Design of Power Terminal Communication Access Platform Based on Blockchain

Dong KaiLi[1], Qin Xiaoyang[1,a,*], Wu Yangyang[1], Wang Chunying[1]

[1]State Grid Henan Information & Telecommunication Company, Zhengzhou, 450000, China

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Abstract: *Terminal* communication access network is the extension of backbone communication network. With the end boundary of backbone communication network and terminal equipment as the demarcation point, effective data transmission between service main station and terminal equipment cannot be achieved without the bearing of access network. In view of the characteristics of electric power communication access network, such as multi-service, scattered distribution, and bad environment, it cannot adopt a single technology to realize network formation. This paper designs a terminal communication access platform based on blockchain to realize the decentralized security access mechanism of terminals, networks and services and secure transmission based on blockchain services.

1. Introduction

With the increasing demand for service access of power grid intelligent service and energy Internet ubiquitous service, it is urgent for power communication network to support secure, credible, and flexible service access. Breaking through decentralized trusted authentication technology, privacy and anonymity are used in distributed ubiquitous service access. It solves the problem of decentralization consensus among network, system, and business, and forms a secure, autonomous, peer-to-peer and trusted network platform. Then it gives business users the ability to control their privacy and data sharing. Ensure the security and credibility of power communication equipment and data from source to data sharing. It realizes safe, efficient, and reliable access of power communication network and supports the research of ubiquitous business trusted access [1].

2.Overview of Power Terminal Communication Access Network

The terminal communication access network integrates optical fiber, power line carrier, power wireless broadband and public network wireless communication technologies to provide dedicated access communication channels for power distribution production management business to meet the requirements of high security and reliability of power grid business[2].According to the characteristics of power communication network, the services of power communication network access network include: transmission and transformation equipment monitoring, distribution automation, communication support auxiliary system, distributed power supply monitoring, user power information monitoring, distribution video monitoring, mobile operation, electric vehicle charging and switching, emergency command and communication, etc. A large number of heterogeneous power communication service terminals are used at the end of power communication network. They are connected to the backbone communication network through the heterogeneous access mode of private network/public network and support many new services.

Traditional terminal communication access network only pays attention to the application of power distribution service. In the face of new business development, the existing research lacks the analysis of the bearing adaptability of terminal access network to these new terminal services, which limits the business scope supported by future terminal communication access network. Blockchain technology makes de-trust and peer-to-peer communication a reality [3]. Distributed accounts based on blockchain can provide trust, ownership record, transparency, communication support for power communication network, and preserve transaction information in the way of

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private chain. The technical characteristics of blockchain are consistent with the concept of power communication ubiquitous services. Based on blockchain technology, this paper carries out the research and platform design of power terminal communication access network service carrying capacity to support the safe access and transmission of various terminal services.

3. Terminal Communication Access Platform Based on BlockChain

This paper combs the value transfer mode of blockchain in the process of ubiquitous secure and trusted access of distribution telecommunications. Based on the application scenario, a technical framework based on blockchain is constructed as shown in Figure 1. It consists of three parts: multimode communication terminal, ubiquitous service communication node and data gateway. Multimode communication terminals mainly deal with terminals and data access, including multi-mode communication terminal devices with secure and trusted communication capabilities. Communication terminal devices share data with various business systems through distributed data trusted chains. Communication terminal devices with secure and trusted communication capabilities and business isolation capabilities can ensure the safe and reliable operation of existing power grid services. Compatible with existing competitive Internet business data access. Ubiquitous business communication nodes can directly use the existing mature public chain platform to realize the trusted storage and sharing of all kinds of ubiquitous business data [4]. They can also build data trusted chain separately to realize the sharing of all kinds of ubiquitous business data. Because the cost of public chain service is uncontrollable, this paper chooses the latter mode, which needs to consider the different roles of business, supervision and technical support relevant nodes to ensure the reliable operation of blockchain service. Data gateway, after introducing blockchain technology, on the basis of ensuring data security, trustworthiness and slice sharing, sets up corresponding data gateway for the existing system to realize data access to the old system; for the new system based on blockchain technology, data access can be directly carried out.

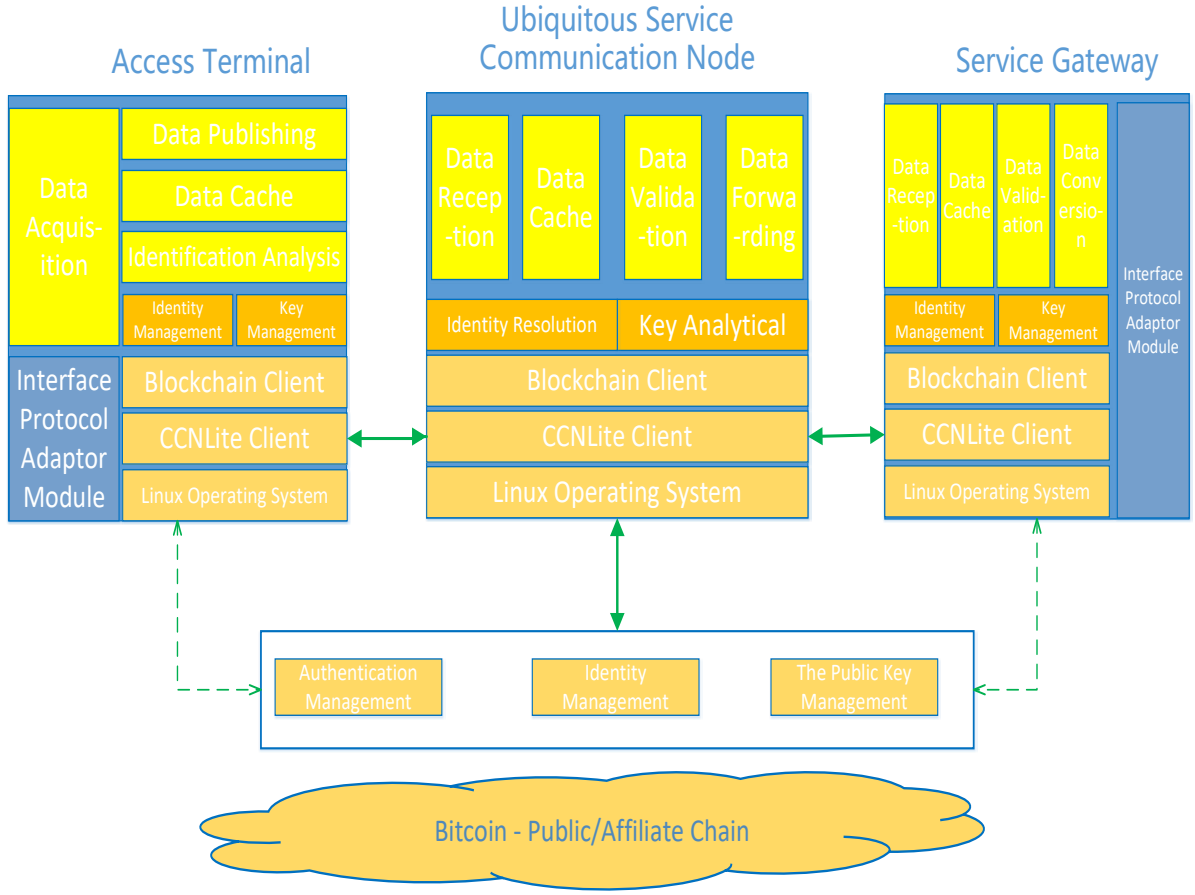

Fig.1. A Blockchain-based Terminal Communication Access Service Access Network Technology Framework

(1) Access Terminal

Communication terminals need to provide standardized wired wireless interfaces on the service side, support multiple access technologies, support multiple services and secure isolated slice access; on the network side, they need to be able to flexibly adapt local, remote, wired, wireless, public and private network communication channels according to the quality of communication channels; and through the adaptive edge of terminal capabilities. Computing flexible organization makes communication terminals more universal and standardized, and further solves the problems of ubiquitous service data access mode, diversification of communication technology system and decentralization of equipment in distribution telecommunications. At the same time, data protocol conversion based on blockchain should be completed on communication terminal, and blockchain data identification should be added to realize secure and trusted access to business data in distribution telecommunications, so as to reduce additional equipment deployment and data security access links[5].

(2) Ubiquitous Business Communication Node

Distributed data trusted chain needs to complete distributed shared storage and scheduling of data with blockchain identification, consensus calculation of data, autonomous access and so on, which are accessed through communication terminals. The trusted chain is mainly composed of several ubiquitous service communication nodes deployed in the relevant communication centers and service centers for ubiquitous service access of distribution and power telecommunications. Ubiquitous business communication nodes need to complete the specific functions of trusted chain, providing data privacy, storage-related computing, and storage capabilities. At the same time, it has strong protection ability to ensure that the whole trusted chain cannot operate safely and effectively because a ubiquitous business communication node is not broken.

(3) Data Gateway

Data gateway needs to acquire data through the data interface of business system provided by trusted chain and needs to support blockchain data identification service. Through relevant protocol parsing, the data needed by the business system connected with it is obtained [6]. It ensures that the business data processed, transmitted and stored by Ubiquitous Distribution Communications in Business Secure Trusted Chain can be independently released and accessed by multi-service systems, and ensures the applicability and validity of Ubiquitous Distribution Communications based on Blockchain in Business Secure Trusted Access Platform.

4. Summary

In this paper, blockchain technology is applied to power communication network. Construct an autonomous, peer-to-peer, secure and credible communication environment covering equipment, network, system, and business. Through the design of terminal communication access platform based on blockchain, the decentralized security access mechanism of terminal, network and business is realized, and the security of business data is guaranteed.

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