Routing Optimization in Blockchain Payment Channels

FAKULTÄT FÜR !NFORMATIK
Faculty of Informatics

Master thesis or Project in Software Engineering & Internet Computing

1 Motivation

Blockchains like the ones underlying cryptocurrencies like Bitcoin and Ethereum suffer from scalability issues [4]. One approach to improve the situation is the application of so-called payment channel networks like Lightning or Raiden [2]. According protocols enable faster transactions between participating nodes. So far, the focus of payment channels is largely on their basic implementation, while other aspects, e.g., routing of transactions within the channel networks based on latency or cost, are not regarded.

Therefore, it is the goal of this Master thesis to evaluate the application of existing routing algorithms (e.g., from the field of Wireless Sensor Networks [3]) regarding their application in payment channels. Afterwards, promising routing algorithms should be extended, taking into account the specific requirements of payment channels. For evaluating the algorithms, an existing simulator will be used.

2 Work Description

- Literature work on routing algorithms and payment channels.
- Implementation of candidate algorithms, using the abovementioned simulator.
- Evaluation and comparison of the implemented algorithms.
- Extension of the most promising algorithms to become fitting for specific requirements of payment channels.
- Evaluation of the extended algorithms.

3 Further Information

Start: From June 2019

Basic Requirements: Very good implementation skills; basic knowledge about blockchains is helpful

References

[1] M. Grandjean. La connaissance est un réseau. *Les Cahiers du Numerérique*, 10(3):37–54.

[2] S. Kim, Y. Kwon, and S. Cho. A Survey of Scalability Solutions on Blockchain. In *2018 International Conference on Information and Communication Technology Convergence*, pages 1204–1207. IEEE, 2018.

[3] N. A. Pantazis, S. A. Nikolidakis, and D. D. Vergados. Energy-Efficient Routing Protocols in Wireless Sensor Networks: A Survey. *IEEE Communications Surveys & Tutorials*, 15:551–591, 2013.

[4] F. Tschorsch and B. Scheuermann. Bitcoin and Beyond: A Technical Survey on Decentralized Digital Currencies. *IEEE Communications Surveys and Tutorials*, 18(3):2084–2123, 2016.

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Conceptual (Analytical)	☐	☐	☐	☐	X	☐	☐
Empirical (Simulation)	☐	☐	☐	☐	☐	☐	X
Practical (Implementation)	☐	☐	☐	☐	☐	X	☐
Literature Work	☐	☐	☐	☐	☐	X	☐

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