

Integrating Blockchain Technology and IoT to devise a secure IoT solution

Shreya Rupesh Farkade
MSc Cybersecurity
Letterkenny Institute of
Technology
Letterkenny, Donegal, Ireland
L00150050@student.lyit.ie

Praveen David Mathew
MSc Cybersecurity
Letterkenny Institute of
Technology
Letterkenny, Donegal, Ireland
L00144603@lyit.ie

Ruth G. Lennon
Dept. Computing
Letterkenny Institute of
Technology
Letterkenny, Donegal, Ireland
Ruth.Lennon@lyit.ie

ABSTRACT

Internet of Things (IoT) has evolved from being a mere technological concept to a reality over the past years. This advancement was welcomed with many security challenges like integrity & confidentiality breaches, presence of rogue nodes, and malware attacks to name a few. This work analyzes the feasibility of devising a secure IoT solution to address these challenges by leveraging the power of blockchain technology.

CCS CONCEPTS

Decision Support Systems, Data Analytics

KEYWORDS

IoT, Blockchain, Security, Distributed Ledger.

1. Introduction

The IoT networks are evolving swiftly and would require to handle massive sensitive data. Current IoT solutions aim predominantly at providing system functionality [1] and tend to cloud the need for security. Majority of the currently available IoT devices have resource constraints like limited memory and power. This makes loading agents like antivirus on end devices a challenge. The result could be a network with no or limited end point security. In addition to resource constraints, other critical issues in this domain include the presence of rogue devices, on-the-air update risks, single-point-of-failures, insecure data-exchange, and poor IoT network-monitoring, that together makes 'IoT' an 'Holy Grail' for cyber attacks.

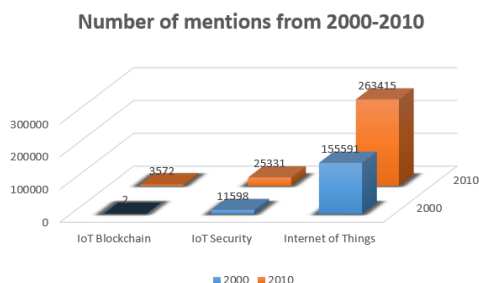
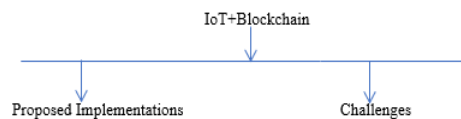


Fig 1 IoT-Block chain mentions in the ACM Digital Library

This work studies the possibility of adapting the power of blockchain; a distributed ledger technology, to address these issues. An efficient IoT-Blockchain solution could provide better node membership management; immutable block-chains for preventing data tampering; distributed

ledger for faster data exchange; and smart contracts for securing on-the-air firmware updates and node interactions.

2. Proposed Implementation and challenges



- 1) Use of blockchain consortium for regulating device membership and thereby preventing rogue devices in IOT network.
- 2) Use of smart contracts and chain validation to secure on-the-air firmware updates and node communications.
- 3) Use of distributed ledger for faster, secure and non-single point of failure, IOT networks.
- 4) Use of blockchains for storing network logs thereby facilitating secure network monitoring through unalterable immutable logs.

- 1) Storage and scalability issues due to immutable nature of blockchain.
- 2) Consensus based PoW could create High operational and speed overhead in data writing.
- 3) Threat in public IOT blockchain due to lack of central authority and 51% attacks.
- 4) Compliance challenges with GDPR due to immutability feature of blockchain.

3. Conclusion

The IoT network is predicted to have around 21 billion or more connected devices by the year 2025 [2]. The challenges [3] in the IoT technology is also growing exponentially along with this new trend. This work highlights the potentiality of blockchain technology as an effective solution for addressing the IoT performance and security challenges. IoT is no more a concept but a reality, and it is not long before the entire world is digitalized. Let's work together to ensure a secure and smart connected world where life is easier and happier. This research is at a very early stage and at present, investigations are still ongoing.

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