) chip interface power on initialization;
- o) device and gateway handshake;
- p) send the device description file to the gateway.

7 Security requirements

7.1 Self-diagnosis function

The intelligent hardware shall have security self-diagnosis functions; the specific requirements are as follows:

- a) It shall be equipped with necessary abnormality detection, crash recovery, data backup and error prompts; for serious faults, it shall have necessary emergency measures;
- b) It shall have the functions of software tamper evidence collection and tamper defense; when the intelligent hardware finds that the device is

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