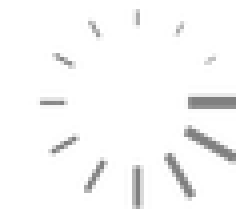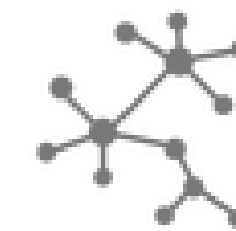# Raiden Network

Off-Chain State Network
for fast DApps
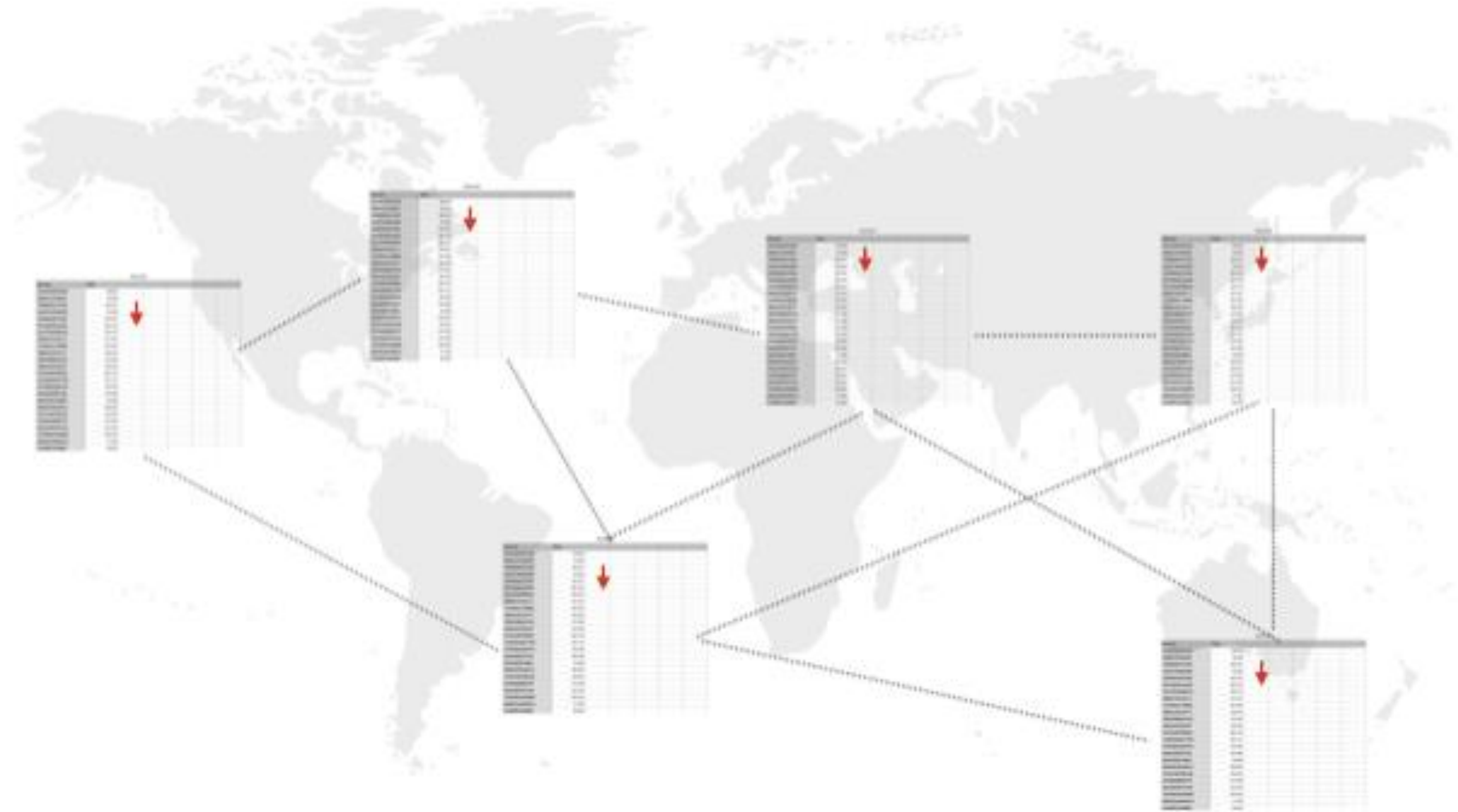
Heiko Hees / <heiko@brainbot.com>

Motivation

Problems

- Throughput

- Transaction Finality
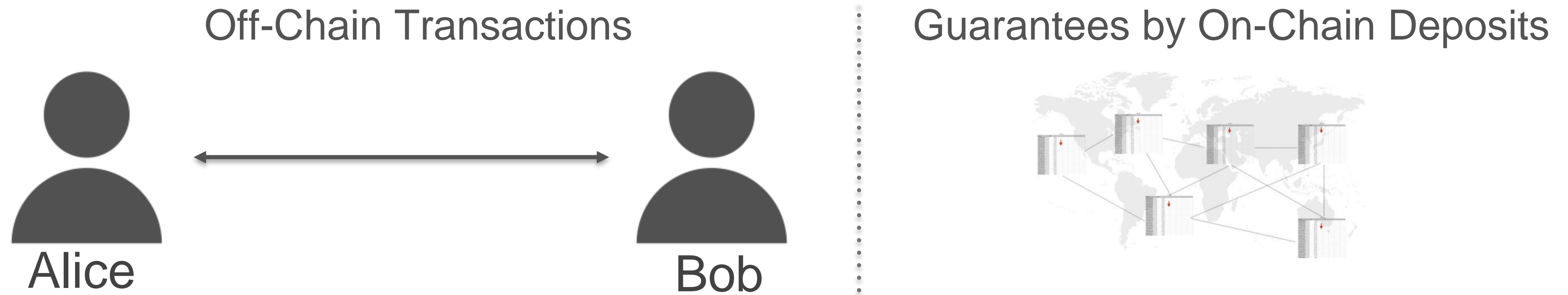
- Transaction Confidentiality

- Transaction Cost

Global Consensus

- The World knows: Alice sent Bob 5 tokens

- Problem: Latency & Bandwidth

Local Consensus

Off-Chain Transactions

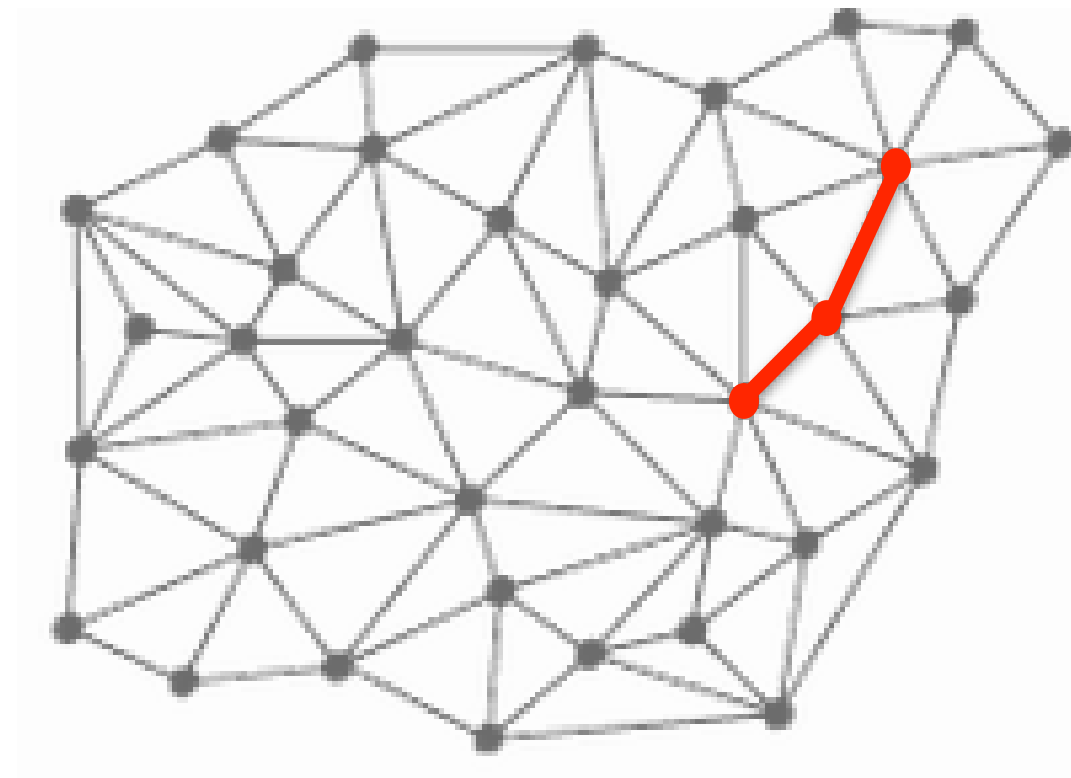Guarantees by On-Chain Deposits

Alice

Bob

- Only Alice and Bob know:

  - Alice owes Bob 5 tokens

- With state channel technology:

  - Both know that Bob can settle this claim on the Blockchain

Raiden Token Network

**Scalable, Instant and Low Cost
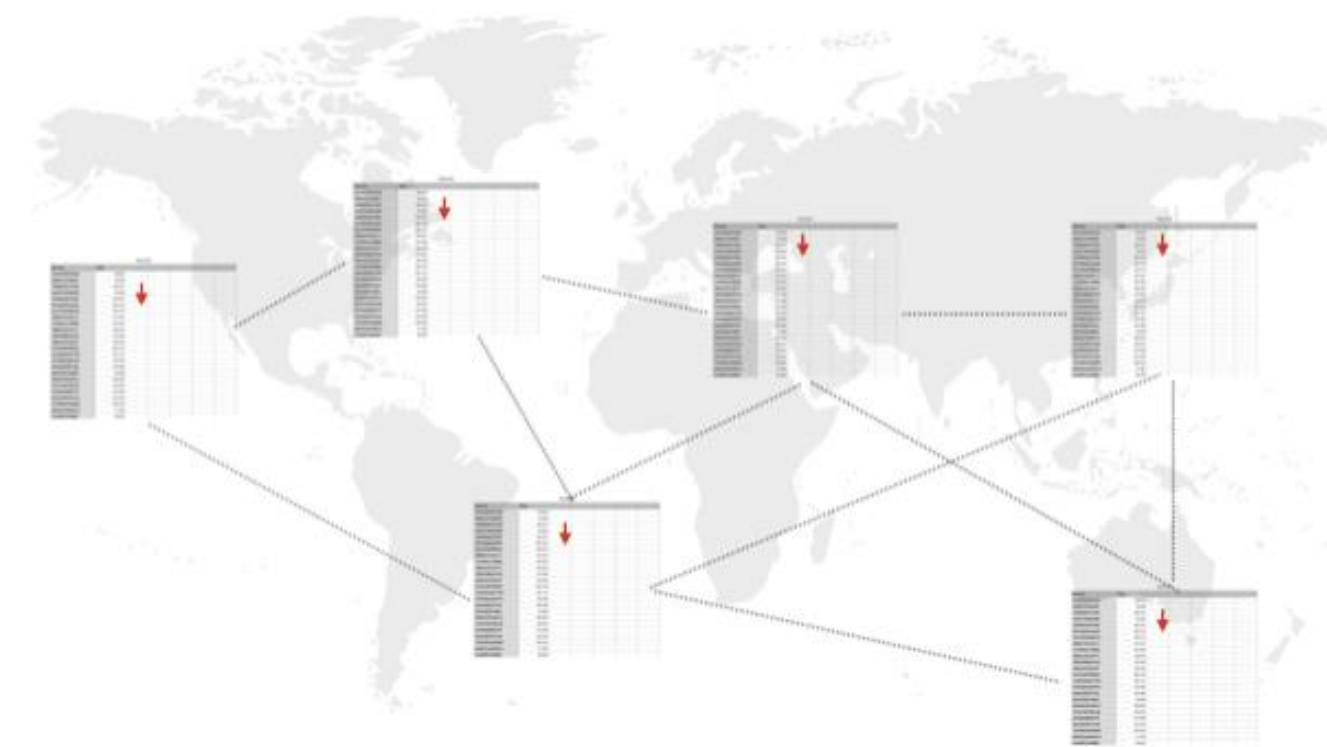Token Transfers for Ethereum**

State Channel Network

State Channel Network

- off-chain transfers
- bilateral state updates

Blockchain

- deposits
- settlement

Implementation Details

https://www.youtube.com/watch?v=h791zjvf3uQ
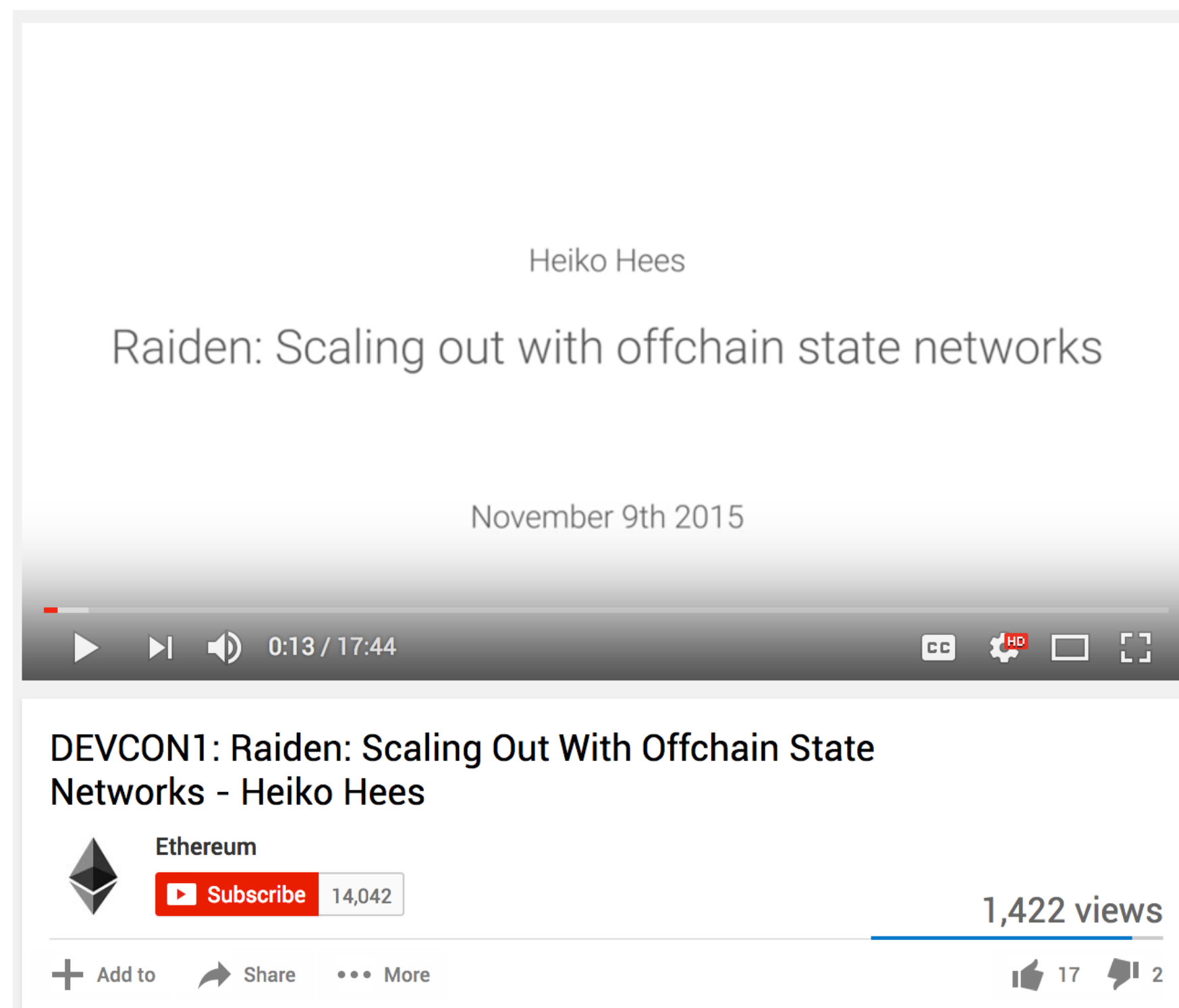
Features

- Scaling out to 1.000.000+ transfers per second

- Low latency, instant token transfers

- Improved transaction confidentiality

- Low fees, Micropayments

- ERC20 token compatibility

Unfair comparison

VS.
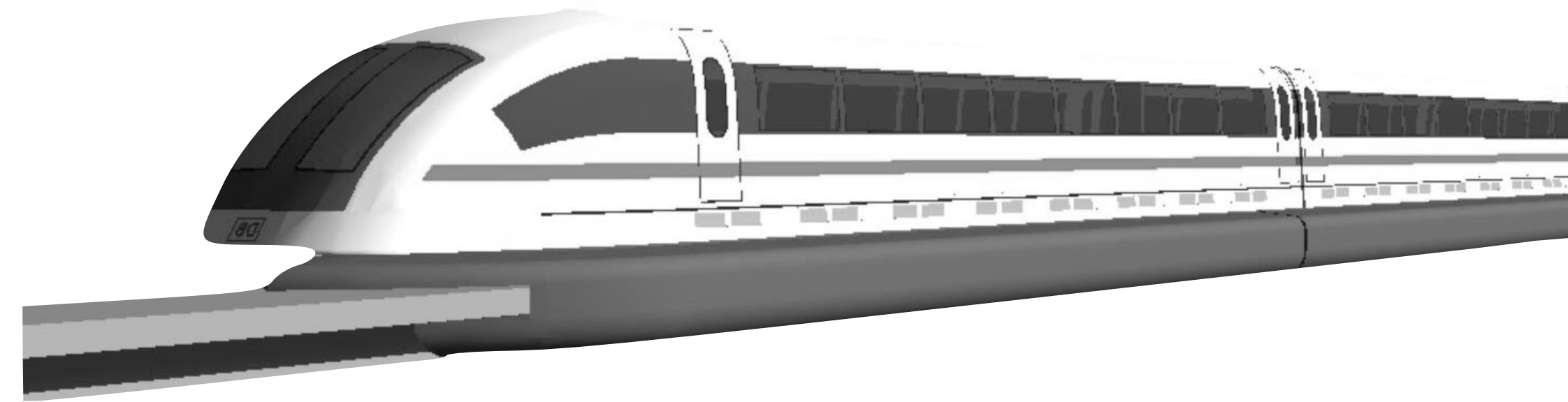
- Speed: ~x100

- Throughput: ~x10,000

- Cost: ~x1/1,000

Atomic Swaps


```
(asset=A, qty=10, hashlock=0xbeef)
```

Bob

🔒 10 A   🔒 10 A

Alice   Charlie

🔒 3 B   🔒 3 B

Dave
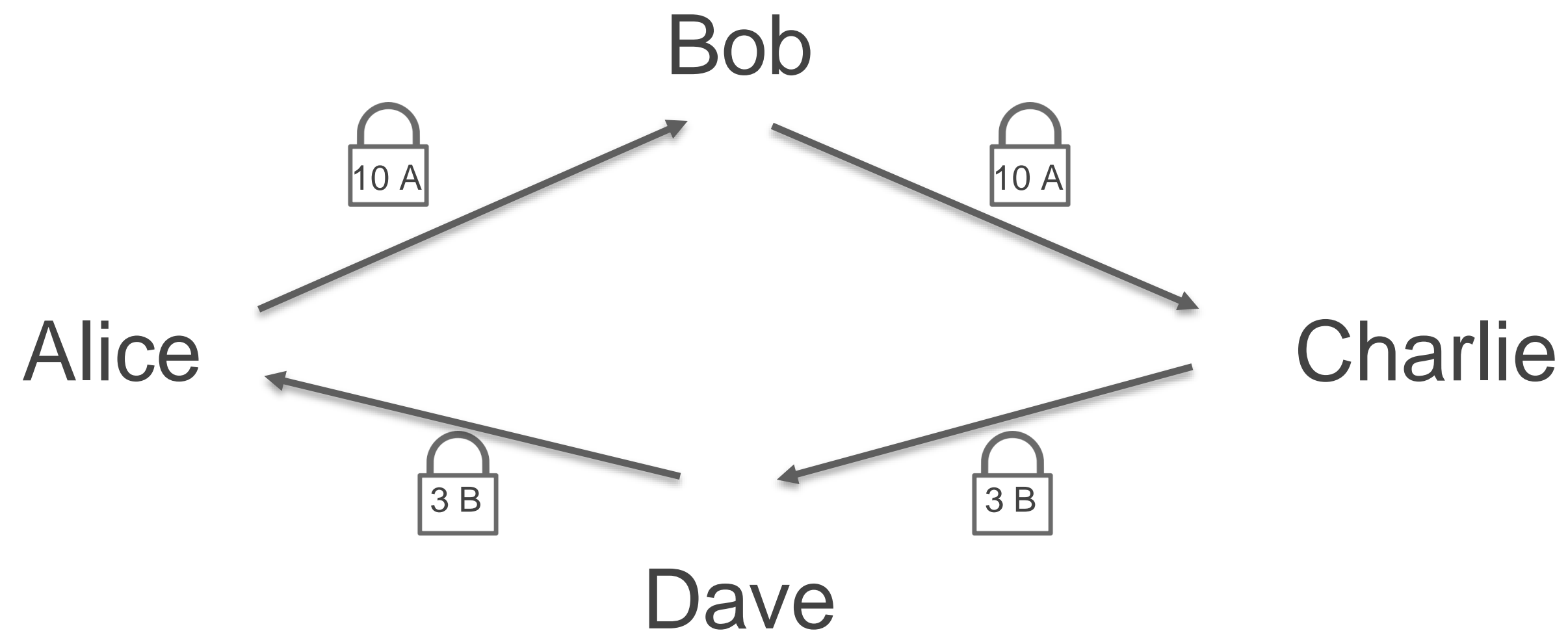
```
(asset=B, qty=3, hashlock=0xbeef)
```

Smart Transfers

- Transfer settlement can be dependent on on-chain conditions (i.e. smart contract state)

- Examples:

  - Betting, Options, etc.

Project Status

Working Prototype

Raiden PoC-0

Augusto Hack edited this page 6 days ago · 14 revisions

First Raiden Transaction

Channel 1

Channel 2

Ethereum's 'Lightning Network' Raiden to strike IoT and micropayments

Raiden creator Heiko Hees said a 100K transactions per second proof of concept could happen by end of August.

By Ian Allison
August 10, 2016 09:02 BST

Ethereum Races Ahead with Raiden's Implementation of the Lightning Network

05/08/2016   Andrew Quentson
Ethereum News, News

Lightning Fast Raiden Network Coming to Ethereum Blockchain

August 12, 2016, 03:45:13 PM EDT By Giulio Prisco, Bitcoin Magazine   Comment

IoT Demo

- https://www.youtube.com/watch?v=dsWtxi--JFo

Collaborations

- Swarm Message Transport

- Micropayments for Swarm & LES

- Ethereum Client Integrations

- Early industry adopters

Roadmap

Sort ▾

PoC-1: Scalability Demo

📅 Due by September 29, 2016   🕐 Last updated 2 minutes ago

Demonstrate 100K tps on a setup with 200 cores

30% complete   **7** open   **3** closed

Edit   Close   Delete

PoC-2: Auto Discovery & Setup, CLI

📅 Due by October 15, 2016   🕐 Last updated 2 minutes ago

Adds support for automatic endpoint discovery and channel creation …(more)

0% complete   **8** open   **0** closed

Edit   Close   Delete

PoC-4: Persistence, Testnet Launch & IoT Demo

📅 Due by October 31, 2016   🕐 Last updated 1 minute ago

Active on the Morden test network users can install Raiden start …(more)

9% complete   **10** open   **1** closed

Edit   Close   Delete

PoC-5: Token Exchange & Smart Transfers

📅 Due by November 13, 2016   🕐 Last updated less than a minute ago

0% complete   **4** open   **0** closed

Edit   Close   Delete

PoC-6: Fees and Reputation

📅 Due by November 20, 2016   🕐 Last updated 1 minute ago

0% complete   **2** open   **0** closed

Edit   Close   Delete

PoC-7: Swarm Transport & Discovery integration

📅 Due by November 29, 2016   🕐 Last updated about 1 month ago

0% complete   **1** open   **0** closed

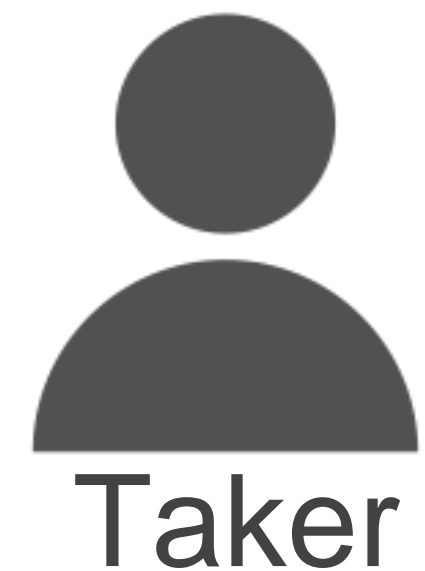Edit   Close   Delete

COMING SOON!

Decentralized Exchanges

On-Chain DEX

Orderbook on the Blockchain

| ID	Amount	Price
0xd313	623	23.15
0xd23f	1346	23.16
0x9f72	4235	23.18
0x1e23	234	23.25

TX

TX

- Maker: Adds offer, smart contract takes tokens to into escrow

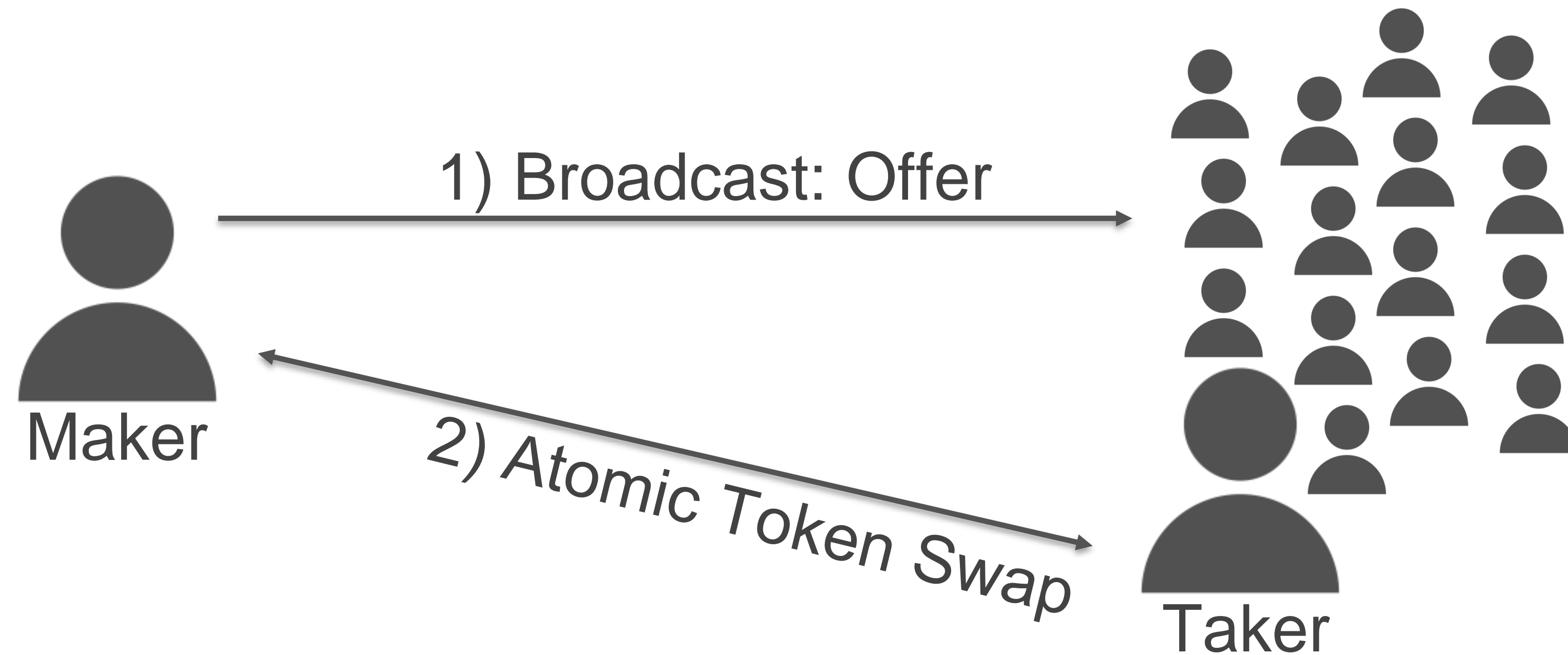- Taker: Picks offer, sends requested tokens, gets offered tokens

Maker

Taker

Problems with on-chain exchanges

- Throughput

- Transaction Finality

- Transaction Cost

Off-Chain DEX

Maker

1) Broadcast: Offer
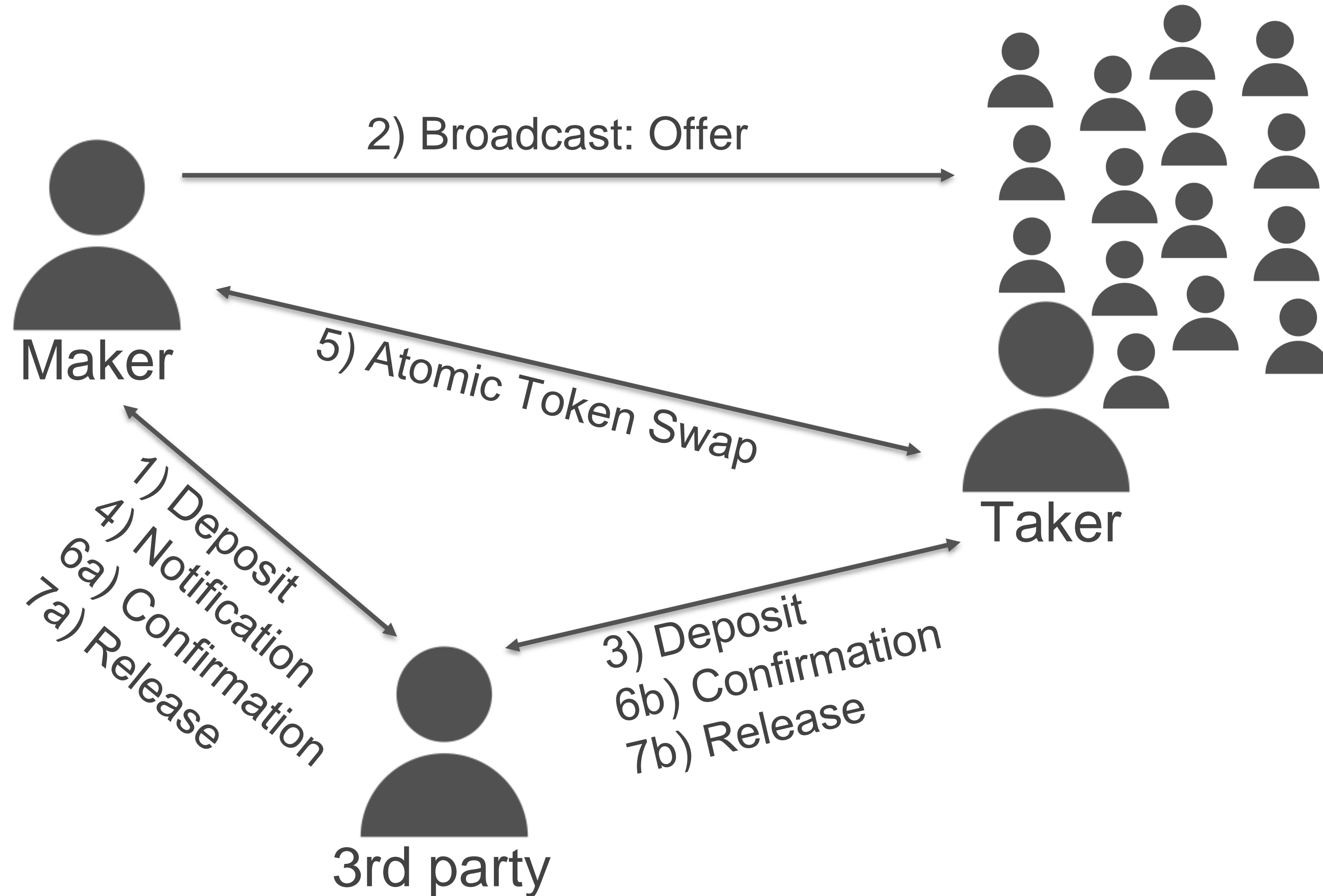
2) Atomic Token Swap

Taker
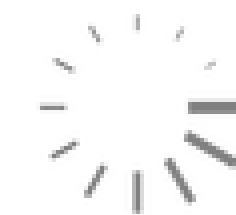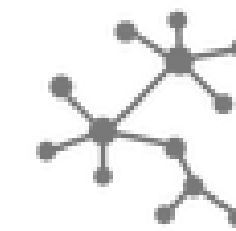
Problem: Free Option

- Party that commits first, offers free option

- Fake offers, will be exploited

- Tokens locked till timeout

Possible Solution: Commitment Deposits

- small commitment deposits held by 3rd party

- released

  - on proof of swap

  - on timeout if only one committer

- lost if both committed but can not proof execution

Off-Chain DEX

2) Broadcast: Offer

Maker

5) Atomic Token Swap

Taker

1) Deposit
4) Notification
6a) Confirmation
7a) Release

3) Deposit
6b) Confirmation
7b) Release

3rd party

Properties

- Off-Chain, based on Raiden token transfers

- High throughput, low latency, low fees

- Abstraction: Traditional API and UX

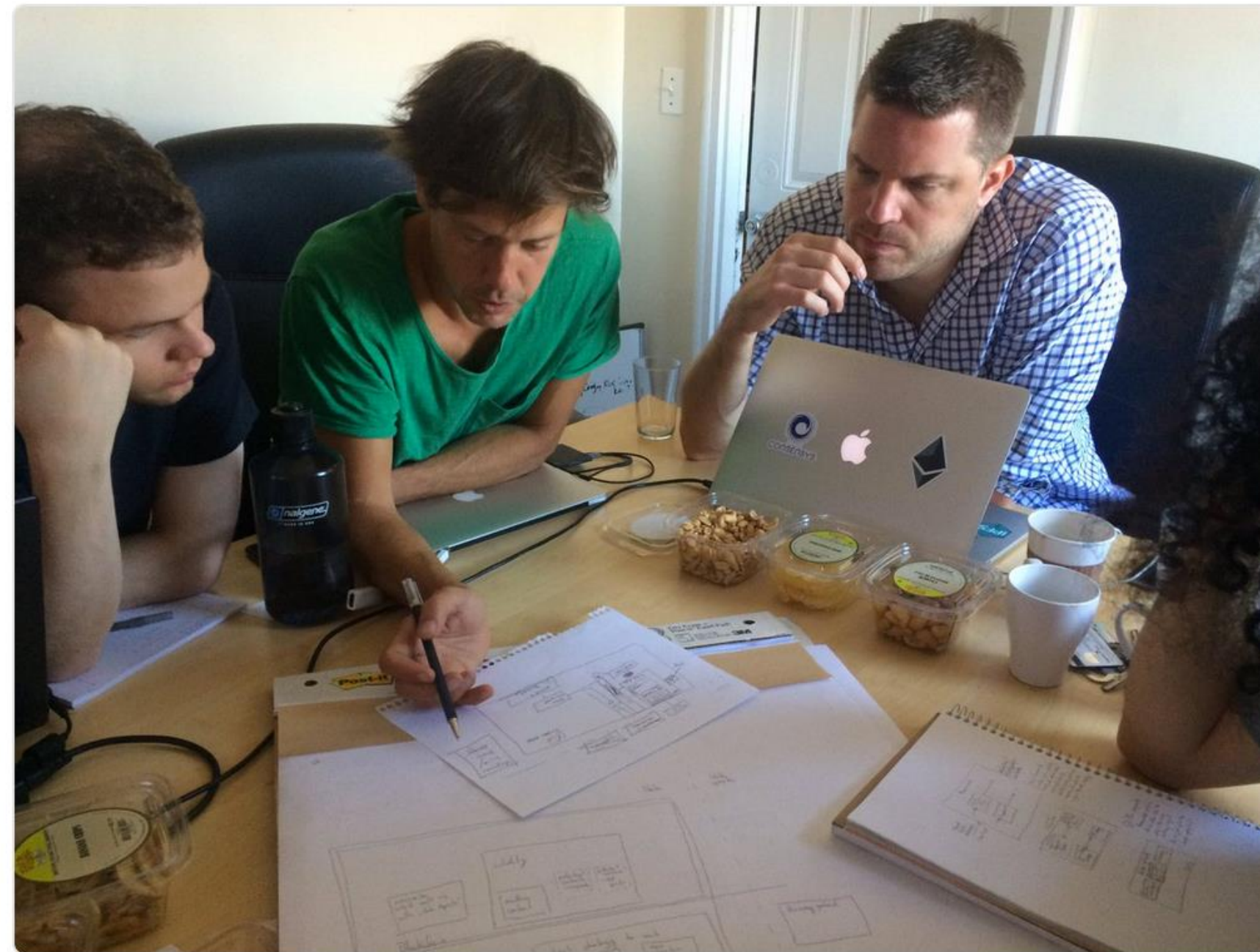- Limited trust required

Plan: Generalization

Goal

- Raiden Network as a **generalized infrastructure** to **host** secure, scalable, low latency **Dapps** off-chain

- Software **framework** which makes it **easy for developers** to build off-chain applications
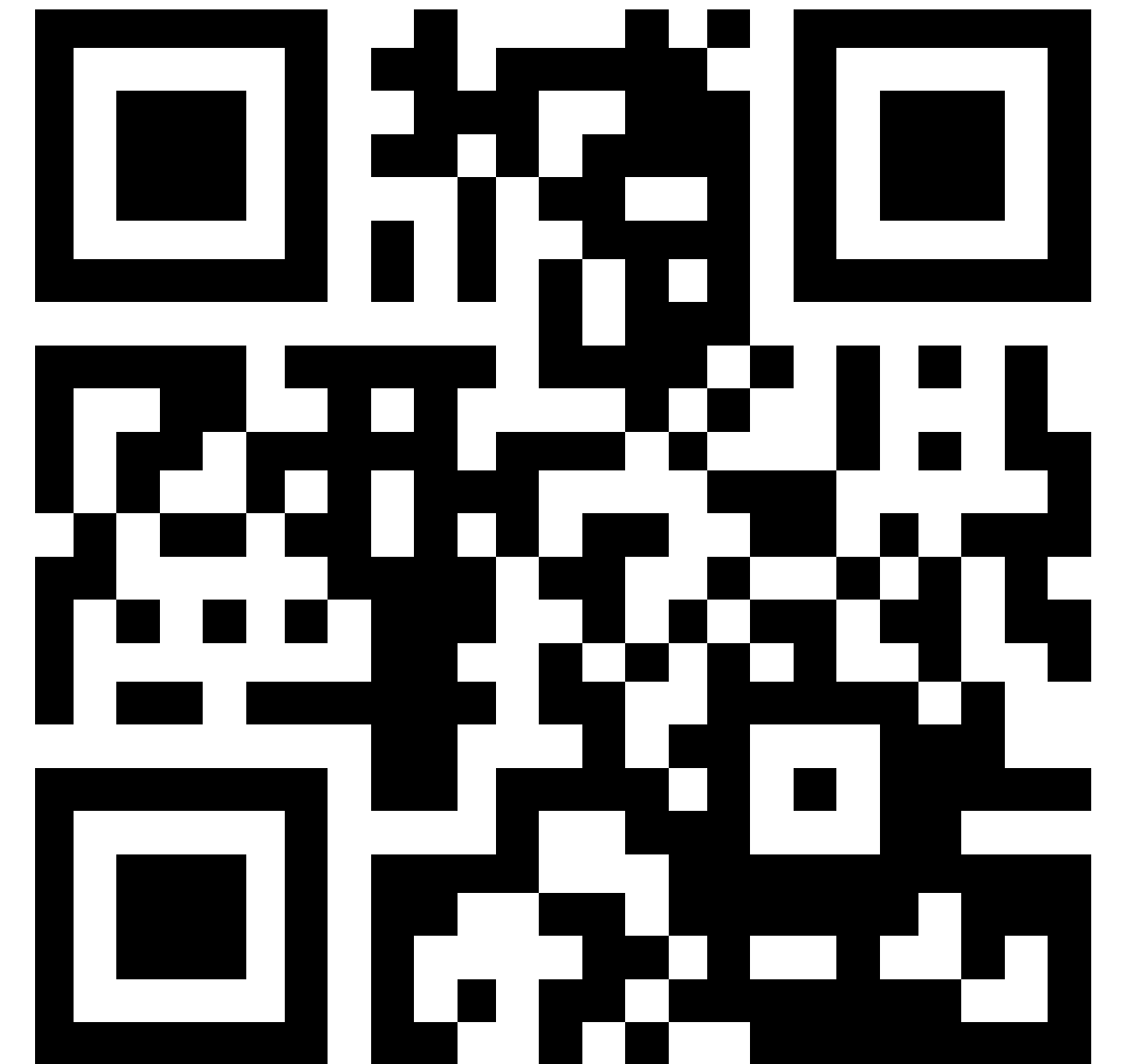
Teaming Up

Conclusion

Raiden Network

- Works and is available soon™

- Goes beyond token transfers

- Killer Dapps very likely to use it

- Offers the properties required for broad industry adoption of DLT

Get in touch

- Project: http://raiden.network/

- Github: https://github.com/raiden-network/

- Gitter: https://gitter.im/brainbot-com/raiden

- Company: http://brainbot.com/

Thank you

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