

How can blockchain-based frameworks protect the IoT against DDoS and Sybil attacks?

Research Project | CSE3000

Cemal Dikmen, C.Dikmen@student.tudelft.nl

Supervised by Dr. Z. Erkin and M. Ayşen | April – July 2021

1 Blockchain and IoT

Blockchain	IoT
Distributed ledger Immutable Transactions	Autonomous Networked devices Growing

2 IoT Security challenges and blockchain

Heterogeneity
Heavily centralised
Constrained devices

Decentralised
Consensus
Immutable

3 Research method

- Literature study
- Frameworks
- Blockchain Technologies
- Risks and limitations

4 Limitations of research

- Limited number of frameworks
- Implementations
- Quantitative data

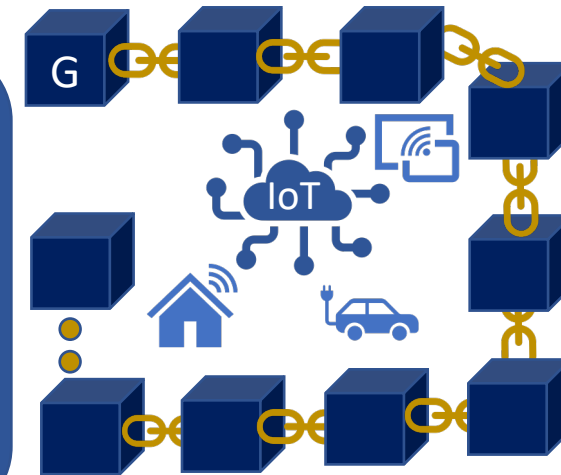


Table 1: Comparison table of frameworks and their technologies and limitations

Framework	Focus	Main features	Blockchain	Other Technologies	Limitations
Co-IoT [1]	DDoS	Collaboration of IoT devices, blacklisting IPs	Ethereum	SDN, Smart contracts	No DDoS prevention, SDN risks, Ethereum limitations
Giri <i>et al.</i> [2]	DDoS	Blacklisting IPs	Unspecified	SDN, Smart contracts	SDN risks, Conventional mitigation techniques
Shafi and Basit [3]	DDoS	Botnet prevention, Whitelisting IPs	Unspecified	SDN	SDN risks
Javaid <i>et al.</i> [4]	DDoS	Gas limits, Legacy IoT devices	Ethereum	Smart contracts	Ethereum limitations
Al-Shakran <i>et al.</i> [5]	DDoS	Botnet prevention, Blacklisting IPs	Unspecified	SDN, Smart contracts	SDN risks
Asiri and Miri [6]	Sybil	Trust among IoT devices	Hyperledger Fabric	None	Limited trust criteria
Rechained [7]	Sybil	Access control, Tokenisation	Bitcoin	None	Bitcoin limitations

5 Risks

- SDN
- Bitcoin
- Ethereum
- Strategy
- Tokenisation
- Untested

6 Conclusions and future work

- Multiple approaches
- Limitations
- Quantitafaction
- Other attacks
- Alternatives

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[2] N. Giri, R. Jaisinghani, R. Kriplani, T. Ramrakhiani, and V. Bhatia, "Distributed denial of service(ddos) mitigation in software defined network using blockchain," in *2019 Third International conference on I-SMAC (IoT in Social, Mobile, Analytics and Cloud) (I-SMAC)*, 2019, pp. 673–678.

[3] Q. Shafi and A. Basit, "Ddos botnet prevention using blockchain in software defined internet of things," in *2019 16th International Bhurban Conference on Applied Sciences and Technology (IBCST)*, 2019, pp. 624–628.

[4] U. Javaid, A. K. Siang, M. N. Aman, and B. Sikdar, "Mitigating iot device based ddos attacks using blockchain," ser. *CryBlock'18*. New York, NY, USA: Association for Computing Machinery, 2018, p. 71–76. [Online]. Available: <https://doi.org/10.1145/3211933.3211946>

[5] H. Al-Sakran, Y. Alharbi, and I. Serguevskaia, "Framework architecture for securing iot using blockchain, smart contract and software defined network technologies," in *2019 2nd International Conference on new Trends in Computing Sciences (ICTCS)*, 2019, pp. 1–6.

[6] S. Asiri and A. Miri, "A sybil resistant iot trust model using blockchains," in *2018 IEEE International Conference on Internet of Things (Things) and IEEE Green Computing and Communications (GreenCom) and IEEE Cyber, Physical and Social Computing (CPSCom) and IEEE Smart Data (SmartData)*, 2018, pp. 1017–1026.

[7] A. Bochem and B. Leiding, "Rechained: Sybil-resistant distributed identities for the internet of things and mobile ad hoc networks," *Sensors*, vol. 21, no. 9, p. 3257, 2021.