

Splitting Payments To Increase Blockchain Effectiveness

Integrating Fee Models Into Splitting Protocols Using Local Routing

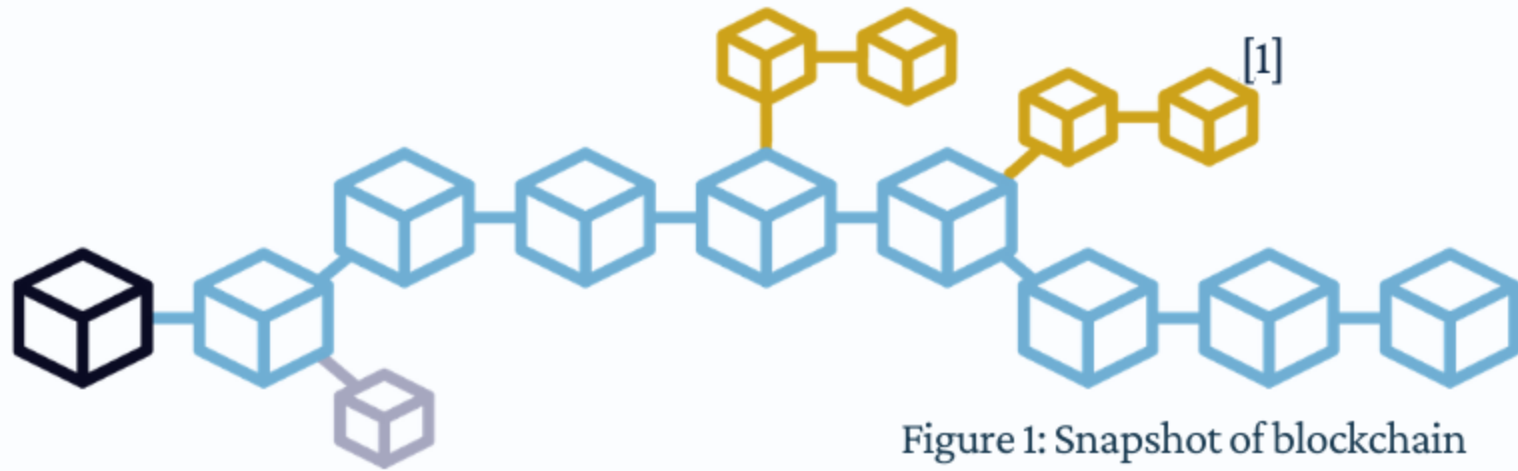


Figure 1: Snapshot of blockchain

Introduction

- **Blockchain** lacks scalability.
- **Payment channels** (PCs) = "off-chain" solution
- Communication with the **blockchain**:
 - **opening/closing** a channel
 - **dispute resolution**
- PCs are **debit-based**
- A payment may fail if some node on the route cannot forward the payment (e.g., *lack of available funds*)^[2]
- A node may decide to **split** the transaction and **route it through multiple PCs**

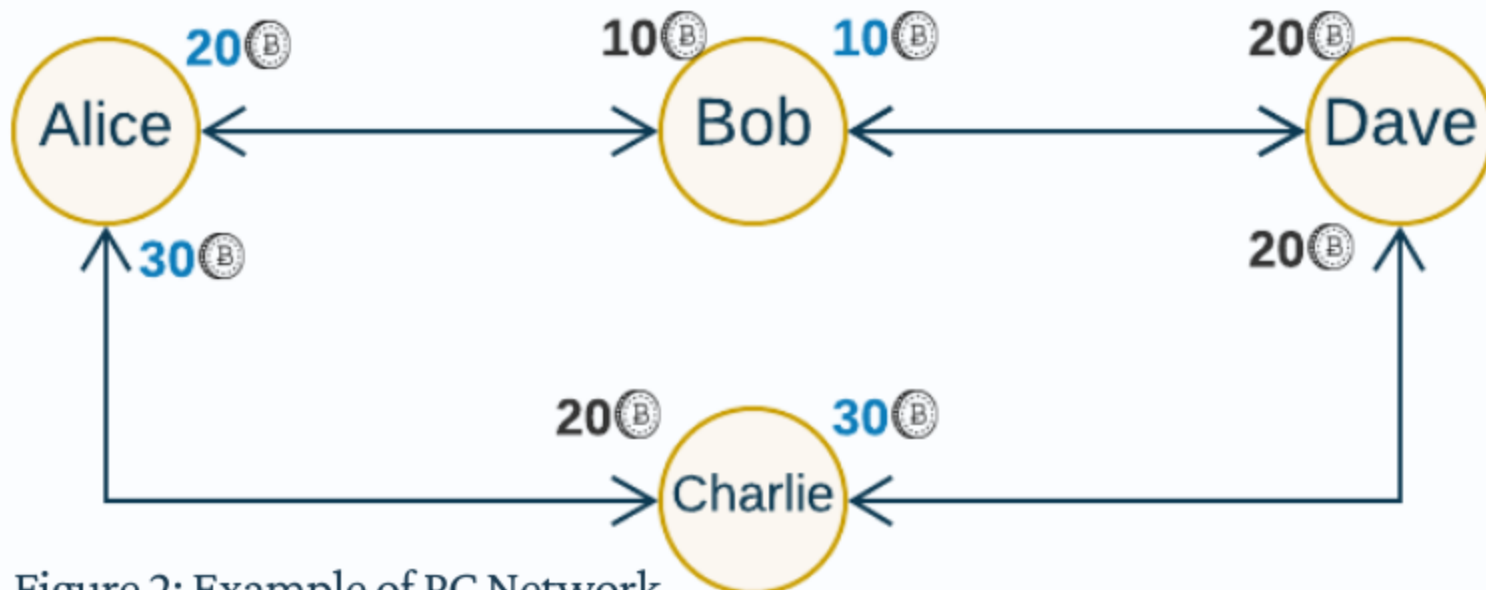


Figure 2: Example of PC Network

Objective

- Research **fee models**
- How will the fee be calculated?
- Apply a **model/mixture** in **splitting protocols**
- Are there any **issues** raised if fees are charged?
- Does fee integration affect the **success ratio** of transactions?

Method

- Look into current implementations of **routing**, **fee models** and **splitting protocols**
- Understand the limitations of implementing fees in **global/local routing**
- Document findings and design splitting protocol with fees
- Gather (real-world/synthetic) data sets for **evaluation**
- Assess proposed solution and **report results**

Implementation

- 1. Local Routing**
 - fee computed before knowing the path
- 2. Splitting Algorithm**
 - SplitClosest, SplitIfNecessary & ClosestNeighbour
- 3. Fee Model**
 - number of hops
 - standard deviation of channel balances
 - fee rate & base rate

Results and Conclusion

- initial capacities with average = **200 sat**
- Exponentially distributed
- **100 TXs/trial**
- **fee rate = 0.3; base rate = 1**

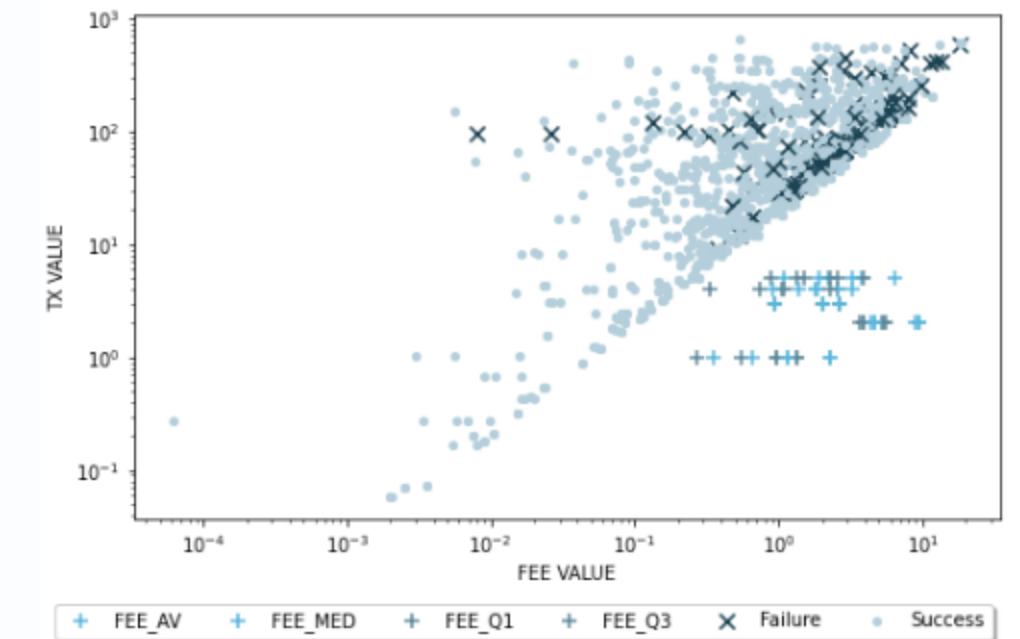


Figure 3: Plot representing the TX value and the corresponding fee

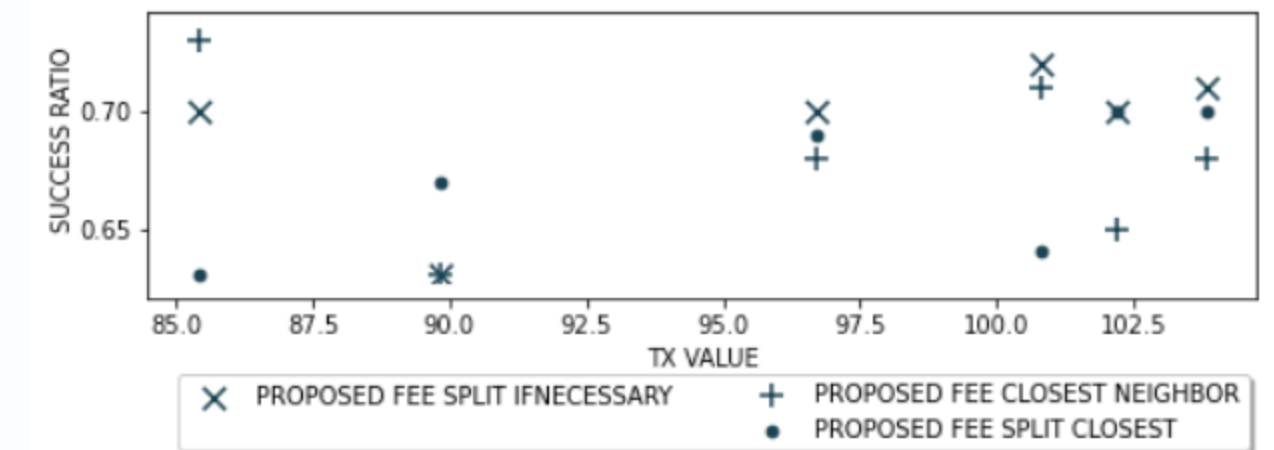


Figure 4: Plot of the TX value and the corresponding success ratio

References

- [1] A. Preukschat, 2021. Self Sovereign Identity — a guide to privacy for your digital identity with Blockchain. Miro.medium.com. Available at: https://miro.medium.com/max/3000/1*Op8I-1tNmt2eU_wg8ZDaKg.png
- [2] Y. van Engelshoven, S. Roos. The Merchant: Avoiding Payment Channel Depletion through Incentives