Research of Smart Power Utilization Service System Based on IoT

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Abstract. Smart power utilization service is an important part of the grid, and its core to realize the intelligent service for users is to build a real-time interaction platform between the grid enterprises and users, which can improve the stability and reliability of power supply, and provide users with more humanized and multiple intelligence service. IoT technology can able to effectively enhance the smart power utilization service system with its overall perception, reliable communication and strong data processing ability. In this paper, electricity service system based on intelligent networking was studied.

1. Introduction

With the increasingly prominent global resources and environmental problems, the rapid rise in electricity load of the user, and the user quality of service requirements continue to increase, the global power industry is facing unprecedented challenges. States the power industry to meet the challenge, actively study based on the future direction of the electric power industry, and the construction of smart grid has become a challenge to deal with their own global power industry to achieve common choice for sustainable development.

Smart grids and things as the world's two research focus, has risen to the national strategic level, both in terms of content, features, and so we have the means of achieving a very close relationship: Things technology is an important support smart grid technology, improve all aspects of comprehensive smart grid perception of depth and breadth, is conducive to enhancing power system monitoring, early warning and disaster prevention capabilities to enhance security and stability of the power grid, and through the "power flow, information flow, business flow "the high degree of integration, to achieve electricity from production to consumption in all aspects of intelligent, meticulous management, to achieve energy saving, cost-effective purposes.

Internet of things technology for the smart grid, using its comprehensive perception, reliable communication and powerful massive data processing capacity, will effectively provide technical support for all aspects of grid generation, transmission, substation, distribution, electricity, scheduling, improve grid intelligence level, promote energy conservation. The intelligent electricity service as an important part of smart grid electricity sectors, is an important guarantee to realize the smart grid safe, reliable, cost-effective. Things technology for smart electricity service system that can effectively improve the reliability of the power grid, and the grid through the two-way interaction between users, to provide users with more intelligent, diversified electricity services, improve the power supply service levels, which specific applications in the smart electricity services mainly include user energy information collection, intelligent power two-way interactive services, home energy management services, intelligent home control, access control, and distributed energy electric car charging for electric auxiliary management.

2. Applications of IoT in the Smart Grid

The Internet of Things (IoT) is generally defined as: radio frequency identification, infrared sensors, global positioning systems, laser scanners and other information sensing device, according

to the agreed protocol, the objects connected to the Internet, information exchange and communication, in order to achieve the object of the intelligent identify, locate, track, monitor and manage a network.

IoT is a network extension and application development Internet and communications network, which means the use of sensing technology and intelligent perception of the physical world were recognized by sensing data communications network, and analyze and processing, objects, things and information exchange between things, to achieve real-time monitoring of the physical world and intelligent decision-making purposes. Therefore, things can be widely applied to industrial automation and control, in all areas of health care, traffic operations, engineering exploration, military and defense, by physical entities and natural resources perception, identification, analysis, processing and control, greatly enhance the production and living and social management of intelligence, and humanity to better adapt to natural conditions, state of the environment and resource constraints.

Smart grid is a highly modern technology and strong grid integration, you can maximize acceptance of clean energy, low-carbon green living, improve grid security stability, it is a new modern grid. The Internet of Things technology for the smart grid, power system can effectively integrate infrastructure resources and communications infrastructure resources to information and communication services in the power system operation, effectively providing important technical support for all aspects of the power grid, improve power system information level, improving the efficiency of existing power system infrastructure.

Electricity IoT, the perception layer is mainly composed of a number of sensor nodes deployed in each of the sensing target composition, the formation of networks by self-organization perceived, realize intelligent physical world of collaborative awareness, identification, information acquisition and processing and automatic control. Through a variety of new sensors, embedded system based on technology Smart sensors, intelligence gathering equipment, etc., to achieve the smart grid generation, transmission, substation, distribution, electricity, scheduling and other aspects of the mechanical condition of critical equipment, energy consumption, the environmental status information such as the identification and acquisition.

In the transmission line online monitoring system, through the deployment of multiple sensors in transmission lines, such as a temperature sensor, an acceleration sensor, a humidity sensor, wind speed sensor, and a tilt sensor on the high-voltage towers, vibration sensors. Combined with advanced video recognition technology, transmission technology, three-dimensional geographic information systems, technology, communications technology components for wireless broadband transmission line applications, networking network, various states of transmission lines, such as icing, dirt moved, temperature, dancing, multi-faceted micro-meteorological information visualization real-time monitoring and early warning information release failure based on monitoring the situation to ensure the safety and reliable operation of transmission lines.

Power line carrier communication technology (PLC) is a power line as a communication medium, and business transfer voice, data and other communications technology. Is the unique power system of communication that utilizes the power cable as a transmission medium, the transmission of voice and manner through the carrier data signals with high reliability, strong anti-destructive characteristics, and communication can directly use the existing infrastructure of power lines, communication lines no longer need to be laid individually, it is a low cost, and the more mature communications technology.

Depending on the voltage level of the power cable, power line communication can be divided into high, medium and low voltage power line; depending on the modulation frequency band and bandwidth, PLC technology can be divided into broadband and narrowband PLC technology. Currently in the field of communication with the electricity use of more technology: Medium voltage power line communication technology, low-voltage and low-voltage power line communication broadband narrowband power line communication. Currently in the field of communication with the electricity use of more technology: Medium voltage power line communication technology, low-voltage and low-voltage power line communication broadband

narrowband power line communication. There are two mainstream applications, one of which is the use of household electrical outlet for networking without rewiring the "Home Network", the second is the use of medium and low voltage power distribution network transmission of wideband signals "last kilometer access ", also known as the access network.

3. Design of Intelligent Power System Services

Based on the actual needs of project tasks, this article will use the wireless sensor network, means of communication power line carrier communications, optical fiber communications and other hybrid networking technology, design of intelligent power networking service based systems, the system is mainly the following functions: user information collection, two-way interactive services, users with performance management, intelligent home appliances control, three tables collecting, home security, community services, and other Internet functions.

3.1. Control Center

Control center is smart electricity services to various communication devices highly integrated, can provide a variety of communication methods, can easily and flexibly carry out various types of electricity related services business intelligence. A control center can achieve centralized access and management of all types of communications equipment, not only simplifies the complexity of the terminal design, changing the traditional intelligence community networking, but also reduces terminal costs, help to optimize the communication network structure, improve smart electricity service flexibility, stability, and reliability.

3.2. Intelligent interactive terminals

Smart electricity service system, intelligent interactive terminals is an important device users and systems interact, the user directly for various operations in the smart interactive end-user interface; intelligent key equipment is for home electricity services, which through advanced information communication technology and control center is connected to the home electrical equipment monitoring and management of electricity and other data query information, and displays the user of electricity instructions to adjust the grid peak load, between intelligent power grid and users. In addition, through intelligent interactive terminals, users can also provide community services, value-added services and other smart home services. Intelligent interactive terminals configured larger size touch screen, user-friendly and convenient operation.

3.3. Intelligent interactive hand-held terminal

Handheld terminal is simplified functional intelligent interactive terminals, smaller, with a small-size LCD screen, easy to operate in mobile home content. However, because of the smaller screen simplifies and supports only part of the function of intelligent interactive terminals, supporting appliance control and home security functions, but it may be connected through wireless intelligent interactive terminals, data for interactive services and information collection on the LCD screen the conduct show.

3.4. Intelligent interactive set-top boxes

Intelligent interactive set-top box is supplementary equipment intelligent interactive terminals, which is a carrier of the TV as the display intelligent interactive terminals. Work smart interactive set-top boxes and televisions, to facilitate users to achieve intelligent interactive terminals on the TV's functions, in addition to support interactive services, appliance control, community services, Internet and other functions, also supports video on demand and three communities network integration and other services.

3.5. Smart socket

Smart electricity service system, to achieve the control center and home appliance interconnection, there are two ways: one is the control center directly with smart appliances with intelligent communication module for communication and control; the other is by adding fitted with a communication module smart sockets to complete communication and control between the control center and the traditional home appliances.

4. Summary

Smart electricity service system is an important part of smart grid electricity research area is to achieve real-time interaction between the grid and the user response, enhance grid integrated service capabilities to meet the needs of interactive marketing, an important means to enhance the level of service. With the development of Internet of Things technology, networking technology for its comprehensive perception, reliable communication and powerful data integration capabilities, can effectively enhance the intelligence level of the electricity service system. With the development of networking technology, the overall perception, reliable communications, and powerful integrated mass data processing capabilities will continue to improve the intelligence level of electricity services, and enhance user interaction with the grid, allowing users to enjoy a more secure, convenient, more diverse technology, as well as more environmentally friendly electricity service.

5. Reference

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