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Blockchain: Potential Game Changer for IoT Data

[1]PURITIPATI SWETHA, [2]POLISHETTY SAI KRISHNA, [3]PYVARDHA BALA SHESHA SREENIDHY,[4]JORRIGALA HRUSHEEKESH,[5]V.ANUJA,[6]LALAM RAMU

Department of Computer Science and Engineering – Internet of Things
Malla Reddy Engineering College, Hyderabad, Telangana

Abstract: ***The convergence of Blockchain technology and the Internet of Things (IoT) holds promise for significant advancements that will impact various industries, including marketing, in the coming decade. IoT is poised to revolutionize daily life and societal norms through innovations such as smart buildings and cities. As IoT expands, it introduces challenges, including cybersecurity risks, as previously offline devices become interconnected. Addressing these challenges requires robust security measures, with Blockchain emerging as a potential solution to enhance the security of IoT systems.***

Keywords: Internet of Things, Blockchain, IoT Security

I. INTRODUCTION

The Blockchain technology has garnered significant attention from software engineers and data scientists since its inception. Its integration with IoT has the potential to revolutionize the internet landscape, transforming and enhancing global technological infrastructure connectivity. Smart buildings and cities represent intricate ecosystems where various elements, including people, objects, structures, and vehicles, interact in complex ways. This fusion of social and technological aspects makes urban areas fertile ground for the application of diverse sciences and technologies facilitated by IoT. The concept of Smart Cities has become widespread across multiple research fields, ranging from architecture and urban planning to information and communication technologies (ICT), aiming to enhance city life. A Smart City framework encompasses a network of digitally enabled physical "things," such as traffic sensors, surveillance cameras, traffic lights, and citizens' mobile devices, contributing to sensing and facilitating city operations. These numerous objects typically belong to different owners and administrators across various sectors.

Recently, there has been a surge of interest in the Internet of Things (IoT) as a leading technological trend, aiming to facilitate the interconnection and communication of various smart devices. Cloud computing is widely regarded as the primary model for efficiently managing these devices, offering scalability and on-demand services, potentially utilizing reflection and virtualization techniques within the IoT framework.

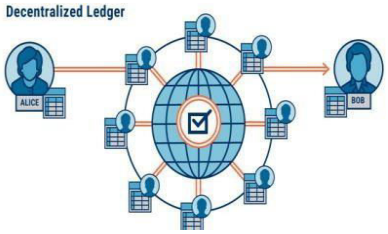

Fig.1 Block chain model

There are primarily two areas that will be influenced by blockchain technology:

1. It can establish a decentralized framework, eliminating the need for centralized servers and promoting shared communication.
2. It can create a fully transparent and accessible database for IoT security, enhancing transparency in governance and elections.

Blockchain technology relies on four pillars:

1. Consensus, which involves proof of work (POW) to verify operations within the network.
2. Ledger, which records all transaction details within the network.
3. Cryptography, ensuring data encryption and decryption by authorized users.
4. Smart contracts, used to authenticate and authorize network participants.

These three key benefits of blockchain technology in IoT are illustrated in Figure 2:

1. Building trust
2. Reducing costs
3. Accelerating transactions

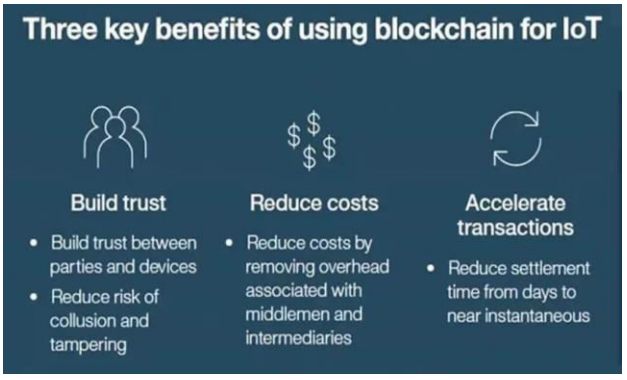

Fig.2 Key Benefits of Blockchain

The combination of these three significant benefits, simplifies our daily lives. When we contemplate how these technologies are merging, we envision exciting possibilities for the future that could result in a transformative impact greater than the sum of their parts. This integration is poised to be part of the revolutions that will reshape the world in the near future.

II. LITERATURE REVIEW

A. *Blockchain Technology as a Facilitator of Service Systems:*

Expectations surrounding block chain technology suggest a transformation in transaction processes, potentially impacting various application areas. However, the actual impact and benefits remain uncertain. To assess its potential contribution, a comprehensive review of peer-reviewed articles is conducted. Given blockchain's emphasis on decentralized systems and collaboration among different parties, the focus is on service systems as a unit of analysis. Numerous features enabling trust and decentralization are identified, facilitating the formation and coordination of service structures.

B. *Blockchain Technology: An Overview of Existing Literature:*

Industries such as government, finance, and securities are poised to face significant challenges. While blockchain technology offers transparency beneficial for accountability, it poses challenges for data privacy. A key issue in the existing literature is the predominance of theoretical research rather than practical applications. An article on product traceability by Robert Anascavage and Nathan Davis stands out for its practical implementation, demonstrating the tracking of products throughout their lifecycle. The authors emphasize that blockchain technology cannot function as a standalone solution but is effective as a publicly accessible ledger.

C. *Blockchain: Revolutionizing IoT Data Security:*

This paper provides an overview of blockchain technology and its application in securing IoT systems. It discusses the framework of IoT based on blockchain networks and presents a model for enhancing IoT security using blockchain. As IoT expands, the risk of cyber attacks on homes and businesses increases due to the integration of formerly offline devices into online systems.

D. *Blockchain and the Industrial Internet of Things:*

The Industrial Internet of Things (IIoT) enables real-time data capture from sensors, and as sensor and actuator costs decline, organizations in the industrial sector are expected to overcome cost barriers to adopting IoT platforms. Blockchain facilitates the sharing of crucial data obtained from IIoT through a distributed, decentralized ledger accessible to stakeholders in the industry network.

III. RESULT & DISCUSSION

To comprehensively examine the impact of blockchain technology on organizational systems, the first systematic literature review, based on peer-reviewed articles, was conducted. As depicted in Figure 3 and Table 1, numerous characteristics were identified, fostering trust and decentralization within collaborative environments.

Table 1 presents a performance comparison in percentage for various security parameters between traditional methods and blockchain security. Blockchain technology establishes a trusted environment through its transparent nature, making data openly accessible throughout its entire network while ensuring the authenticity and permanence of information.

Table 1 Performance Comparison in Percentage

Security Parameters	Traditional Methods	Blockchain security
Privacy	72	87
Interruption	82	79
Blocking	57	78
Fabrication	66	86
DoS	76	90

In terms of privacy, blockchain security scores higher, indicating better protection of sensitive information. However, blockchain's performance in interruption and fabrication prevention is slightly lower than traditional methods. Nevertheless, blockchain excels in mitigating Denial of Service (DoS) attacks, demonstrating its effectiveness in ensuring uninterrupted service availability and resilience against cyber threats.

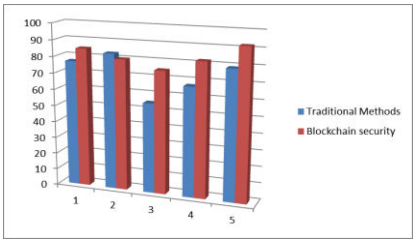

Fig 3. Performance Comparison in Percentage

IV. CONCLUSION

Decentralization enhances security by employing pseudonymization, fostering a trustworthy and adaptable environment. These identified qualities were subsequently evaluated in the context of organizational structures. Blockchain technology addresses various essential aspects that bolster the functioning of organizational systems, such as facilitating collaborative value co-development, ensuring data accessibility, and providing coordination tools. Consequently, this advancement is expected to significantly impact existing systems and contribute to the development of novel organizational frameworks.

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