Blockchain Oriented IoT Monitoring Architecture with an Efficient Miner Selection

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Abstract

- Blockchain based decentralized architecture for the storage of IoT data produced from smart home/cities. The architecture includes a secure communication protocol using a sign-encryption technique between power constrained IoT devices and a Gateway.
- We propose that a Software Agent executing on the Gateway selects a Miner node using performance parameters of Miners.

Objectives

- To safeguard against a Denial of Service attack and a single point of failure.
- Addressing the security and privacy challenges while collecting records from IoT devices.
- Optimizing the response time and energy consumption in the Blockchain.

Related Works

- A scalable Blockchain consensus protocol called Bitcoin-NG(Next Generation) by Eyal et al. A random miner selection consensus protocol like MultiChain by Peterson et al.

Sign Encryption to Protect privacy of IoT devices

- Network Manager(NM): Network Manager is a semi trusted powerful entity that might be owned by a particular organization such as a government institution, or research center. It plays a role in initializing IoT devices of smart home network/cities, managing membership of IoT devices, and generating keys.

Gateway Controlled Blockchain

- Block metadata
  - Source Address
  - Previous Block Hash
- Execute Miner Selection Algorithm
  - Miner Miners
  - Signature Using/Public/ Private key
- Update Block
  - Hash Block
  - IncreaseNonce

Performance Analysis

- Figure 1: Blockchain based distributed architecture for IoT Monitoring
- Figure 2: Relay process in the proposed architecture
- Figure 3: The Gateway controlled Blockchain
- Figure 4: Miner Selection by the Gateway
- Figure 5: Block processing time of proposed, random and Bitcoin miner selection

Conclusion

- The sign-encryption technique which is a lightweight cryptography for IoT devices has been used to ensure the privacy and security of IoT devices.
- We further advanced the functionality of Gateway as a Miner Selector to bridge the gap between power and memory constraint IoT devices and Blockchain. The Gateway selects a small set of efficient Miners based on performance to make the Blocks ‘processing faster.

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Reference