IETF – RTG WG

https://datatracker.ietf.org/doc/draft-trossen-rtgwg-impact-of-dlts/

Impact of DLTs on Provider Networks

IETF 113

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21.03.2022

Goal for this Draft

Our work aims to understand the impact of DLTs* on provider networks and the possible opportunities to improve on those impacts

Want to *engage with the RTG WG* community to gain more understanding on those two issues (impact & opportunities), extending on an IIC Whitepaper with same title!

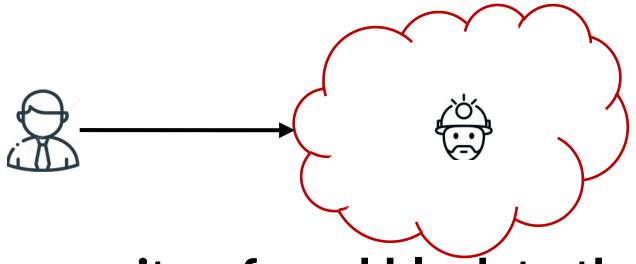
-> draft meant as a living document

***Note**: We start with a PoW (proof-of-work) based DLT (Ethereum) in this draft

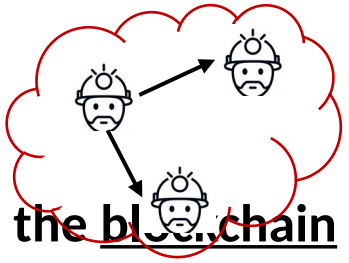
Structure of this Draft

Communication in a DLT: Interactions

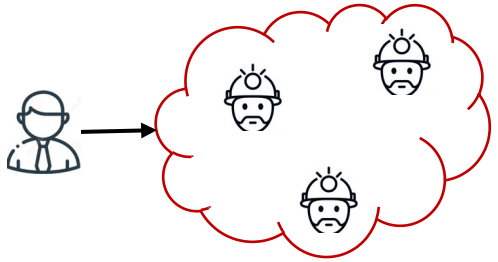
- **A client commits a transaction (request) to the DLT**



- **A miner (peer) commits a found block to the DLT**

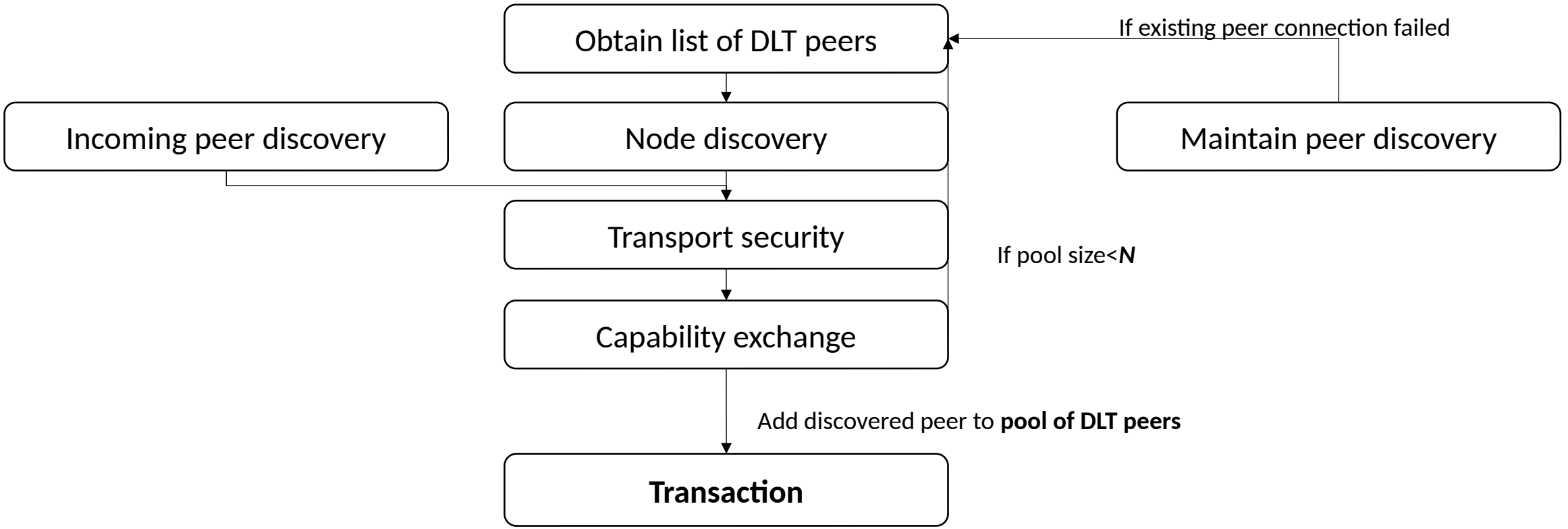


- **Any client or miner can read the blockchain in the DLT**



All of those interactions are between originator and *N* miners, i.e. inherently **multipoint** in nature

Communication in a DLT: Resulting Communication Patterns



Challenges for Users and Provider Networks

Problem 1: Information is required to reach other miners

- Bootstrap nodes maintain IP addresses of all miners (plus port information)
- New DLT members ***need to discover & maintain IP address and ETHID information*** upon joining

Problem 2: Clients know nothing about miners' capability to serve requests

- Approach is to (1) contact potential miner, (2) wait for connection, (3) inquire capabilities, (4) disconnect if not matching
- Miners/peers ***may never reply*** to connection establishment (step 2)

Problem 3: Clients map sending of transactions onto unicast communication

- Negatively impacts ***efficiency*** (bandwidth usage) and ***completion time***

Problem 4: Need to expose IP address to Bootstrapping Node (and Peers)

- Sending one's IP address as part of signing up to DLT may lead to ***privacy*** (e.g., exposing topological location of peer) and/or ***security*** issues
- Difficult to handle ***IP address changes*** or ***supporting mobility***

Experimental Insights

At the moment, insights are pointing to initial IIC whitepaper at https://www.iiconsortium.org/pdf/2022-01-10-Impact-of-Distributed-Ledgers-on-Provider-Networks.pdf

Main insights:

- Different **types** of DLTs (unreachable, just signaling, mismatching capabilities, useless data, useful data)

- About 16% of all nodes just **useful ones** (good nodes)

- About 42% of **traffic wasted** by those not being useful (bad nodes)

Planning update after IETF113 with more insights on **additional KPIs**, such as pool establishment (time & cost) and ratio of useful vs useless data comms

Network Innovations & Standardization Efforts

- Innovations currently captured in Section 7 as opportunities
  - References to ongoing drafts and research in this space

- Standardization efforts, captured in Section 8
  - IEEE references
  - DLT interop work in IETF
  - Semantic routing and DINRG in IRTF

More input needed and wanted on both!

What Next?

- Extend our work to other DLTs to understand differences in overlay management
  - Other PoW systems
  - PoS and its impact on overlay management
  - …
- Extend our insights into Ethereum as PoW example
  - More KPIs
- Look into other network innovations
  - LISP, use of IP multicast…
- Look into impact of network innovations
  - Improvement over IP overlay

More importantly, we are looking for **collaborators** to deepen our insights

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We need the wider RTG community to better understand impact of DLTs and any possible mitigation – **any contributors, please drop us an email**!

For more discussion, join the ***DLT & Networking*** side meeting on 22.03.2022 at 6pm local time (https://trac.ietf.org/trac/ietf/meeting/wiki/113sidemeetings#point2)

THANKS!

QUESTIONS? / COMMENTS?
21.03.2022