Lightning Network
Identifying Beneficial Connection Types in a Payment Channel Network

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Welcome to EvaWorld
Making digital payments
Cryptocurrencies!

Payment Channel
Payment Channels require effort to set up
Let’s get help from others to send Transactions
Payment Channel Network: Lightning

Fewer Hops = Speedy Network
What if the network becomes too reliant on one participant?
Alternative connections = Robust network
What if some of them don’t benefit by connecting?
The Developer’s problem: Finding the right connections

Goals

- Speed
- Robust
- Individually beneficial

Possible Approaches

- Analytical  
- Numerical Optimizations  
- Simulations  

Research Questions

**RQ1:** How are the different types of pair-wise connections predictive of the Lightning Network’s payment speed and robustness over time?

**RQ2:** Do the types of connections that produce positive network outcomes also benefit individual participants?
Methodology

36k Network snapshots over 2 years

Clustering and Linear Regression Analysis

- Participant characteristics
- Network Properties Calculation

5 Semi-structured interviews
Results
Research Questions

**RQ1:** How are the different *types* of pair-wise *connections* *predictive* of the Lightning Network’s *efficiency* and *robustness* over time?
Participant Types

The 99%

The Well-Connected
Three Salient Participant Types

- The Nouveau Riche
- The Well-Connected

Image Credit: Marika dribble.com
Three Salient Connection Types

The 99%

The 99% - The Nouveau Riche

The 99% - The Well-connected
Effects of Connection Types on the Network

Image Credit: Marika dribble.com
Network Evolution

Image Credit: Marika dribble.com
Research Questions

**RQ2:** Do the types of connections that produce positive network outcomes also benefit individual participants?
Effects of Connection Types on Individuals

Faster Transactions

Intermediation Power

Image Credit: Marika dribble.com
Conclusion

Faster Transactions

Intermediation

Power

Fast Transactions

Robust

Pair-wise Benefits

Network Benefits
Thank You