

# Introduction to Half Epsilon

- About Us
- Problem Statement
- Our Product
- Use Case 1: Inter-bank Payments
- Use Case 2: Inter-bank Risk Participation
- Use Case 3: Inter-bank Repo

# About Us



**Pralhad Deshpande, Ph.D.**

Responsible for vision, design and overall execution



**Sanil Borkar**

Responsible for engineering the core technology



Bell Laboratories

Microsoft  
Research



UF UNIVERSITY of  
FLORIDA



# About the Company

## Half Epsilon Pte. Ltd.

- Incorporated in Singapore, Feb 2020.

## March 2020 – Now

- Solved a very difficult and impactful technical challenge.
- Built the technology. Patent pending.
- Identified several use cases.
- Looking for an anchor partner.

# Problem

Institutional tokens are different from Crypto-currencies

## Crypto-currencies have two requirements

- Secure Double-spend Prevention
- Decentralization – No centralized control over transaction processing

## Institutional tokens have two additional requirements

- Confidentiality – Parties not involved in the transaction should not be aware of it
- Compliance – Adherence to data residency, data hygiene and financial reporting guidelines



# 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.

# Half Epsilon's Approach

1. Ignore the Blockchain / DLT hype
2. Re-solve the double-spend prevention problem to satisfy the four requirements

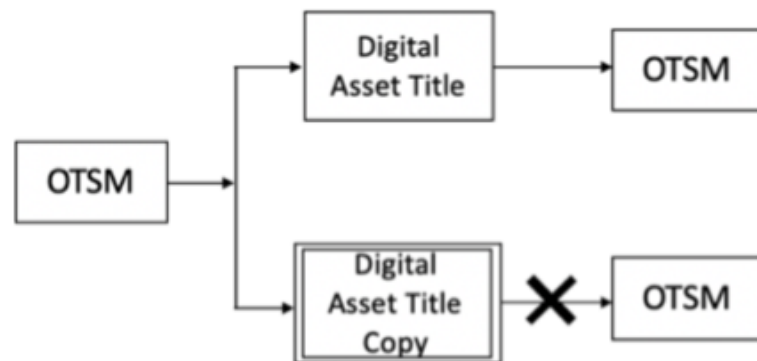


*This is very hard. But, we did it!*

# 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  |
| Secure DSP       | Yes  |
| Decentralization | Yes  |
| Compliance       | Yes  |

OTSM enables direct institution-to-institution transfers of tokens.



# Features

Secure Minting

Secure Storage

Confidential Transfers

Unbounded Scalability

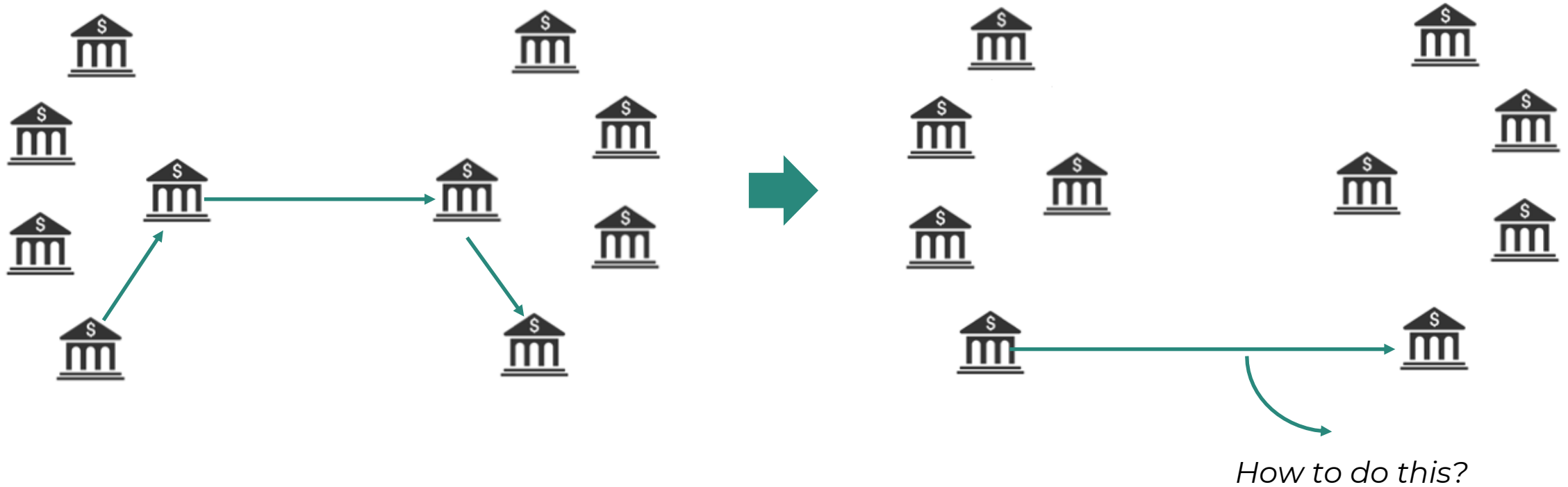
High Resilience

Audit role for Regulators

# Use Case 1: Inter-bank Payments

# From Hub and Spoke to Point-to-point

Partior use case



# Key Enablers

## Tokenized Fiat Currencies

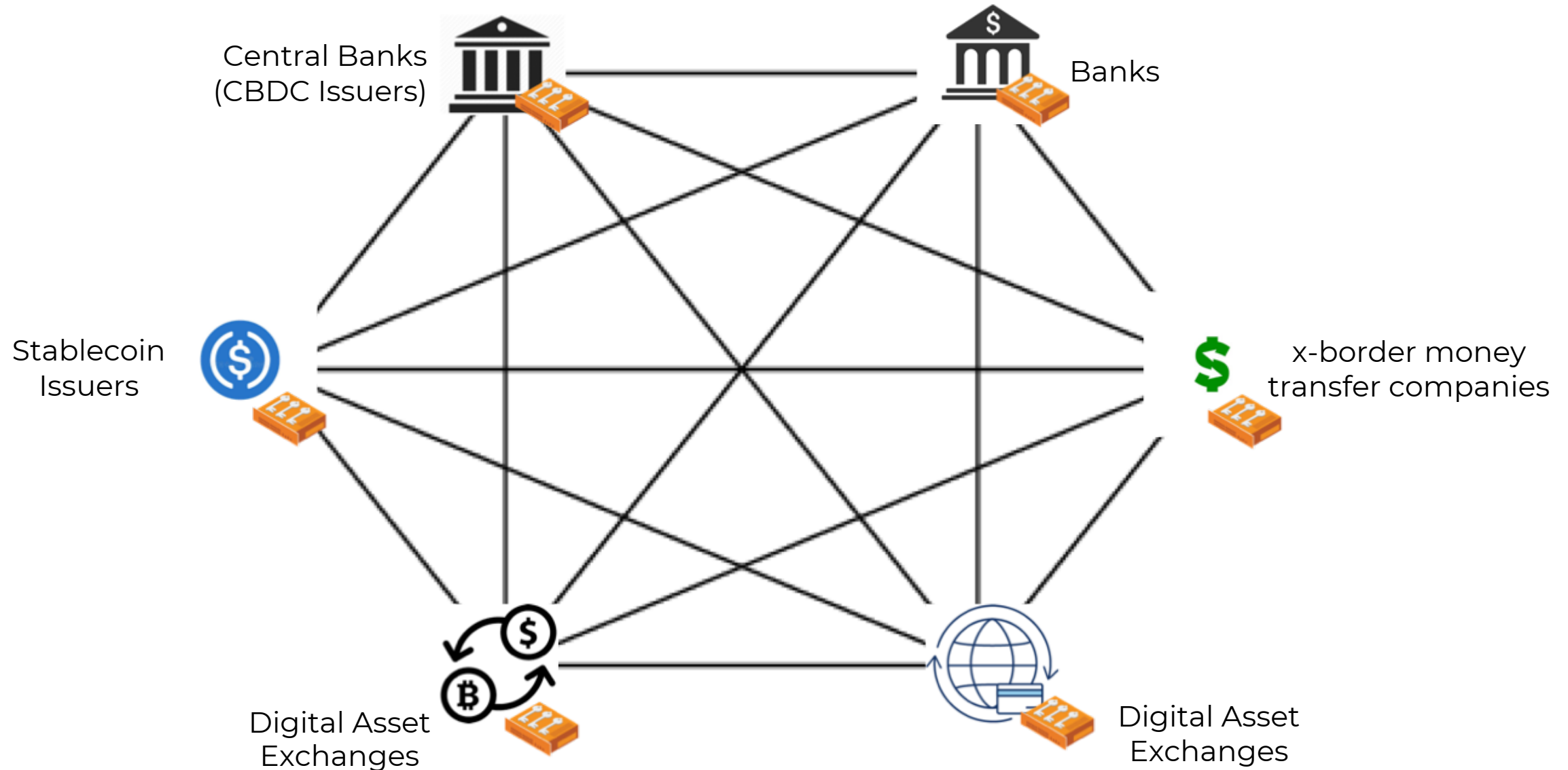
- Inspired by Crypto-currencies
- Digital Bearer Assets, to be transferred point-to-point between institutions
- Denominated in fiat currencies like SGD, USD, etc.
- Issued by a bank

## One Time Spend Machine



# Big Picture

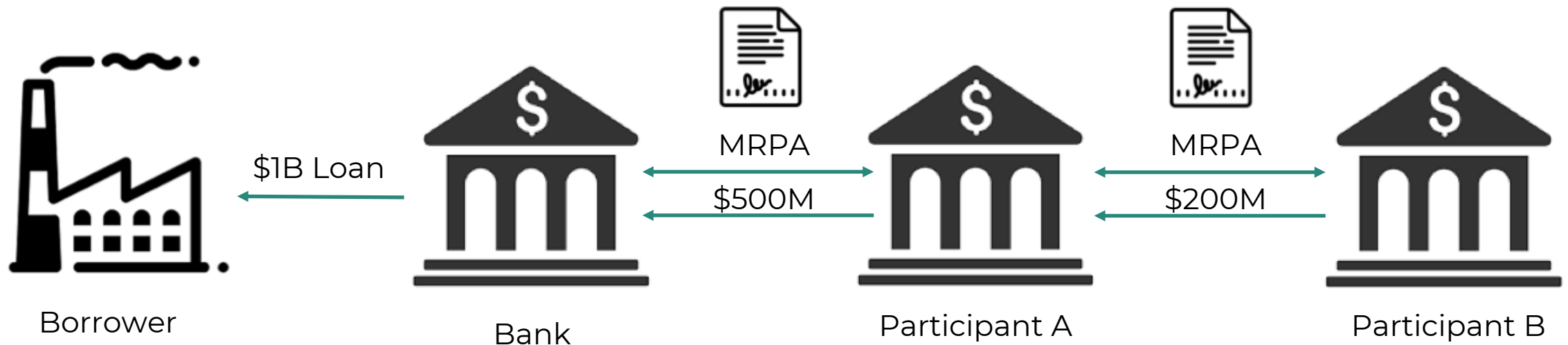
## Instant Settlement Network



# Use Case 2: Inter-bank Risk Participation

# Risk Participation Chain

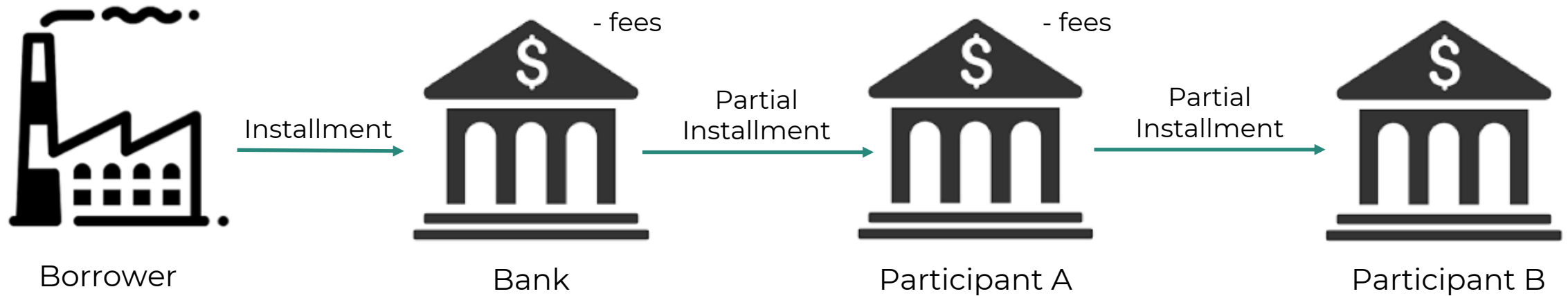
A participant could sell its exposure to another participant



Chaining adds additional risk, reduces return

# Risk Participation Chain

Partial installments are transferred down the chain.

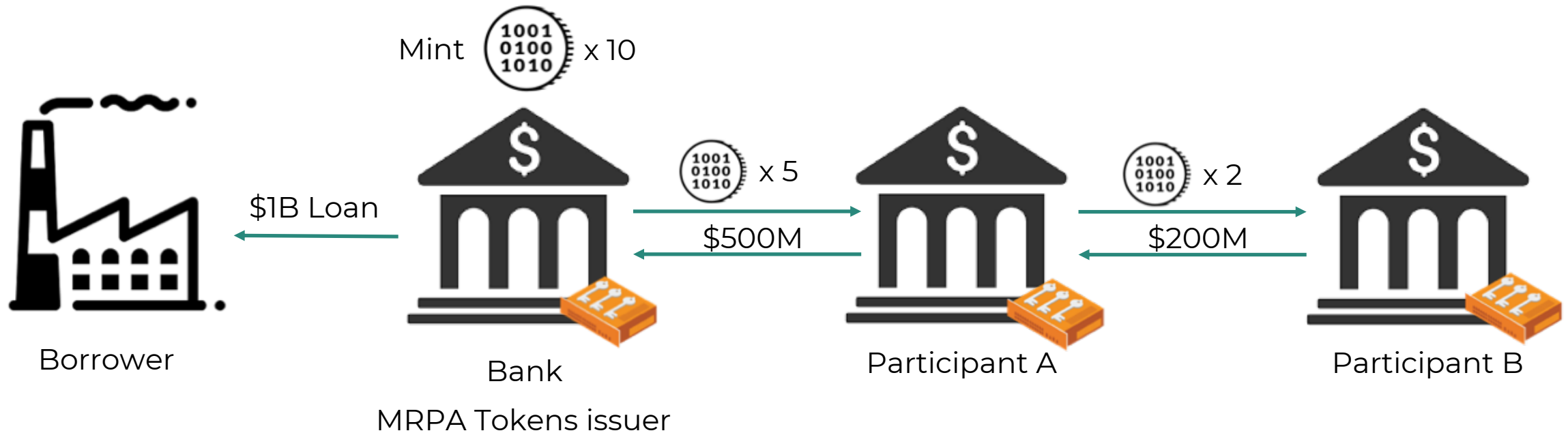


Chaining adds additional risk, reduces return



# Risk Participation with MRPA Tokens

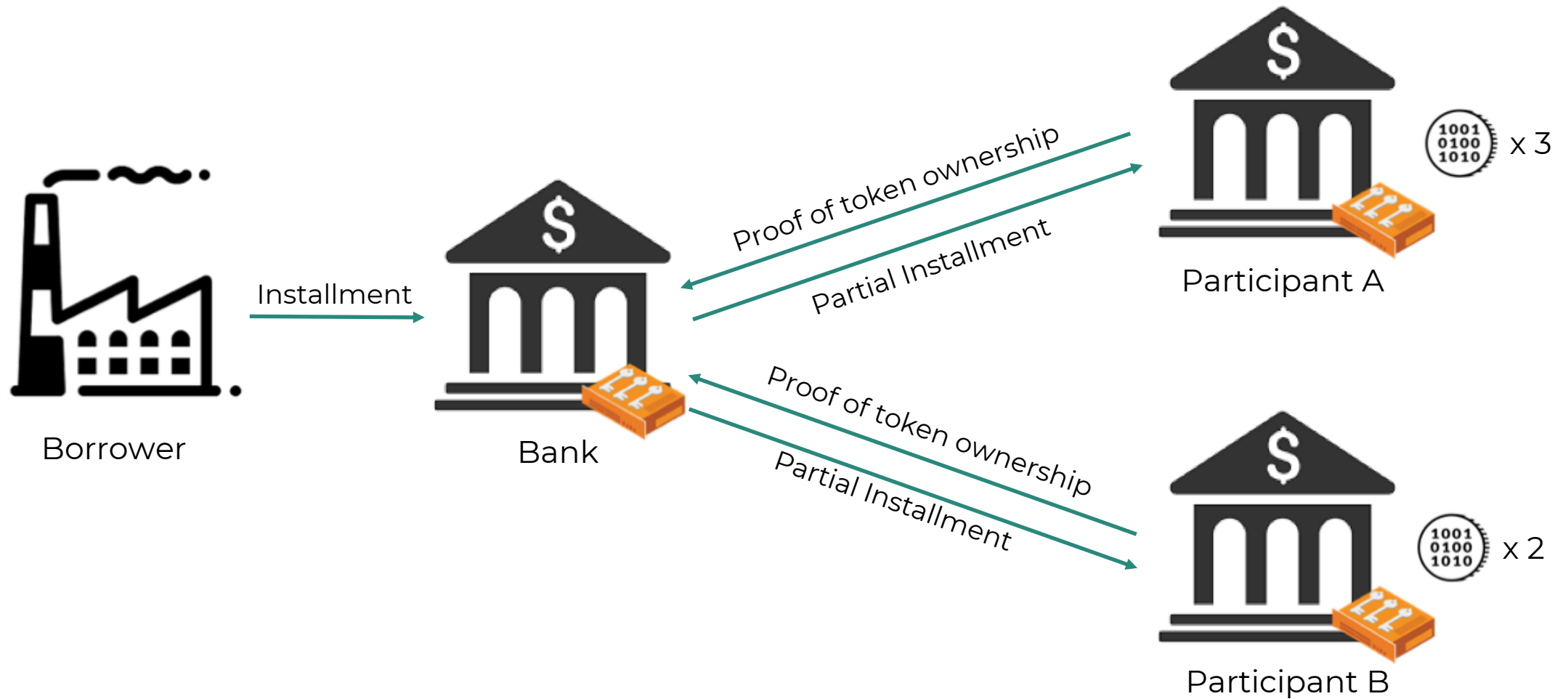
MRPA Tokens are Digital Bearer Assets



Digital Bearer Assets can be transferred from bank to bank instantly and with settlement finality.

# Risk Participation with MRPA Tokens

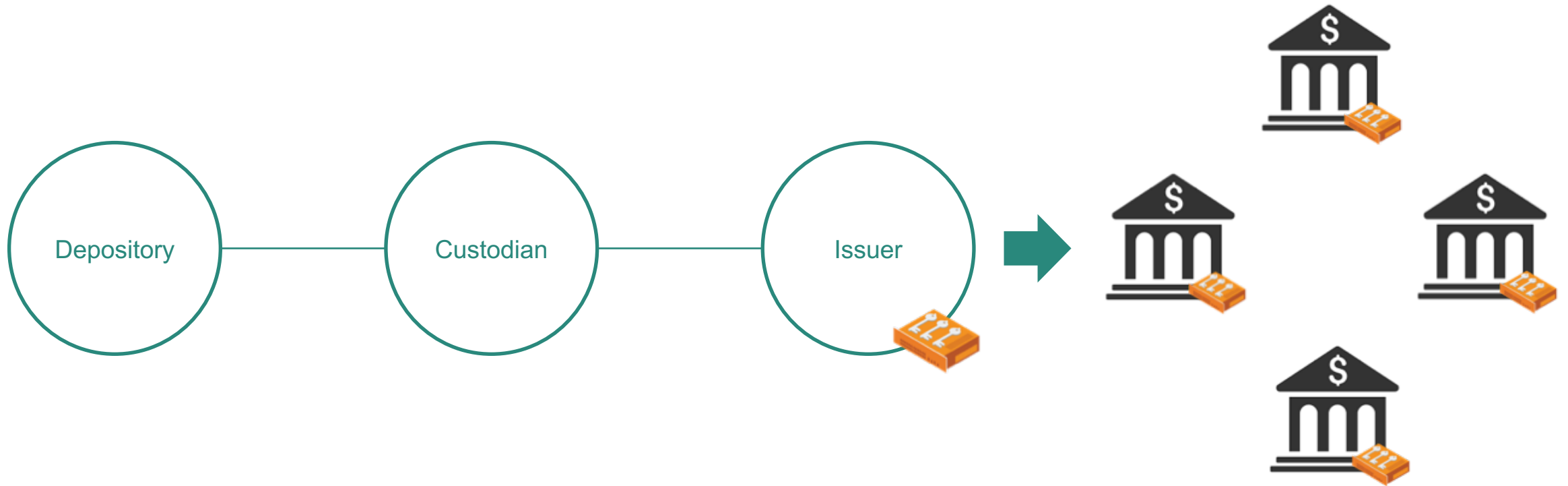
On installment due date, participants present proof of MRPA Token ownership. Issuer makes partial payments.



MRPA tokens reduce intermediaries and consequently risk. Participants get better returns.

# Use Case 3: Inter-bank Repo

# Token Issuance



Token transfers are instant.

Bank in the OTC Network holds beneficiary interest in underlying securities represented by token.

# Servicing Tokens

What a token represents can change over time

| Token ID | Issuance Date | Issuer | Securities                                 | Securities Custodian | Accrued Cash |
|----------|---------------|--------|--|----------------------|--------------|
| DBS-101  | 1/1/2022      | DBS    | 1000 shares of APPL                        | JP Morgan            | USD 220      |
| DBS-102  | 30/3/2022     | DBS    | 1000 shares of MRK +<br>1000 shares of OGN | JP Morgan            | 0            |

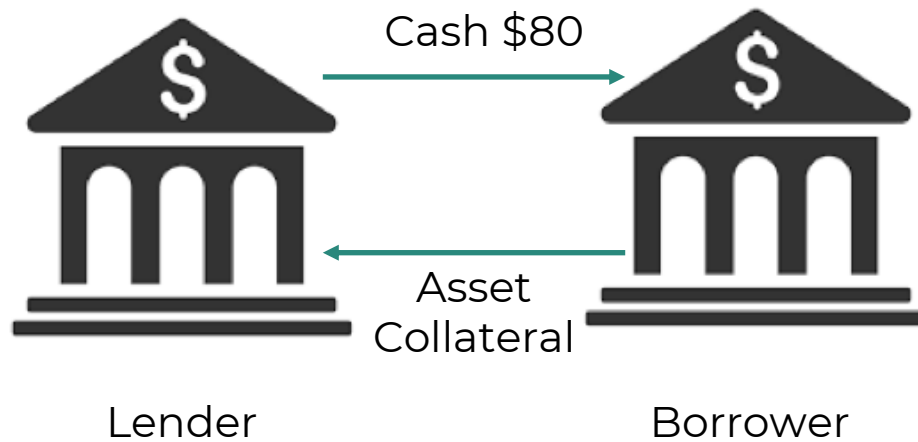
*A token may represent a new set of securities, perhaps after a corporate spinoff.*

*A token may accrue cash, perhaps after dividends are distributed.*

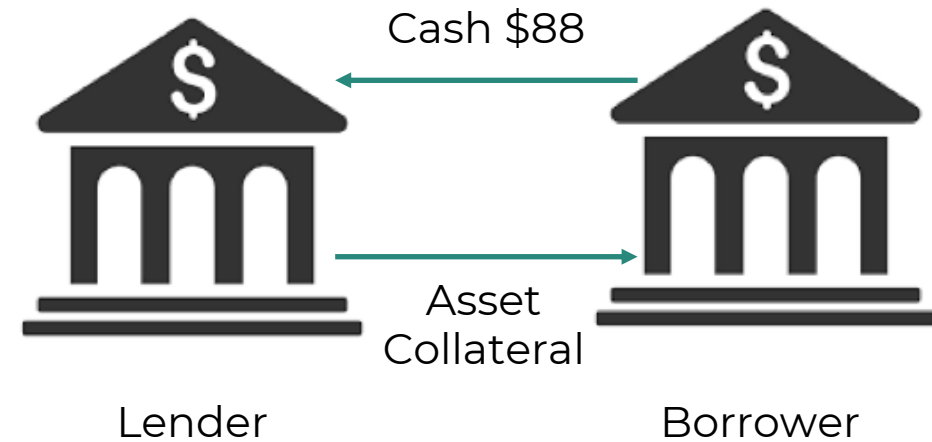
Issuer manages corporate actions

# Repurchase Agreements (Repo)

Step One: Sale



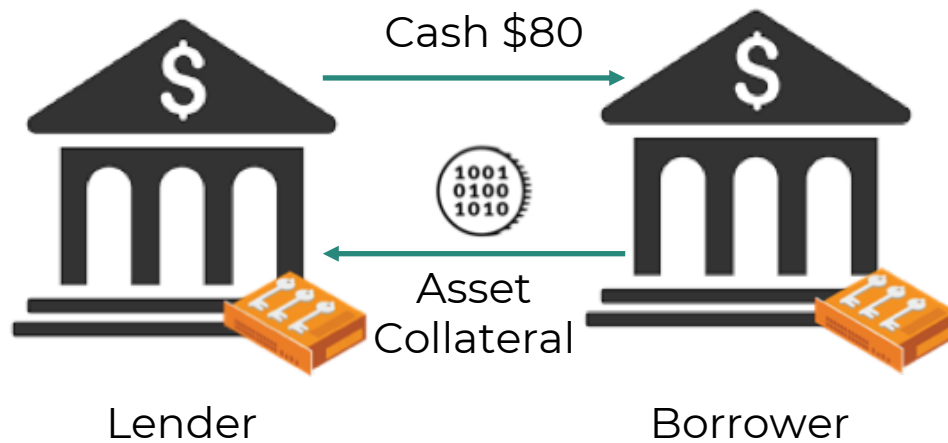
Step Two: Buyback



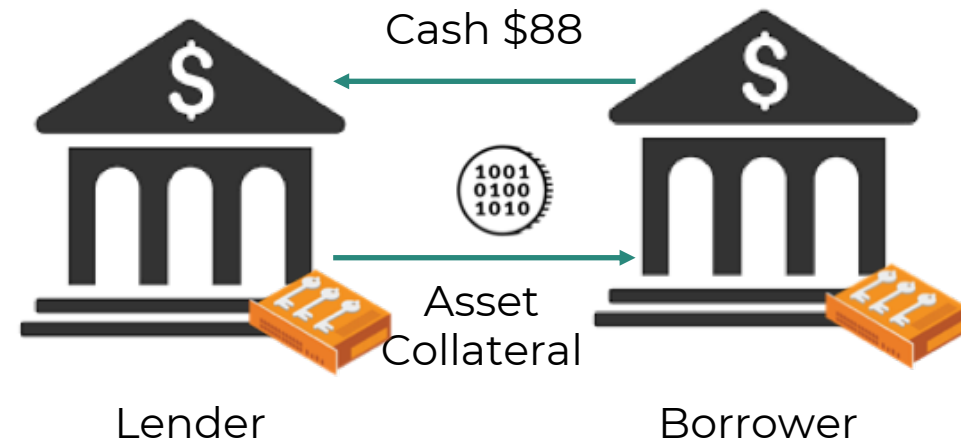
Asset collateral movement can be significantly slower than cash movement. T+2.

# Repurchase Agreements (Repo)

Step One: Sale



Step Two: Buyback



Asset movement can be instant just like cash movement.

- Institutional tokens can reduce costs, eliminate settlement latencies, reduce risks, and increase returns
- Present day token transfer systems fall short in delivering these benefits.
- A new token transfer system is required.
- Half Epsilon provides such a token transfer system.



# Thank You!

If you liked this deck, share it!

Contact: [pralhad@halfepsilon.com](mailto:pralhad@halfepsilon.com)