Research and Application of New Business Hierarchical Security Strategies for Power Internet of Things

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Abstract. In 2019, the State Grid Corporation of China released the power Internet of things construction outline. The power Internet of things has spawned a large number of new business models. There is an urgent need for more flexible and precise security strategies and protective measures to solve the security problems caused by the complex interaction of new services. This article analyzes the purpose of business classification based on the characteristics of the new business of the power Internet of Things. From the perspective of enterprise security, the new business is classified from the perspective of users, devices, data, applications, and combined with the idea of zero trust, so as to achieve accurate protection and access control from all angles of business. Finally, the hierarchical method is applied in the Xiong'an comprehensive energy service and State Grid mall of Hebei Province under the scenario of power Internet of things.

Keywords: Power Internet of things, New business, Classification, Zero trust, Business subject

1. Introduction

In 2019, State Grid Corporation of China (SGCC) deeply grasps the trend of deep integration of energy revolution and digital revolution, actively adapts to the requirements of power reform and state-owned enterprise reform, comprehensively carries out the construction of power Internet of things, and speeds up the strategic deployment of building a world-class energy Internet enterprise with global competitiveness [1-2]. The power Internet of Things has the characteristics of comprehensive status perception, efficient information processing, and convenient and flexible application [3]. The power application it carries needs to respond to user needs in a timely manner, to achieve rapid iteration of business and stable operation of applications. However, the current protection methods based on centralized access and isolation control limit the flexibility of technology and services to a certain extent, and it is difficult to meet the requirements for efficient interaction of services. State Grid Corporation's end-to-end security protection for electric power Internet of Things is more flexible and can be differentiated and accurately protected. Under the premise of taking into account security, it supports
sustainable and good end-to-end flexible and friendly interaction between mass terminals, internal and external users, and Internet of Things platforms [4-5].

The idea of hierarchical protection can be traced back to the United States military document secrecy system in the 1960s. In 2002, the United States passed the Federal Information Security Management Act (FISMA), which set goals for the improvement of information security in US government agencies, highlighting the development of information security classification and implementation protection. Drawing on the series of standards issued by the United States, the European Union, and ISO, China has also formulated laws and regulations and standard systems for network security level protection that adapt to its own development. In 2007, China promulgated the management measures for classified protection of information system, which indicates that the construction of classified protection of information system security in China has officially started. At present, domestic and foreign security classifications are mostly guided by level protection, and only the system is classified according to the physical environment, communication network, computing environment, management system and other networks as a whole, and there is no detailed protection for users, equipment, data and applications in business systems Classification. It is difficult to adapt to the flexible and efficient business protection requirements of the electric power Internet of Things.

In order to realize the on-demand protection of the new business of the power Internet of things, this paper studies the dimensions and methods of describing the new business characteristics of the power Internet of things, and accurately depicts the new business characteristics of the power Internet of things from the business security protection level, business operation mode, business operation efficiency and economy and other dimensions.

2. New business features

Through the integration of advanced information communication, big data, artificial intelligence, Internet and other technologies [6], the power Internet of things can realize the interconnection, holographic perception, efficient analysis, intelligent control and flexible sharing of the links of generation, transmission, distribution, use and storage, and can realize the real-time matching of energy supply and demand, safe economy, intelligent response and efficient service [7-8].

The internal business of the power Internet of Things is mainly the production operation and management of the power grid. There are two management objectives. One is to increase the level of intelligence and ensure the strength of the power grid; Secondly, under the squeeze of profits and strict cost supervision in the future, we will realize the improvement of customer satisfaction and lean management of operations.

The external business of the power Internet of Things mainly revolves around the power grid enterprises to avoid being "pipelined" and to transform to "content services" integrated energy management. This transformation is not just about the power grid doing some investment-type comprehensive energy services in parks, customer distribution stations or energy-saving projects. The fundamental goal is to build an “hub open and shared” industrial ecological platform for power distribution, and form its own new business model.

The characteristics of the power Internet of things are as follows:

First, based on the Internet technology to achieve a wider range, greater space energy sharing; Second, support the access and exit of large-scale distributed energy system and energy storage system at any time; Third, the proportion of renewable energy in primary energy is increasing year by year. The power grid should be able to control a certain amount of backup energy storage system, and be able to translate the fluctuation of clean energy power generation on the power grid system; The fourth is to support and meet the electric ecology of intelligent transportation such as electric vehicles. The essential characteristics of the Power Internet of Things are neither competition at the level of big data, cloud platforms, AI technology or business, nor competition in a certain market segment or local technology, but the competition of ecological platforms and layouts. System competition.
3. New business security classification strategy

3.1. Purpose of classification
The purpose of the new business classification of the electric power Internet of Things is to clarify safety responsibilities and determine the protection boundary. The purpose of classification is to define the scope of business data, to clarify the supervision scope of industry authorities from the perspective of the industry, to implement the responsibility of the main body of data security from the perspective of the enterprise, and to determine the boundary of data security protection from the perspective of protection. At the enterprise level, each enterprise shall bear the main responsibility for the security of the data generated or used by it. For example, the data on the power Internet platform should be protected by the platform enterprise. According to the data source, use and other subdivision of R & D domain and production domain, IaaS layer and PaaS layer, the protection boundary between domains and layers should be determined respectively.

3.2. Zero trust model
Zero trust was first proposed by John kindervag in 2010 [9-10]. Its core idea is that by default, no one, device or system inside or outside the network should be trusted, and the trust foundation of access control needs to be reconstructed based on authentication and authorization. After years of practice, Google released “beyondcomp”, a zero trust architecture, which has gradually been recognized by the industry. Zero trust subverts the paradigm of access control and leads the security architecture from network centered to identity centered. Its essential demand is identity centered access control.

In the process of promoting the power Internet of things, the application of modern information technology, such as "big cloud intelligent chain of things", realizes the interconnection of everything and human-computer interaction in each link of the power system, and the network boundary at the terminal side will become fuzzy and complex. The traditional border based security architecture is difficult to protect. The number of power grid assets is large and scattered, the types are numerous, and the environment is complex. The construction of the power Internet of things will be based on the construction of a unified identity. The security protection based on "zero trust" can break the traditional thinking of border protection and help the "three types, two networks and world-class" energy Internet.
Based on the "zero boundary" power internet of things security protection system, with zero trust network security architecture as a reference, unified identity management is implemented to achieve ubiquitous IoT device and service identity authentication. According to the environmental attributes and access attributes of the device, dynamic permission control is performed.

3.3. Classification method
Drawing on the experience of data classification and classification at home and abroad, and closely following the purpose of data classification and classification, according to the characteristics of new business data and security protection requirements, a data classification and classification method for electric power Internet of Things is proposed.

First of all, from the data source, characteristics, use, relevance, security needs and other aspects of comprehensive analysis, this paper proposes a data classification method, to ensure that the data categories are closely coupled, security needs are basically the same. At the same time, in order to facilitate management, data classification should not be too much. At the same time, in order to facilitate management, data classification should not be too much.

Then, based on the principle of "high not low", according to any of the three security attributes of the data damaged, use the combination of qualitative and quantitative methods to determine the biggest consequences on power production and operation, public interest, economic and social stability, ecological environment, people's life and health, national security and so on.

4. Application

4.1. Application of comprehensive energy services
Comprehensive energy Service Company is an enterprise entity that provides for-profit comprehensive energy services for its customers based on their diversified energy service needs. The business activities of integrated energy service companies generally have the following characteristics.

One is energy. One of the business characteristics of comprehensive energy Service Company is to basically focus on the theme of "energy", and carry out comprehensive energy service business in the
whole process of energy production, processing and conversion, transmission and distribution, storage and terminal use.

Second, comprehensive. In view of the diversity of customers' demand for energy services, the second business feature of integrated energy Service Company is its comprehensiveness, which is shown as follows:

- Diversity rather than singleness of energy supply services;
- The diversity of energy use services involves providing customers with diversified services related to energy use, such as safety, quality, efficiency, environmental protection, low carbon, intelligence, etc;
- The diversity of service forms, including planning, design, engineering, investment and financing, operation and maintenance, consulting services, etc.

Third, service. In general, the business of comprehensive energy Service Company is different from the simple production and sales of energy production, processing and conversion, transmission and distribution, storage and terminal use related products. It is based on "hardware" such as products and technologies, and provides customers with diversified "soft" value-added services.

Fourth, chain network. In view of the demand for energy services in all aspects of energy production, processing and conversion, transmission and distribution, storage, and terminal use, the comprehensive energy service companies with strong strength carry out energy services in all or more of the above aspects and build the energy service business chain.

This classification method will be applied in the comprehensive energy service of Xiong'an, Hebei Province. The joint operation and maintenance service business uses the advanced service concept of "Internet of things + equipment operation and maintenance" for reference to provide customers with specialized and low-cost intelligent custody service of transformation and distribution facilities for operation and maintenance, build professional, responsive and accurate equipment operation and maintenance services, guarantee 24-hour platform monitoring services, provide energy use analysis and power use analysis management services, solve many disadvantages of traditional operation and maintenance, reduce the risk and cost investment of customer self maintenance, provide solid guarantee for customer's safe, economic and reliable power use, and let customers truly feel the economic benefits brought by energy conservation and consumption reduction through joint operation and maintenance services.

4.2. Application of State Grid mall
State Grid mall is an e-commerce website invested and constructed by State Grid Corporation of China. It is characterized by "energy saving" and "intelligent" electric products, and mainly provides online sales and supporting services for smart home, electric vehicles and other products. Based on the positioning of "safety, specialty and quality", the mall aims to serve government affairs, business of enterprises and institutions and household chores of residents, and promote the market expansion of strategic emerging industries such as energy conservation and environmental protection, new energy and electric vehicles.

State Grid Mall is composed of two parts: Personal Mall (B2C) and Enterprise Mall (B2B), which provide online transactions of commodities for individuals and corporate customers. The business scope covers the three major sectors of smart home, new energy, and power. There are 9 categories of products in the mall, including smart home appliances, power books, electric vehicles, distributed power solutions, electrical appliances, contract energy management, and customer-side power engineering services.

In 2017, the State Grid shopping mall promoted the development of Internet plus energy e-commerce in an all-round way. With the characteristics of electrical equipment, it promoted the development of energy B2B business, and gathered high-quality industrial resources. It shared with the partners the achievements of the Internet information platform, such as material procurement, online marketing, intelligent manufacturing, etc. It forms a B2B comprehensive characteristic service that integrates information service, index evaluation, rating certification, procurement transaction, logistics finance, material procurement cloud, and supply chain finance and cross-border transaction.
By the end of 2017, State Grid mall has more than 80,000 merchants and transaction volume of the platform has exceeded 250 billion yuan. In addition, the foreign online shopping mall successfully held 21 partner conferences in 22 provinces (districts and cities), more than 80,000 power and energy industry enterprises responded positively, more than 3700 enterprise representatives attended the conference, reached more than 500 cooperation intentions, successfully built the energy Internet industry circle of friends and ecosphere, and made positive contributions to the sustainable innovation and development of the power and energy industry.

This classification method will be applied in the State Grid mall. Based on the business characteristics of State Grid mall, user identity as the center, and according to the hierarchical security strategy of users and applications, flexible user authentication and dynamic access control measures are established to achieve accurate business protection.

5. Conclusion
In this paper, a new business multi-dimensional security classification method is proposed according to the characteristics of the new business forms of the power Internet of things. This method is a more fine-grained multi-dimensional classification method at the business application level, which comprehensively considers the system protection level, business operation mode, business operation efficiency and economy. It can provide the basis for the realization of business-based, flexible and on-demand protection.

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