A Scheme of Shared Charging Pile Based on Blockchain

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Keywords: Block Chain, Charging Pile, Sharing

Abstract. With the increasing maturity of blockchain technology, the application of blockchain in the power industry is becoming increasingly important. This article proposes a charging pile sharing system based on blockchain technology, gives the system architecture and business processes. By applying blockchain technology to shared charging piles, it can make up for the shortcomings of traditional charging piles and promote shared charging, and promote the development of pile business.

1. Introduction

With the development of blockchain technology, blockchain has begun to be applied in various industries. For the power industry, blockchain technology can be widely used in the four levels of perception, network, platform, application, and supervision of the IoT. The construction of the ubiquitous electric power Internet of Things covers diverse and massive information. It is necessary to integrate blockchain technology and off-chain data technology to jointly promote the management of system data flow, and then promote the integration of on-chain and off-chain technologies. The successful application of blockchain in the ubiquitous electric power Internet of Things will form a good demonstration and promotion role, which will help to promote the widespread application of blockchain technology in energy and more fields, and then form a comprehensive blockchain application technology standard.

The technical advantages of openness, sharing, and collaboration of the blockchain can effectively solve the problems of data integration, equipment security, personal privacy, and multi-agent collaboration faced during the construction of the electric power Internet of Things. "Blockchain +" smart energy is a new form of energy industry development in which the blockchain is deeply integrated with energy production, transmission, storage, consumption, and the energy market. How to re-construct the blockchain technology to form a blockchain architecture with deep integration of the power system is the main development direction of the future integration of blockchain and energy systems, and it will have a profound impact on the energy industry.

In the actual operation process, most charging pile operators think that data including user information, charging pile information, and transaction amount are important, but this is a difficult problem to solve. For example, the two giants in the industry, State Grid and special callers, are involved in data opening if they want to get through, then who is open to whom? In addition, the interconnection between charging pile operation companies will also be biased when it comes to money. Even if there is a third-party platform, once the payment link is involved, the charging pile operator needs to settle with the third-party platform, which means that the payment center of the charging pile operation enterprise must be open to the third-party platform, which is fatal for many companies. In addition, many charging pile operation companies are poorly managed themselves. For example, old charging piles can be used free of charge without user identification many years ago, and new energy vehicle owners often encounter public resources. Therefore, after the country opened up the electric vehicle infrastructure construction market, after a large number of private charging pile companies emerged at the historic moment, even if the market understands that the utilization rate of charging piles is not high, it still cannot produce a unified one that can query the location of the charging piles and use a real-time APP for unified payment.
2. Charging Pile Sharing System Based on Blockchain Technology

We propose a charging pile system based on blockchain technology. Through the blockchain technology, it just makes up for the pain points mentioned above. By promoting the sharing of charging piles, there is a market gap in improving the utilization rate of charging piles. Using blockchain technology, through the alliance chain established by commercial organizations, members within the alliance chain can take advantage of the blockchain's non-tamperable and multi-party accounting features to open and transparent real-time accounting of charging conditions, thereby solving the possibility of multiple parties. The resulting friction of trust has formed a shared charging alliance jointly established by multiple parties such as time-sharing leasing operators, charging pile operators, and platform users to increase the utilization rate of new energy vehicle charging resources.

The alliance blockchain is established by linking electric vehicle time-sharing operators, charging pile operators, parking lots, and distributed new energy. Each B-end (operating entity) is a node that realizes the sharing of cross-platform charging piles and private piles, and uses the non-tamperable technical characteristics of the blockchain to openly and transparently record the charging situation in order to solve the problems that may occur between multiple parties.

Through the blockchain business alliance technology, the privacy issues involved in the development process can be considered, so only part of the user data will be opened to the charging pile operator. If a transaction occurs, some of the data will be opened for settlement and reconciliation. But this does not mean that all data will be publicly displayed on the chain. The user's private information is uploaded to the underlying platform of the blockchain after cryptographic encryption, which ensures the operator's data privacy and security.

3. Architecture of the Sharing System

The architecture of the system based on block chain is shown in figure 1.

![Figure 1. System Architecture.](image-url)
in the construction. Point-to-point transactions make payment more intuitive and convenient. Charging piles belonging to different operators can achieve low-cost access, break the original industry barriers, greatly improve the cooperation efficiency between piles and car companies, and truly realize resource sharing.

After the implementation of the shared charging pile interconnection platform based on the blockchain business alliance chain, not only can the shared charging pile be realized, but also when the business scenario needs are sufficiently large, more similar companies can be introduced to build an ecological circle. Many upstream and downstream companies join the platform, and the traffic can be further expanded, and the revenue is expected to increase significantly.

3. Business Process

The blockchain-based charging pile business process is as follows:

For charging needs, users query the nearby charging posts through the APP and select the charging posts for appointment;
Scan order generation: The user arrives at the charging pile, scans and submits the order, and both parties confirm the order;
Payment: Enter the address of the other party's wallet in the payment order to complete the payment;
Smart contract: after the contract is opened, the charging switch is turned on, the contract is turned off, and the contract bill is distributed to both parties;
Asset settlement: Confirmation and completion of digital asset settlement.

The issuance, payment, circulation, settlement and recovery of digital assets are realized through the blockchain. Realization of power source tracing: The charging pile data is recorded through the blockchain, including charging pile identity information, charging pile status information, and charging pile transaction information. The electrical information obtained by the charging pile through that grid can also be recorded to achieve power source tracing. The cost of the source can adopt a differentiated service model.
Transaction traceability: Users and owners of charging piles can track the entire process, deposit transaction information, and achieve credible and secure information traceability. All transactions are realized through blockchain digital assets, free of intermediary, pay-as-you-go settlement, and lower cost.

By create reciprocal economic value, both charging pile owners and car owners can benefit from it, making full use of private charging piles for a lot of time in idle state, providing protection through blockchain technology, convenient network access, and providing reliable human-machine interaction and remote-control technical guarantee. Charging pile owners and electric vehicle owners form a huge community, maintaining the peer-to-peer trust mechanism in the community through blockchain technology, and reducing the need for electric vehicle owners to own charging piles alone through a mature, stable, and reliable sharing economy model, further increasing social resources Utilization.

4. Conclusion

This article proposes a blockchain technology application in the power industry. Blockchain technology provides a way to share charging piles. Blockchain technology is used to maintain a peer-to-peer trust mechanism in the community. Through mature, stable and reliable, the sharing economy model reduces the need for electric vehicle owners to own charging piles and further improves the utilization of social resources.
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