Ubiquitous Power Internet of Things and IPv6 Technology in Wireless Access Terminal and Intelligent Meter Reading Application System

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Abstract. State Grid Corporation of China (SGCC) has put forward the decision of building "three types and two networks", which makes the energy Internet enterprises more competitive. With the goal of reaching the first-class level in the world, they are confident to meet greater challenges. To a certain extent, the power Internet of things has a great impact on the enterprises in the power industry, but also faces a huge impact and challenge. Based on the analysis of the current situation of China's electric power enterprises, this paper puts forward the research of ubiquitous power Internet of things and IPv6 Technology in wireless access terminal and intelligent meter reading application system. Through the investigation and analysis of 180 staff of an electric power enterprise in China, this paper compares the cost, rationality and efficiency of traditional power mode and IPv6 technology power mode, and discusses and analyzes the results. It is concluded that after the introduction of IPv6 technology into the power industry, the cost of the enterprise is saved, the rationality of the structure is improved, and the benefit of the power enterprise is also significantly improved, which provides technical guarantee for the development of the power enterprise. The research in this paper has important practical significance for further promoting the application of ubiquitous power Internet of things and IPv6 Technology in wireless access terminal and intelligent meter reading application in power enterprises.

Keywords: Power Internet of Things, IPv6 Technology, Wireless Terminals, Intelligent Meter Reading

1. Introduction

In order to comprehensively and effectively implement the planning, design and management of power grid and realize the unified utilization of network information, the State Grid Corporation of China has proposed the deployment arrangement for further comprehensive construction of ubiquitous power Internet of things [1-3]. However, the general implementation of the power Internet of things also puts forward new requirements for the overall perception of the perception layer equipment. In the field of electric power, intelligent substation, remote meter reading and other applications have...
been gradually promoted; good results have been achieved in security prevention and perimeter intrusion prevention; in the field of traffic management, road network monitoring and other applications are playing an active role; in the field of logistics, transportation, tracking and other applications are gradually expanding; in the medical industry, telemedicine and other applications are increasingly mature [4-5].

Carry out "Application Research of new generation power information and communication technology (ICT)"; which can effectively support key technologies such as project and distribution in IPv6 network system and IPv6 address management [6-7]. At the same time, we carried out "Research on the construction mode and key technologies of intelligent power consumption community", established demonstration systems in Shanxi, Nanjing, Tianjin and other places, provided experience for the interconnection of power IPv6 network and national NGI network, successfully developed industrial Ethernet switch, passive optical network equipment and safety isolation device with power characteristics, and mastered non-blocking switching, VPN tunnel, OSPF and BGP And other IP network key technologies [8-10].

This paper analyzes the actual situation of intelligent power enterprises, and points out that some leaders of power enterprises do not have a deep understanding of IPv6 technology, which leads to some deficiencies in wireless access terminals and intelligent meter reading. This paper establishes the ubiquitous power Internet of things and IPv6 Technology in wireless access terminal and intelligent meter reading application system research. In the research, according to the characteristics of the Internet of things and intelligent management and control of intelligent power enterprises, combined with IPv6 technology, the paper puts forward construction suggestions, which has a positive impact on the ubiquitous power Internet of things control, and effectively improves the efficiency of power enterprises. Through the investigation and analysis of the factors influencing the application of IPv6 Technology in wireless access terminals and intelligent meter reading, this paper believes that the use of ubiquitous power Internet of things and IPv6 technology can enhance the competitiveness of power enterprises.

2. Ubiquitous Power Internet of Things and IPv6 Technology

2.1 Ubiquitous Power Internet of Things
Power Internet of things is a new generation of information and communication system. It connects the equipment and data of energy production, consumption and other links in real time, and comprehensively carries the power grid operation and related full business. It has the characteristics of ubiquitous terminal access, computing cloud collaboration, data-driven services and other features. It is deeply integrated with smart grid to form the energy Internet together. In recent years, the Internet of things has become an important national development strategy of the Internet of things. The technology of the Internet of things has become the focus of the national strategic development plan, and the Internet of things will become the focus of the national strategic development. The State Grid Corporation of China clearly points out that the construction and operation of the "universal power Internet of things" is imperative.

2.2 IPv6 Technology
In 1992, the Internet Engineering working group proposed to build the next generation IP (IPng). IPng is the predecessor of IPv6, now officially named IPv6. The proposal of the next generation Internet Protocol IPv6 is mainly aimed at the problem that the current IPv4 address resource is about to run out and the network transmission rate cannot adapt to the development.

From the perspective of technology development, policy orientation, market demand and development opportunities, China will enter the stage of large-scale deployment of IPv6. In this context, Internet companies have accelerated the pace of IPv6 ecological construction. During the 2018 World Cup, Alibaba completed the IPv6 transformation of Taobao, Tmall, Ali cloud and Alipay. Youku tries to provide live broadcast technology with IPv6. During this period, IPv6 users reached 11
million and IPv6 traffic reached 51T / day. In 2019, JD cloud said that it had completed the IPv4 / IPv6 dual stack transformation of several products and services, and provided IPv6 support for the services of Jingdong Mall. In 2019, Tencent video and others have completed full support for IPv6, and the IPv6 technology upgrading of wechat and QQ is also accelerating.

3. Survey Results and Analysis of the Application of IPv6 Technology in Wireless Access Terminal and Intelligent Meter Reading

Research shows that more than 92% of China's power enterprises take IPv6 technology as the core factor of enterprise competitiveness. IPv6 technology has gradually penetrated into enterprises of different industries through various ways. Compared with the previous working mode of electric power enterprises, IPv6 technology has the advantages of high transmission rate and fast flow. IPv6 technology mode can replace the traditional power technology mode, improve the market share of enterprises, improve the efficiency of data transmission, and effectively ensure the application of IPv6 Technology in wireless access terminals and intelligent meter reading, so as to improve the competitiveness of enterprises.

In the research and analysis, this paper adopts two methods, namely electronic questionnaire survey and sampling survey. 180 employees of an electric power enterprise in China were selected as the survey samples. In the process of investigation, this paper found that both managers and ordinary staff involved in the operation of enterprises involved in IPv6 technology. In this survey, we conducted a data survey on two groups of people in power enterprises. One group is the leadership of the enterprise; the other group is the ordinary staff of the enterprise. This paper analyzes the comprehensive application of IPv6 Technology in wireless access terminal and intelligent meter reading in China's power enterprises. The results are shown in Table 1. Based on the survey results of the two groups, the power enterprises can enhance their competitiveness under the promotion of IPv6 technology.

Table 1. Impact of IPv6 Technology on wireless access terminals and intelligent meter reading applications

| Investigation items          | Enterprise leadership (%) | Ordinary employees (%) |
|-----------------------------|---------------------------|------------------------|
| It has a promoting effect   | 95                        | 91                     |
| No effect                   | 4                         | 6                      |
| Play a limiting role        | 1                         | 3                      |
| Hope to increase technology investment | 97 | 93 |

4. Discussion

4.1 Application Prospect of Ubiquitous Power Internet of Things

(1) Realize the utilization of clean energy

In the application process of ubiquitous power Internet of things, it can overcome the problem of energy shortage at this stage, actively promote the application of clean energy, protect the environment and avoid environmental pollution. The ubiquitous power Internet of things can make full use of its information perception function and artificial intelligence technology to timely predict various clean energy sources and take effective incentive measures. In this way, users can be motivated to actively participate in the use of clean energy. Distributed new energy can establish virtual power plants in the ubiquitous power Internet of things, play the role of this kind of energy, reduce the user energy consumption caused by grid operation, and realize cross regional coordination. The ubiquitous power Internet of things can promote the use of clean energy, so it has a broad development prospect.

(2) Optimizing power system functions

Ubiquitous power Internet of things can solve the problems of energy shortage and unreasonable power grid structure at this stage, optimize the power system, make every link get technical support, realize stable operation, strengthen the prediction of emerging energy such as wind energy and solar energy, establish a perfect monitoring and forecasting system, make full preparation for new energy
power generation, and make full use of the advantages of the Internet of things, Real time monitoring of equipment operation status to ensure that problems are improved. Intelligent technology is used to optimize the communication function, so that the sensor has stronger perception of information, and further improve the intelligent judgment and processing function of data. The intelligent distribution management system is constructed to monitor the distribution network in real time, monitor the fault in time and deal with the error. The use of the Internet of things can further improve work efficiency, achieve online office and identity authentication, and can supervise and manage the work at any time.

(3) Data value added services

Data value-added service is a way of mining information and improving the value of data application. Generally, the data value-added services adapted to the power Internet of things can be divided into the following two aspects. The first is about promoting industrial integration. The data information generated by power system can be applied to more than ten industries. According to the characteristics of related industries, the personalized service process is formulated to improve the economic benefits of enterprises. The second is about derivative new business. Ubiquitous power Internet of things can develop Internet financial flow entry business with the help of huge user groups and accumulated user data, and ultimately improve the service quality of enterprises.

From the analysis results in Figure 1, it can be seen that the application of ubiquitous power Internet of things can reduce the energy consumption of enterprises, optimize the energy structure of power grid, and significantly improve the management status and business performance of enterprises. The comparative analysis of various numerical changes of an electric power enterprise after investing in ubiquitous power Internet of things from 2017 to 2019 shows that after the popularization and application of ubiquitous power Internet of things, energy consumption, energy institutions and data value-added show a good development momentum every year, bringing unprecedented opportunities for enterprises.

![Figure 1](image.png)

**Figure 1.** Comparison of various numerical changes after the ubiquitous power Internet of things was put into operation from 2017 to 2019

In order to further analyze the scope and depth of IPv6 Technology in wireless access terminal and intelligent meter reading application of power enterprises, the results are shown in Figure 2. As can be seen from Figure 2, the influence of traditional power enterprise mode on power enterprises is far less than that of IPv6 technology. The traditional mode has high cost, lack of rationality, limited data value, and the effect is not ideal. After the introduction of IPv6 technology into the power industry, the cost of enterprises is saved, the rationality of the structure is improved, and the benefits of power enterprises are also significantly improved. Therefore, they think that the advantages of IPv6
Technology in the development of the power industry outweigh the disadvantages, and that the promotion of IPv6 technology is very necessary.

Figure 2. Comparison of cost, rationality and benefit between traditional power mode and IPv6 technology power mode

4.2 Advantages of IPv6 Technology in Wireless Access Terminal and Intelligent Meter Reading

(1) Wide address space

Generally referred to as wide address space: general situation refers to the basic characteristics of IPv6 technology. However, this feature provides the possibility for the full application and coverage of wireless sensor networks. In smart grid, if power generation, power consumption and other links need to be interconnected, it needs at least 11 billion addresses to build a network connected with objects. The main purpose of different IP addresses is to distinguish between different devices and users. Only through different IP addresses can the network system send out security alarm more accurately, so as to improve the emergency capability. The emergence of IPv6 technology provides a good way to support the implementation of such applications.

(2) High security

In the development of IP protocol, the security of users has always been an important and noteworthy issue. Making authentication and access control for different users is an important strategy for security services. In terms of consistency, it mainly includes the measures to prevent data from being modified in the process of transmission and resist replay attacks. Of course, there are also services that use confidentiality and non-replication, as well as protection through denial attacks. Therefore, security is particularly important in wireless sensor network applications.

(3) Stateless auto configuration

IPv6 protocol support, plug and play network connection without any form of manual configuration, IPv6 host can connect to the network. However, due to the need to install and manage the DHCP server, there is not enough flexibility. And in the general application of wireless sensor networks, each node is relatively scattered, and the scale of each subnet is relatively small, so stateless automatic configuration is more appropriate in the networking process.

5. Conclusions

In the process of studying ubiquitous power Internet of things and IPv6 Technology in wireless access terminal and intelligent meter reading application process, this paper introduces IPv6 technology and ubiquitous power Internet of things as the main line of research, through the study, this paper considers that ubiquitous power Internet of things and IPv6 technology is an indispensable part of the
development of power enterprises, and through the selection of 180 workers in a power enterprise in China. Through the investigation and analysis of the staff, we get their investigation and Analysis on the impact of IPv6 Technology in wireless access terminal and intelligent meter reading application. After the introduction of IPv6 technology into the power industry, the cost of enterprises is saved, the rationality of the structure is improved, and the benefits of power enterprises are also significantly improved. According to the survey results of this paper, in order to make full use of ubiquitous power Internet of things and IPv6 technology, it is necessary to integrate relevant technologies with the actual situation of power enterprise work content. We should focus on the actual situation, attach importance to scientific introduction, and effectively formulate development strategies in combination with the situation of power enterprises to ensure the effective development of enterprises. This research has achieved ideal results and made contributions to the application of ubiquitous power Internet of things and IPv6 Technology in wireless access terminal and intelligent meter reading application.

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