

Application of Block chain and IPv6 in Micro-Grid

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Abstract

Micro-grid is an autonomous system which can realize self-control, protection and management. As a complete power system, it can realize power balance control, system operation optimization, fault detection and protection, power quality control and so on. But the micro-grid itself also has a variety of problems. By introducing block chain and IPv6 technology, this paper briefly introduces the application of block chain and IPv6 technology in micro-grid.

Keywords

Block chain, IPv6, micro-grid.

1. Introduction Of Block Chain

Block chain technology, also known as distributed ledger technology. Block chain, as the underlying technology and infrastructure of Bitcoin, has the characteristics of decentralized, open, untampered information, anonymity and so on.

Block chain is divided into three kinds: public chain, alliance chain and private chain. Digital currency such as Bitcoin is a public chain, which is characterized by being open to everyone, anyone can participate, and the transaction on it can be effectively confirmed by the block chain. The alliance chain specifies more than one pre-selected node as the bookkeeper within a certain group, the generation of each block is determined by all the pre-selected nodes, and other access nodes can participate in the transaction, but do not ask the bookkeeping process.

The development history of block chain can be summarized into three stages: block chain 1.0, that is, digital currency; block chain 2.0, digital currency and intelligent contract fusion application; block chain 3.0, which can be used to realize the increasingly automatic allocation of physical resources and human assets in the world, and to promote large-scale cooperation in energy, health, education and other fields.

Block-chain technology is considered to be the fifth subversion innovation of the computing paradigm following the mainframe, personal computer, internet, mobile social network, and is widely used in various production and management activities. In this paper, an integrated information platform based on block chain protocol standard is presented in this paper. Zhou Guoliang et al. studied the application of block chain in energy Internet, and pointed out that block chain technology can provide a technical basis for constructing trusted and point-to-point transactions. In the field of power-assisted service, Li Bin et al. proposed the application of block-chain technology in the power-assisted service market, and it also The prospect is analyzed. The application of blockchain to microgrid trading has been carried out in foreign enterprises. The New York-based TransActive Grid project connects solar power generators and power buyers through block chain networks. It does not need professionals to participate in the management and recording of transactions, and can represent the future direction of community energy development.

2. Introduction of Ipv6

Internet Protocol Version 6 (IPv6) is a next generation IP protocol designed by Internet Engineering Task Force (IETF) to replace IPv4. The number of addresses claims to be one address for every grain of sand in the world. The biggest problem of IPv4 is that the network address resources are limited, which seriously restricts the application and development of the Internet. The use of IPv4 can not only solve the problem of the number of network address resources, but also solve the obstacles of multiple access devices connected to the Internet. Internet digital distribution agency (IANA) in 2016 Make a recommendation to (IETF), the Internet Engineering Task Force, to request that the newly developed Internet standards only support that IPv6, is no longer compatible with IPv4.

IPv6 has the following advantages: I. IPv6 has a larger address space. The number of IP addresses specified in IPv4 is 32, and the maximum number of addresses is 2^{32} ; and the length of the IP address in IPv6 is 128, that is, the maximum number of addresses is 2^{128} . Compared with the 32-bit address space, the address space of the 128-bit address space is increased by 2^{128-32} . II. IPv6 uses a smaller routing table. the address assignment of ipv6 follows the principle of clustering, which enables the router to represent a subnet with a record in the routing table, The length of routing table in router is greatly reduced and the speed of forwarding packet is improved. Third, IPv6 adds enhanced multicast (Multicast) support and convective control (Flow Control), which makes multimedia applications on the network have a great opportunity to develop, and provides a good network platform for quality of service (QoS, Quality of Service) control. Fourth, IPv6 added support for automatic configuration of (Auto Configuration). This is an improvement and extension of the DHCP protocol so that The management of the network (especially the local area network) is more convenient and fast. Fifth, IPv6 has higher security. In the IPv6 network, the user can encrypt the data of the network layer and verify the IP message. The encryption and authentication options in IPV6 provide the confidentiality and integrity of the packet. It greatly enhances the security of the network. Sixth, allow expansion. IPV6 allows the protocol to be extended if new technologies or applications require it. Seven, better header format. IPv4 uses the new header format, its options are separate from the basic header, and if necessary, you can insert options into the base header and the upper number Between the two. This simplifies and accelerates the routing process, as most options do not need to be selected by routing.

Although IPv6 is only in the research stage around the world, many technical problems need to be further solved, and the devices that support IPv6 are very limited. But generally speaking, the development of global IPv6 technology continues, and with the depletion of IPv4, many countries have realized the advantages of IPv6 technology, especially in China, through some national projects, to promote the full deployment and large-scale commercial use of the next generation Internet of IPv6. With the IPv6 technology becoming more and more perfect, the cost of IPv4 is too high, the development is slow, the support is not enough and so on. The view of the people.

3. Introduction of Micro-Grid

Micro-grid (Micro-Grid) is also translated as micro-grid, which refers to a small power generation and distribution system composed of distributed power supply, energy storage device, energy conversion device, load, monitoring and protection device. The purpose of micro-grid is to realize the flexible and efficient application of distributed power supply, and to solve the problem of large number and various forms of distributed power supply connected to the grid. The development and extension of micro-grid can fully promote the large-scale access of distributed power supply and renewable energy, and realize the high reliable supply of various energy forms of load. It is an effective way to realize the active distribution network and make the traditional power grid transition to smart grid.

Micro-grid is a small power generation and distribution system, which is composed of distributed power supply, energy storage device, energy conversion device, related load, monitoring and protection device. Most of the power supply in micro-grid is distributed power supply with small capacity, that is, small units with power electronic interface, including micro gas turbine, fuel cell,

photovoltaic cell, small wind turbine and super capacitor, flywheel and battery and other energy storage devices. They are connected to the user side and have the characteristics of low cost, low voltage and low pollution.

Due to the dual pressure of environmental protection and energy depletion, we are forced to vigorously develop clean renewable energy. The development potential and benefit space of efficient distributed energy industry (cogeneration of heat and power) are huge. The requirements of improving power supply reliability and power supply quality, as well as the constraints caused by long-distance transmission, are promoting the establishment of corresponding power supply near the load center. The centralized control of the whole power grid can be realized by micro-grid controller, and the distributed local controller is not needed, but only the conventional measuring device is adopted, and the fast communication channel between the measuring device and the local controller is adopted. Using distributed Power supply and load Local Controller to realize Micro-electricity Network transient control, micro-grid centralized energy management system to achieve steady-state security, economic operation analysis. Weak Communication connection between centralized Energy Management system and Local Controller in Micro-grid.

Micro-Grid is an autonomous system which can realize self-control, protection and management. As a complete power system, it can realize power balance control, system operation optimization, fault detection and protection, power quality control and so on. Smart micro-grid is a small and decentralized independent system, which can realize self-control, protection and management. It can operate with or in isolation from the external power grid. It integrates distributed power supply, energy storage device, energy replacement device, related load and monitoring, protection device into a small power generation and distribution system.

4. Application of Block Chain and Ipv6 in Micro-Grid

The power trade includes the electric energy trade, the power transmission power transaction, the auxiliary service transaction, and the like. In that prior art, the participating main body of the electric power transaction form data island, the data flow is not smooth, and the intelligent degree is not high. The power transaction cannot trace the source, and lacks the secure and credible support. In addition, that technology innovation of the existing electric power trade is lagging, and the technology support is lack for new applications such as new energy and micro-power grid. The collection of electric charge is a traditional power system. In the traditional mode, a lot of manpower and material resources are consumed and the efficiency is low. The efficiency of the power transaction mechanism, the payment method, the clearing and settlement and the like is not high. There are many shortcomings in the current power system: it can't be flexible Track the electric quantity change, power supply of remote area is not ideal, local accident is easy to spread, pollution is serious(generally coal oil and other power generation), etc.

As an important part of strong smart grid, micro-grid can efficiently integrate all kinds of distributed energy, improve the permeability of renewable energy, and make up for the defects of power supply concentration in large power grid. Micro-grid provides ideas for the improvement of the above situation, and can be used as a powerful part of power grid. Micro-grid has many advantages, such as local digestion of distributed clean energy, flexible access and disconnection of power energy, strong stability of micro-grid grid connection, independent operation of power supply in the case of superior power grid failure, and so on. If the infrastructure of a large grid does not provide power to the city in the event of natural disasters or failures, then solar panels or distributed solar panels in neighbors' homes Photovoltaic power stations can serve street residents.

As a new technology in recent years, block-chain technology has provided new ideas and methods for micro-grid system architecture. This paper mainly designs a micro-grid system based on block chain as the bottom layer, and uses a variety of intelligent contracts for power trade and service. The power transaction payment and collection of enterprises or residents in the micro-power grid can be carried out by the micro-power grid or through an integral mode, and finally exchanged with the

RMB. The scheme can greatly improve the area adaptability and power distribution flexibility of the micro-power grid micro-power grid, and greatly ensure the stable operation of the micro-power grid. At the same time, with the access of a large number of users' small power generation equipment in the micro-grid, a large number of data terminals are needed for data acquisition, which also requires a large number of IP addresses. The introduction of IP can meet the needs of a large number of IP addresses. At the same time, the data security of block chain micro-grid is guaranteed from the data protocol.

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