

A Comprehensive Addressing and Erudition on Blockchain in IOT Fortification

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ABSTRACT

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Blockchain is the technology that provides security through its cryptography. IOT (Internet of Things) enhances the usage of software and hardware power in efficient way. The IOT Devices can be configured and controlled by blockchain. In this, the analysis of blockchain in IOT Security presented. The Key management is one of the biggest features for blockchain to be successful in the technology. As security is essential for any technology to be successful, the importance is considered and revealed about the security of IOT through blockchain technology. The features and considerations made would be useful for further research on blockchain in IOT Security.

Keywords : Blockchain, Internet of Things (IOT), Security, Key Mechanism.

I. INTRODUCTION

1.1 Interpretation

A blockchain is a digital record of transactions. The name comes from its structure, in which individual record, called block, are linked together in single list, called a chain. Blockchains are used for recording transaction made with crypto currencies, such as Bitcoin, and have many other applications [1].

1.2 Uses of Blockchain

The following [2] are the potential uses of Blockchain Technology.

- Copyright and royalty protection.
- Digital voting.
- Real estate, land, and auto title transfers.
- Immutable data backup.
- Tax regulations and compliance.
- Worker's Rights.
- Medical recordkeeping.
- Weapons tracking.
- Wills or inheritance.
- Equality trading.
- Managing Internet of Things networks.
- Expenditure energy futures trading and compliance.
- Securing access to belongings
- Tracking Prescription drugs.
- Payment Processing and money transfers.
- Monitor supply chains.
- Retail loyalty rewards programs.
- Digital IDs.
- Data sharing.

1.3 Blockchain Security

The Blockchain technology secures data and network with the following features [3].

1. Distributed Data Database.
2. Encryption Technology.
3. Key Management.

1.4 Internet of Things (IOT)

According to Gartner [4], the Internet of Things is the network of physical objects that contain embedded technology to communicate and sense or interact with their states or external environment.

IOT is the technology that simplifies human life. In the IOT applications, many transactions of data over the network occur.

1.5 IOT Security

The IOT Security is accomplished in all aspects of its functionalities. Data and network should be secured. The following [5] are the basic components for the robust security of [IOT].

- Encryption
- Authentication
- Secure Storage

1.6 Blockchain in IOT

Blockchain in IOT is depicted in the following figure 1.

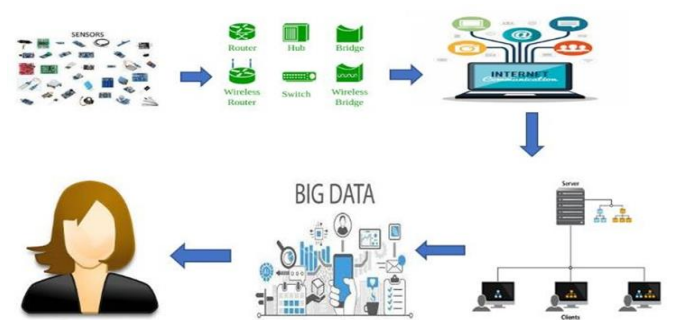


Figure 1. IOT with Blockchain Technology

The centralised network is replaced by decentralised network which would bring the following benefits.

- Secure authentication
- No tampering of data
- Distributed data share

The above introduction gives us about Block chain, Uses of Block chain, Block chain Security, Io T and its Security, Block chain in IOT. The rest of the paper is organised as follows. The following section 2 comprises the related work on Block chain on IOT security. Section 3 comprises Block chain on IOT Security. The conclusion is made in Section 4 with the suggestions regarding Block chain on IOT security for further research.

II. LITERATURE REVIEW

In [7], the author reveals about certain points on the block chain mechanism on IoT Security. The main advantage of using block chain is that it provides security to all layers and domain of IoT System.

The layer level security mechanisms are considered like device-level block chains, site-level block chains, gateway-level block chains, end-to-end block chains and analytical/storage- level block chains. IOT reference framework is framed for the clarity about security in layers.

The smart home system is considered for the block chain based in [8]. The BC (block chain)-Based Smart Home companies are transactions (Stores, Access, Monitor, Genesis (new), Remove), local block chain (tracks transactions and ensures policy), home miner (central process management includes transactions management includes transaction management, integration, transactions collected and appended to BC), local storage.

The BC-Based Smart Home comprises the Initialization steps like Initialization (updating), transactions handling (Distributed key management, authorisation) and shared overlay (shared miner, Virtual Private Network (VPN)). Security analysis and Performance Evaluation are discussed under evaluation and analysis [8].

The symmetric encryption, hashing, transactions limitation, logging transactions and usage of policy header, shared keys are employed to satisfy

requirements like confidentiality, Integrity, availability, user control and authorization respectively. The low overhead gives security and privacy.

The blockchain used for IOT has many key Ethereum nodes execute according to the benefits. It provides trust, reduce task, instructions. Innumerable platform available for blockchain technology success. In [12], the author classifies application as follows in Table 1.

TABLE 1: IOT -BLOCKCHAIN APPLICATIONS

APPLICA TION	CLASSIFICATION	PLATFORM
LO3 Energy	Energy microgrid	Ethereum
ASEPT	Smart contracts involving IOT devices.	Ethereum
Slockit	Renting/Selling/Sharing smart objects	Ethereum
Aigang	Insurance network for IOT assets	Ethereum
MyBit	Mybit	Ethereum
Aero Token	Sharing airspace market for drone navigation	Ethereum
Chain of things	Identity, Security and Interoperability	Ethereum
Chronicled	Identity, data provenance and automation	Multiplatform
Modum	Data integrity for the supply chain	Multiplatform
Riddle and code	Sharing and machine economy	Multiplatform
Blockchain of things	Secure connectivity between IoT devices	Multiplatform

The IOT devices can be configured and controlled by blockchain. Ethereum is used as blockchain platform [11]. Ethereum is massive shared computing system.

Because of its distributed capability, each device communicates with Ethereum. This provokes avoiding denial of services and malicious attacks.

Smart Contract is the concept used in blockchain. The programming languages used is solidity, serpent and LLL. Solidity is used as language and compiler. The codes are compiled and as byte codes deployed onto Ethereum.

There is an example considered by Pradip [9] for the detection of attacks in the IoT network in real time. DIST Block Net is the block chain technique to detect attacks in the IoT network in real time. The architecture of DIST Block satisfies the required principles with minimal overhead. Blockchain is integrated with IOT to reveal Perfect security in real time scenarios [10]. The IOT and blockchains is used to create secure shared economy distributed applications.

The blockchain used for IoT has many key benefits. It provides trust, reduce task, reduce costs and accelerate transactions [13]. Through all the above considered related work, the analysis is made and revealed the clear point about blockchain in IoT security. The following section 3 discusses about complete analysis on the blockchain in IoT security.

III. BLOCK CHAIN IN IOT SECURITY

Block chain can play a vital role in IOT security with its features. The following gives an overview about block chain in IoT security in various aspects.

The devices, processes and the humans using it access the diverse which contains logical supply chain, manufacture and health sector. An important key factor is that different types of sectors are attached and connected to these machines and devices. These devices have ability to sense and transmit the data and information from One node to another node (or) from one Cloud to another Cloud. Moreover, the data which is sensed by the devices are transmitted to the cloud server. Within a few units' time there may

exists a complexity in the storing the date, processing. Here comes the emerging of the artificial intelligence techniques to extract the meaning information from the data which is sensed.

Block chain can potentially minimize the costs of the centralized systems. The internet of things can be used to build their distributed network. This would seek to identify many new applications in the wired and wireless applications. Here it is mandatory to seek and find out many new applications areas and vary high- quality reviews which describes the current state of the act. The following are

Block chain based IoT for the new network architecture.

Consensus algorithm design for wired /wireless environment.

Design for mobility limited resources and large - scale deployment.

3.1. Architecture

The architecture should the efficient usage of block chain in Io T security. Since block chain id decentralised, it provides benefits than traditional architecture [8], cloud and fog computing architectures, edge computing architecture, software defined networking [9] are few traditional architectures. These all have pitfalls like cyber-attacks, lack of maintenance and software problems. Architecture is built to detect real-time attacks,increases through put and reduce delays.[6].

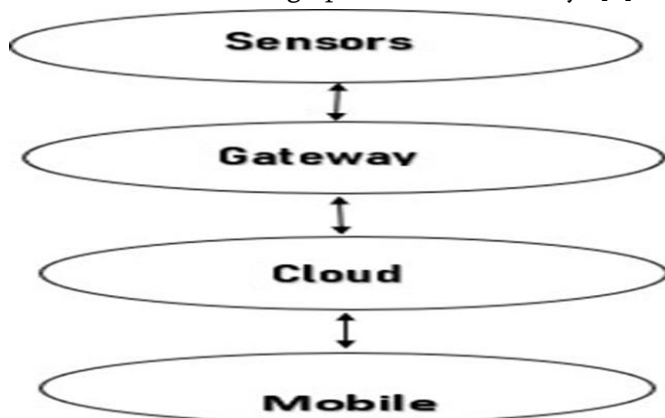


Figure 2. Blockchain Technology at data and network for secured flow

3.2. Cryptographic Algorithms

Security and privacy in a block chain are achieved by public-key cryptography [15].

A. Considerations:

- Computational Load
- Memory consumption
- Energy consumption

B. Algorithms

Algorithm works on key management. Public key is available in network for the flow of data and private key is for the accessibility of data. The smart contracts help in efficient protocol implementation. The protocol stack holds layers to provide accessibility, availability, accountability and efficient security.

Digital credentials are used for verification and validation for the communication over network. The block chain is a cryptographically linked list where the node has header, data and metadata. The ancillary metadata possess creator identity, signature and last block number. Algorithms provides secure in high priority for chain of blocks for transactions.

IV.CONCLUSION

The technologies provide ease of development of computer applications for human life. Blockchain and IOT plays vital role in the developments. blockchain technology is a great success with the emergence of bitcoin in 2008. Blockchain is an open, distributed ledger that can record transactions between two parties efficiently and in a verifiable and permanent way. The records on a block chain are secured through cryptography. IOT safeguards the activity of human life with machines without help of other human.

This paper provides an analysis through study of various related works on blockchain in IOT security. The various aspects like frameworks, key

management, security algorithms for hardware and software, and programming languages is presented. This would lead a successful path for further research on blockchain in IOT security to frame an efficient application for human life.

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