Thesis proposal

AN ANALYSIS OF THE BITCOIN LIGHTNING NETWORK

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GOAL:

The goal of this thesis is to define an analysis of the topology of the Bitcoin's Lightning network (LN), gathering data and exploiting the tools of complex network analysis.

DATA COLLECTION:

Choose one of the two following procedure to gather data for the analysis:

- Monitor the global network, setting up multiple LN nodes which establish connection to other LN nodes. The nodes participate in the message exchange, according to the LN gossip protocol, so acquiring knowledge about the network. In this way, each node constructs a view of the network. Putting together the views, define an approximation of the LN topology.

- Crawl shared data from existing websites (see, for instance, https://hashxp.org/lightning, https://1ml.com/ sites) by using existing API (when available) or by scraping the sites.

DATA ANALYSIS:

- Build a graph from the collected data representing the LN topology and study some properties of the graph, with the tools of complex network analysis
  - Is the network a random graph, a small world, a scale free network?
  - Node degree
  - Clustering coefficient
  - Find cluster of nodes exchanging payments

The thesis may be more focused on the definition of the data collection methods or on the analysis of the topology of the network, according to the interest of the student, i.e. more "network oriented" or more "data analysis" oriented. It is also possible to focus the thesis more on research, for student willing to apply for the PhD program, or on the applications.