

Blockchain for the Internet of Things

Abstract

Blockchain has begun to have a significant influence in the Internet of Things by enhancing security, empowering the incorporation of an increasing number of devices into the ecosystem. The enhancements in IoT device security facilitate faster adoption of this revolutionary innovation, and will open up a wide range of possibilities for enterprises in the days to come.

Introduction

Blockchain is a shared peer-to-peer distributed ledger (distributed database). It is the technology that underlies bitcoin, a digital asset and payment system which was introduced as open source software around 2009. It is a peer-to-peer transaction management system without an intermediary. The transactions are verified by a network of nodes and recorded in a public distributed ledger called blockchain.

With blockchain, we can rethink the world's most major business connections and pave the way for new forms of computerized interactions.

IoT solutions using blockchain can be built to maintain a continuously growing list of cryptographically secured data records protected against alteration and modification. It can set up trust, accountability, and transparency while streamlining business processes.

Blockchain can help reduce expense and unpredictability of working edge devices or connecting servers. Blockchain distributed ledger simplifies the development of cost-effective business systems where anything can be tracked and exchanged, without requiring an essential central control. The adoption of this rising innovation is indicating incredible promise in the IoT space and within the enterprise.

A New Frontier in Data Exchange Framework

Blockchain offerings empower IoT devices to partake in data exchanges. Companies can use blockchain offerings to manage data from edge devices—RFID-based assets, barcode, QR code scan events, or device information. IoT edge devices will have the capacity to convey to blockchain-based records to update or validate communication contracts. For instance, as an IoT-connected (RFID) asset with sensitive location and temperature information moves along various points in a warehouse, this information could be updated on a blockchain. This permits all involved parties to share data and status of the package as it moves among different gatherings to guarantee the terms of an agreement are met.

Blockchain Recommendations for IoT to Exploit

Four important recommendations for IoT include:

1. Trust Building

IoT blockchain empowers devices to engage in transactions and communications as trusted parties. While device A may not know device B, and may not believe it verifiably, the permanent record of exchanges and information from devices stored on the blockchain confirm and enable the vital trust for organizations, individuals, and devices to cooperate.

2. Cost Reduction

It is important for IoT edge devices to reduce processing overhead and eliminate the 'middle man' (IoT gateways) from the procedure. Communication, data exchanges, and device information are conducted on a peer-to-peer basis, removing any additional traditional protocol, hardware, or communication overhead costs.

3. Accelerate Data Exchanges

Improved data exchanges as the 'middle man' (IoT gateway or any intermediate filtering device) is expelled from the process. Peer-to-peer device based contracts and ledgers (blockchain) decrease time required to complete device information exchange and processing time.

4. Scaled Security for IoT

Decentralized technologies hold great promise for a system that needs to handle storing and retrieving information of millions—if not billions—of connected devices. These future systems have to provide low latency, high throughput, querying, permissions, and decentralized control.

Blockchain adoption in the IoT space can change the way IoT edge devices exchange data in a trustworthy environment, mechanizing and encoding transactions, while safeguarding data exchanges and ensuring security of all devices involved.

Failure Points Elimination in Networks

Blockchain for IoT can improve supply chains by tracking items as they navigate the import store network, while authorizing delivery and credit extension. Blockchain innovation empowers secure traceability of confirmations and other notable data in supply chains.

It offers the ability to verify each physical item via a computerized 'visa' that demonstrates legitimacy and origin, making an auditable record of the product journey. Blockchain can also help organizations to track or process history in a permanent record and empower simple sharing of this data to administrative records or back up plans.

IoT and blockchain are not restricted to these enterprises or use cases—any business with a system and IoT devices can reduce costs, enhance business productivity, and eliminate single points of failure in systems by actualizing this new innovation. Companies need to make a commitment to discover how to utilize blockchain for IoT in their solutions.

Companies & Organizations	Offering
Stratumn	Open Source Language called Chainscript
IBM and Samsung	Autonomous Decentralized Peer-To-Peer Telemetry (ADEPT)
IBM BlueMix/ IBM Z Systems	Host Blockchain applications
IBM	Open Source Project Hypeledger
Microsoft	BaaS (Blockchain as a service)
Microsoft & ConsenSys	EBaaS (Ethereum Blockchain as a service) in Azure
Amazon & Digital Currency Group	Unamed Experimental Environment for Blockchain projects
Smartmatic	Blockchain based voting system
Ethereum	Decentralized applications
Chain.com	Blockchain Startup by Visa, Citi and Nasdaq

Some of the multiple technologies that are in varying degrees of adoption, proof of concept, or active use.

Conclusion

Blockchain in IoT represents the biggest technological disruption since the integration of computing and transaction processing systems. Due to major progress in device innovation and software, it is now possible to bring transaction processing and intelligence to devices everywhere. There are critical adaptability challenges connected with distributed systems, as well as security, coordination, intellectual property management, identity, and privacy. Many institutions and individuals are actively working on these issues and building an open source foundation for the proliferation of this technology.

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