Tokenizing Real World Assets

- **A Massive Opportunity**

- **Why we are missing it**

- **And, how to grab it**

Definitions

Tokens

Tokens are Digital Bearer Assets ~~on a blockchain or a DLT~~.

Virtual Tokens

Tokens that do not have any real world representations. Often created by blockchain protocols.

Asset-backed Tokens

Tokens that are ownership titles to real-world assets.

Tokenization

Process of maintaining custody of a real world asset and representing it as a digital bearer asset.

Virtual Tokens are Easy

Creating virtual tokens that are not pegged to any real world assets is well understood.

Two Requirements

- Secure Double-Spend prevention.

- No centralized control over transaction processing.

Nakamoto consensus algorithm successfully addressed the above two requirements.

Large Interest in Tokenizing Real World Assets

HALF EPSILON

Real World Assets

- Equities

- Bonds

- Real Estate

- Commodities

- Retail Currencies (paper money)

- Wholesale Currencies (inter-bank money)

Perceived Benefits of Tokenization

- Efficiency gains via automation – make reconciliation obsolete

- Efficiency gains via disintermediation

- Instant global settlements

- Reduced liquidity requirements

What's in it for Token Issuers?

Excellent Monetization Opportunity

- Custodians of Real World assets can tokenize them and make them transactable.

- Token issuers can earn revenue via charging fees for creation and destruction of tokens. They can also introduce transaction fees.

- Examples: Pax Gold [1], Cache Gold [2]

Attempts at Tokenization: Equities

Exchanges Experimenting with Tokenization of Equities [1]

- Warsaw Stock Exchange
- Australian Stock Exchange
- Deutsche Boerse
- Indian National Stock Exchange
- Japan Exchange Group
- Korea Exchange
- London Stock Exchange

- Luxembourg Stock Exchange
- Moscow Exchange
- Nasdaq
- Santiago de Chile Exchange
- Nasdaq
- SIX
- TMX Group

Perceived benefits include efficiency gains via automation and disintermediation. Instant settlements. Imagine instantly transferring Equity Tokens from one exchange to another.

Attempts at Tokenization: Bonds

Bonds Issued on Ethereum

- In 2017, Nivaura issued an Ether-denominated Bond using the UK FCA regulatory sandbox [1].

- In 2019, Societe Generale issued a bond on Ethereum [2].

Bonds Issued on DLT

- In 2018, the World Bank created the first legally binding bond on DLT [3].

Perceived benefits include efficiency gains via automation and disintermediation. Instant settlements. Imagine instantly transferring Bond Tokens from one bank to another.

Attempts at Tokenization: Real Estate

Real Estate Tokens issued on Ethereum

- In 2018, Propellr and Fluidity launched the tokenization of USD30m Manhattan property on Ethereum [1].

- In 2019, Equisafe investment platform tokenized a luxury property on Ethereum [2].

Perceived benefits include efficiency gains via automation and disintermediation. Instant settlements.

Attempts at Tokenization: Commodities

Several Gold-backed crypto-currencies exist

- Paxos Gold (PAXG)
- Perth Mint Gold Token (PMGT)
- Digix Global (DGX)
- Tether Gold (XAUT)
- Meld Gold by Algorand

Oil backed crypto-currency

- In 2017, Venezuela announced Petro, a crypto-currency backed by its oil reserves [1].

Perceived benefits include instant settlements for payments and trading activities.

Attempts at Tokenization: Retail Currencies

Fiat-backed stablecoins

- Total market-cap of stablecoins is approximately $35B [1].

- Some regulators demand that stablecoins may only be issued by licensed entities and only be traded within regulated exchanges, e.g., Singapore based xSGD [2].

Retail CBDC

- China is testing its retail CBDC in Suzhou. Phone-to-phone offline, in-person payments [3]. No blockchains involved.

Perceived benefits include efficiency gains via automation and disintermediation. Instant settlements. Reduced liquidity requirements.

Attempts at Tokenization: Inter-bank Money

Inter-bank Stablecoins

- JP Morgan Coin for inter-bank settlements [1].

Wholesale CBDC

- Various Central Bank initiated projects around the world. Project Ubin [2], Project Jasper [3], eKrona [4], etc.

Perceived benefits include efficiency gains via automation and disintermediation. Instant settlements. Reduced liquidity requirements.

Observations

Strong Interest in Tokenization
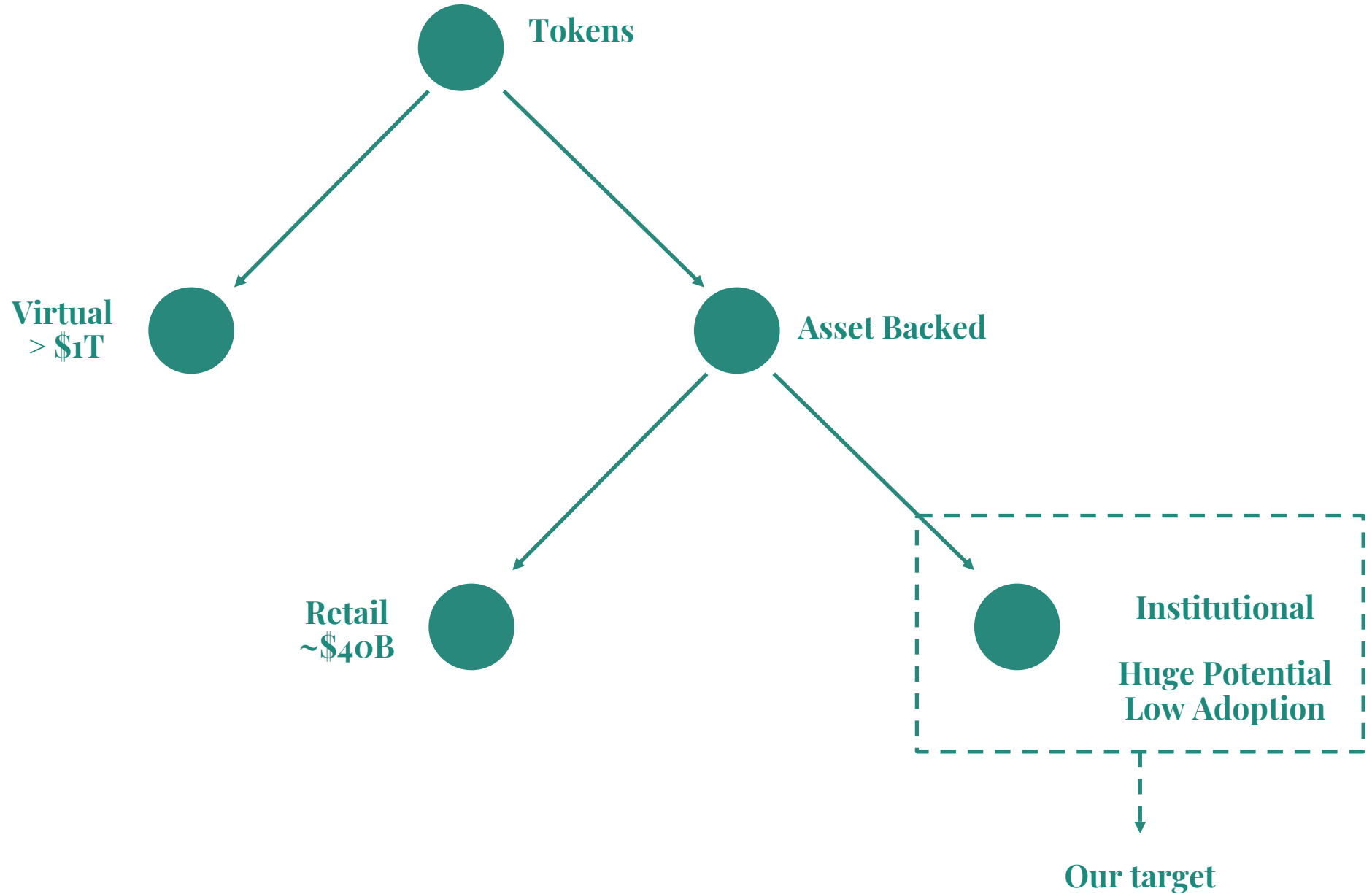
Across all asset-classes.

Retail Use-cases are Flourishing

Regulatory over-sight on person-to-person transactions is minimal in several jurisdictions.
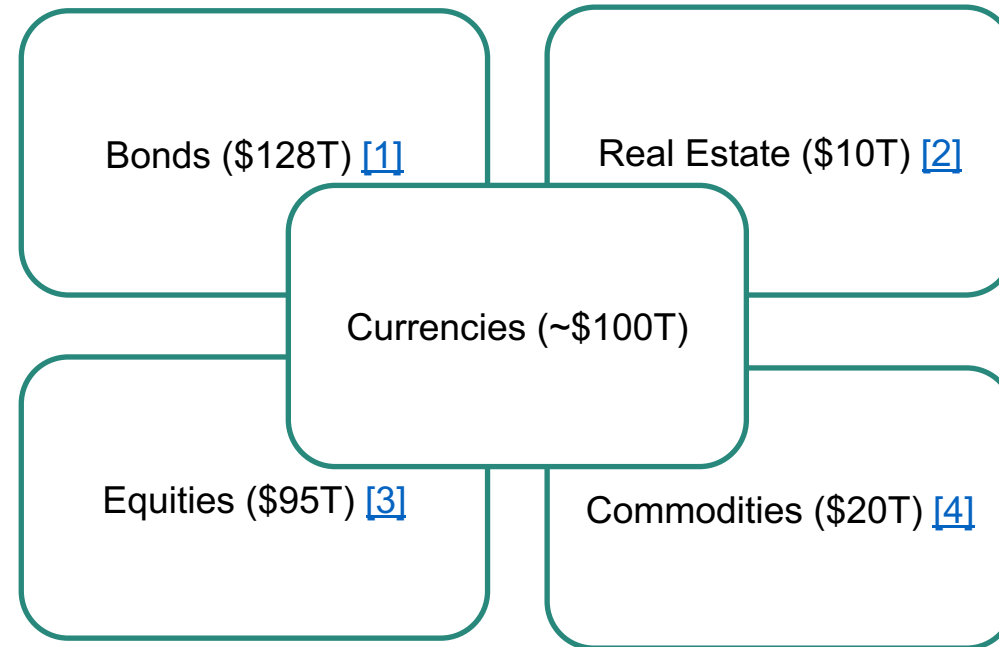
Institutional Use-cases are Stymied (not for lack of trying)

There are strong confidentiality and compliance requirements for institutional use-cases.

Observations

Tokens

Virtual
> $1T

Asset Backed

Retail
~$40B

Institutional

Huge Potential
Low Adoption

Our target

The Institutional Opportunity

HALF
EPSILON

Bonds ($128T) [1]

Real Estate ($10T) [2]

Currencies (~$100T)

Equities ($95T) [3]

Commodities ($20T) [4]

In comparison, present day tokenized world, which primarily comprises of virtual tokens, is valued at $1T.

Institutional Asset-backed Tokens are Hard

Not two, but four requirements

Two Requirements

- Secure Double-Spend prevention

- No centralized control over transaction processing

Two New Requirements

- Confidentiality – Parties not involved in a transaction should not be aware of it.

- Compliance – Adherence to data residency, data hygiene and financial reporting guidelines.

New requirements necessitate a new design. Blockchain inspired approaches will fail.

Current Attempts are Blockchain Inspired

Let's look at four examples.

Ethereum

Public Blockchain with Smart Contract functionality.

ConsenSys Quorum

Permissioned version of Ethereum.

IBM Hyperledger Fabric

IBM's permissioned Blockchain.

R3 Corda

Distributed Ledger Technology (DLT).

None of these designs jointly satisfy the four requirements.

Ethereum

Public Blockchain with Smart Contract functionality.

- Bonds and Real estate tokens have been issued on Ethereum. These seem to be experimental exercises.

- Adoption is lacking.

- **Problem:** Ethereum is too public. Institutions do not want to compromise confidentiality of their transactions.

ConsenSys Quorum

Permissioned version of Ethereum. Also has a confidential transactions mode.
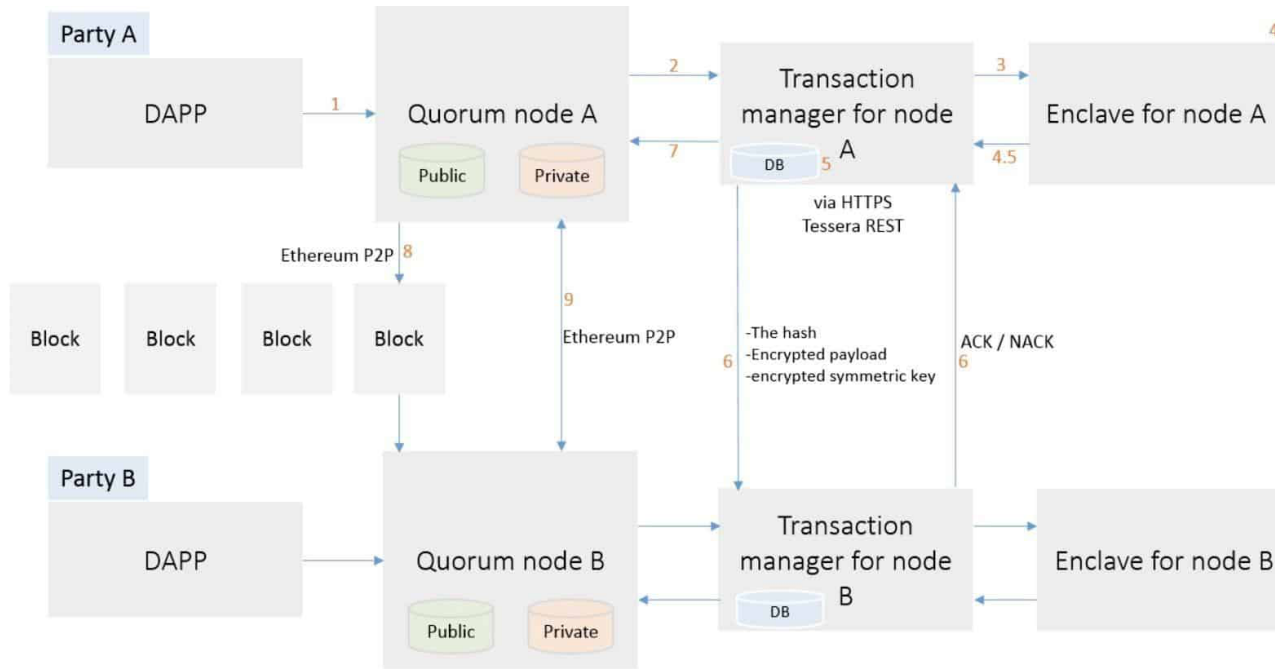

- Payload of confidential transactions is sent to parties involved in transaction. Payload hash is sent to all members to aid ordering via consensus.

- **Problem:** Payload hash does not contain enough information to ensure double-spend prevention when only two parties are involved in a tx. Confidential digital asset transfers are impossible.

JP Morgan, the creator of Quorum, recently sold it to ConsenSys [1]. We believe Quorum is not being used in JPM Coin.

IBM Hyperledger Fabric

Philosophy: Blockchains are replicated databases.
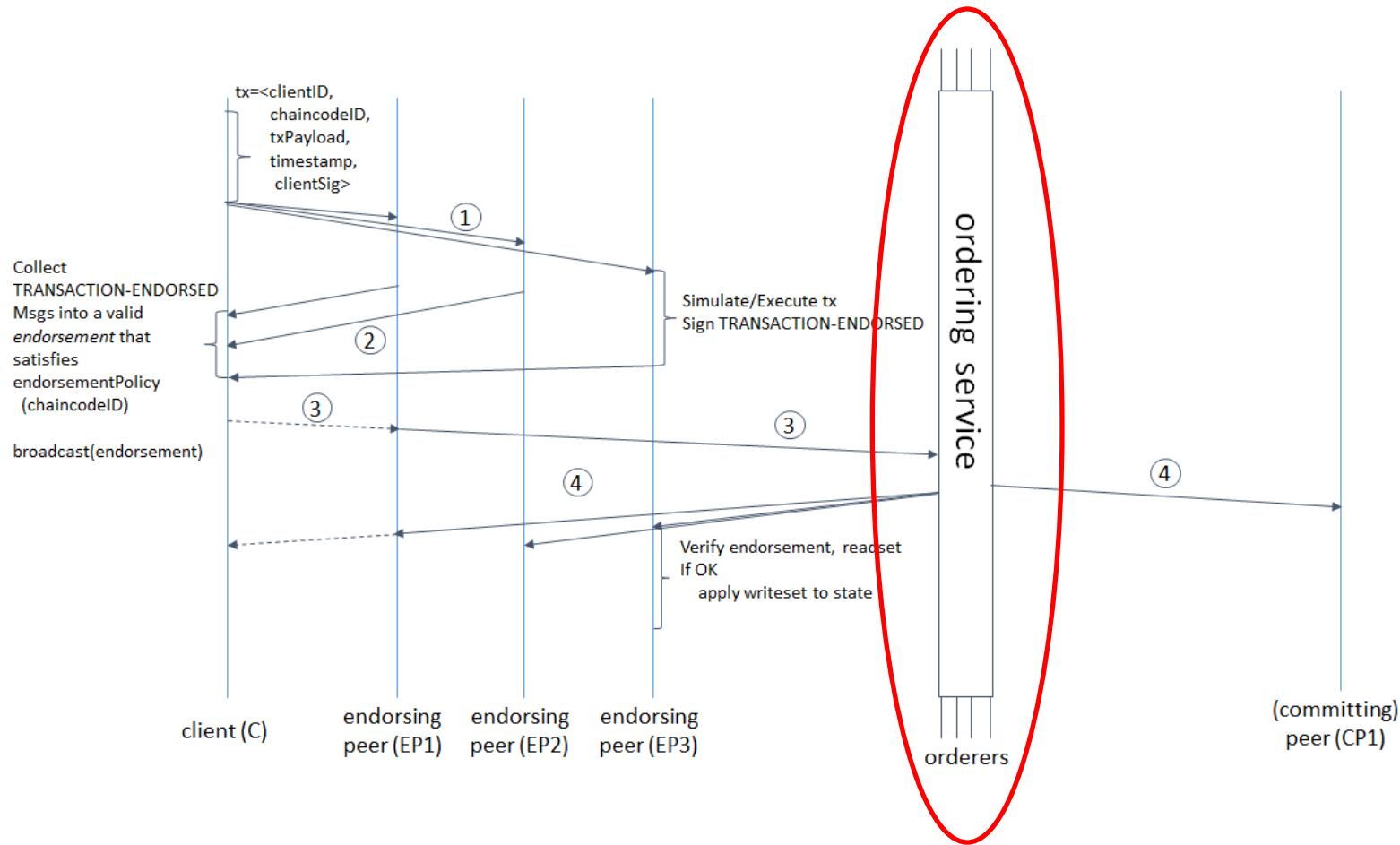
- **Problem:** If ordering service is operated by a centralized entity, decentralization requirement is not satisfied.

- **Problem:** If ordering service is operated by a decentralized set of peers then confidentiality and compliance requirements are not satisfied.

Cross-org replication of data, even encrypted data accrues tremendous liabilities on enterprises.

R3 Corda
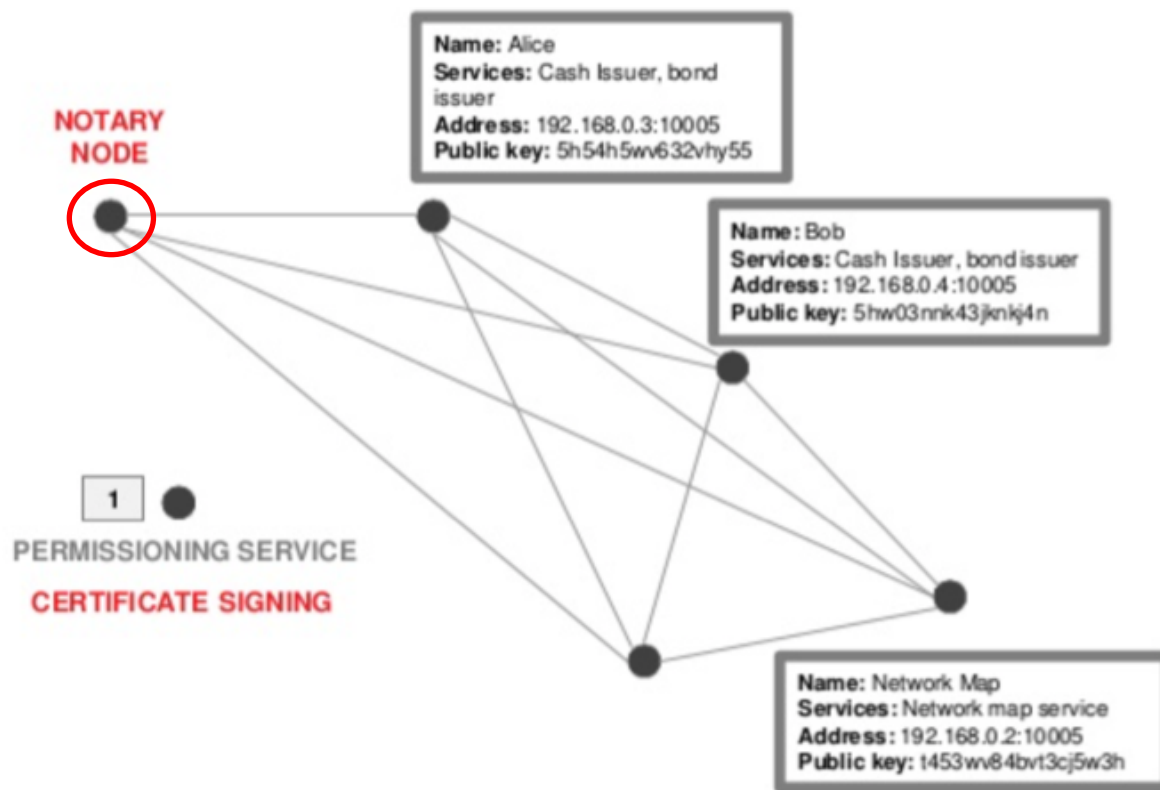
- The notary service is essentially a transaction ordering service.

- **Problem:** The notary service is centralized. Decentralization requirement is not satisfied.

Half Epsilon's Approach
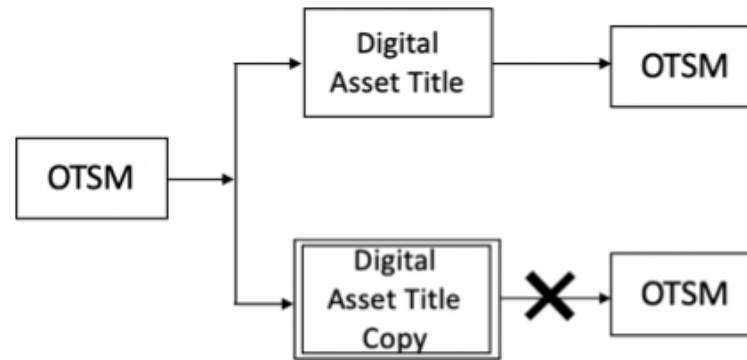
1. Ignore the Blockchain / DLT hype

2. Re-solve the double-spend prevention problem to satisfy the four requirements

This is very hard. But, we did it!

Product: One Time Spend Machine

OTSM – A Special Purpose FIPS 140-2 Level 3 HSM

OTSM prevents a digital asset from being spent multiple times.

	OTSM
Confidentiality	Yes
Security	Yes
Decentralization	Yes
Compliance	Yes

OTSM enables direct institution-to-institution transfers of Tokens. No blockchain / DLT. Satisfies the four requirements.

Bottom Line

Every solution to the double-spend prevention problem brings in massive change.

Think Digital Banking

Enabled by resilient databases.

Think Crypto-economics

Enabled by Nakamoto consensus.

Think One-tap Payments

Enabled by secure ICs in stored value cards and mobile phones.

Now, Think Institution-grade Tokenization of Real-world assets

Enabled by Half Epsilon OTSM.

Thank You!

If you liked this deck, share it!

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