Blockchain Platforms for IoT Use-cases

MOHAMMAD CHOWDHURY, MD. SADEK FERDOUS, KAMANASHIS BISWAS

SWINBURNE UNIVERSITY OF TECHNOLOGY

IMPERIAL COLLEGE LONDON

GRIFFITH UNIVERSITY

Outline

- IoT Systems

- Blockchain Technology

- IoT Use-cases

- Blockchain requirements for IoT systems

- Blockchain Platforms for IoT systems

- Comparison on requirements and playforms

- Conclusion

IoT Systems

- The Internet of Things (IoTs) is a network of physical devices that are connected to the Internet and capable of collecting and sharing data. The IoT technology is fundamentally different due to

  - Decentralised Topology

  - Heterogeneous Network

  - Limited Processing Power at Edge Node

  - Autonomous Behaviour

Blockchain Technology

Distributed shared ledger

254F1 21B2C809 8833B0CC
3ECAA CB3EB DE038D7F
2AA4D 04143 571C83
7DED9 B57G 820 E07
696DB 7D7F7 6DD29
0014D 41080 54E072
05552 534146D 8 960929
18BFC 0F130429 90A60B99

Cryptography

Consensus

Smart contracts

✓ All nodes hold all transactions

✓ Parties identified with public key

✓ Resilient of node failures

✓ Hashing- provides integrity

✓ Encryption- ensures confidentiality

✓ Digital Signature- authenticates nodes

✓ Majority of nodes agree on validity of transactions

✓ Consensus mechanisms: PoW, PoS, PoA, PoE etc.

✓ Acts as a 'notary' of blockchain transactions

✓ Hold conditions for certain actions

IoT Use-cases

▶ Supply Chain Management

▶ Smart Cities

▶ Smart Home

▶ Healthcare

▶ Automated Contracts

▶ Quality Control and Regulations

▶ Financial Services

TECH INSIDER

Australian farmers have started to use blockchain to track produce from paddock to plate

CHRIS PASH
APR 11, 2018, 4:55 PM

How IoT and blockchain is set to transform the global cargo industry

By David H. Deans
29 May 2018, 15:03 p.m. comment

Special Blockchain Requirements for IoT systems

- ▶ Transaction speed & cost
- ▶ Scalable consensus mechanism
- ▶ Data security & privacy
- ▶ Trust establishment
- ▶ Virtual network among partners

Blockchain Platforms for IoT Systems

- IOTA
- Waltonchain
- OriginTrail
- Slock.It
- Moeco
- IBM Watson
- Netobjex Platform

Comparing IoT requirements and Blockchain platforms

Requirements	IOTA	Waltonchain	OriginTrail
Transaction speed	500-800 transactions per second.	4 transactions per second. Uses side chain to speed up.	Depends on IOTA, Ethereum, or NEO for consensus.
Data Security & Privacy	Support data security but not privacy of data	Support data security but not privacy of data	ZKP [4] to provide privacy of the transacted data.
Trust Establishment	IDoT [1] is used to build reputation systems	Use node reputation mechanism	Each stakeholder has to be approved by the previous node
Virtual network	Does not support. Plan is in the pipeline.	Does not support private communication	Does not support private communication

Conclusion and Future Work

- It is evident from the table that the existing platforms do not address all our identified requirements.

- In future, a detailed analysis of each of the requirements in the table need to be done. The proposed concept level requirements and comparison of blockchain platforms will lay the foundation for understanding and developing blockchain platforms.

References

▶ [1]. IOTA White Paper, https://iota.org/IOTA_Whitepaper.pdf

▶ [2]. Waltonchain, White Paper, https://www.waltonchain.org/doc/Waltonchainwhitepaper_en_20180208.pdf

▶ [3]. OriginTrail White Paper, https://origintrail.io/storage/documents/OriginTrail-WhitePaper.pdf

▶ [4]. Feige, U., Fiat, A. and Shamir, A., 1988. Zero-knowledge proofs of identity.Journal of cryptology, 1(2), pp.77-94