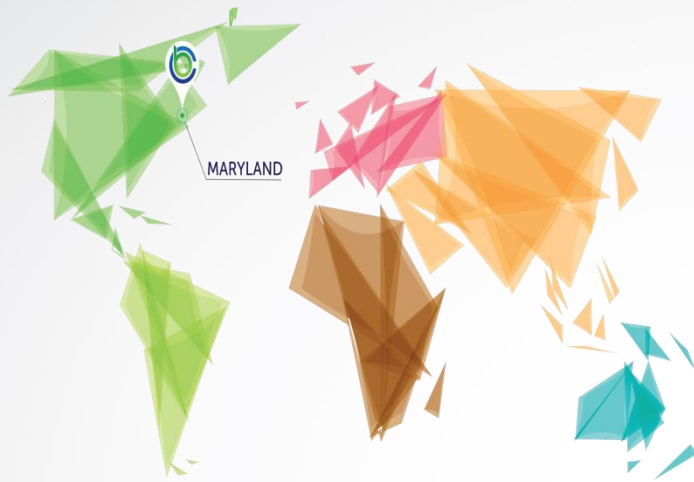**Blockchain Development for FinTech**
(POC)

www.cyberbahntas.com

About Cyberbahn Training & Advisory Services

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MARYLAND

LEADERSHIP

- Blockchain Training
- Blockchain Development

LONG TERM RELATIONSHIPS

- 100% Referenceable clients
- Trusted advisors based relationships
- Technology specialization
- Excellent customer satisfaction ratings

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Training and Advisory Services

Cyberbahn Training & Advisory Services

About Us

Cyberbahn Training & Advisory Services offers certified Agile and Blockchain training. We also provide advisory consulting in organization transformation strategy, change management, DevOps, assessments, coaching, and SAFe. Please also use our site as a resource guide for online training videos, glossaries, templates, book recommendations, etc.

Our Vision

Exceeding our customer's expectation through CyberBahn's brand value, dedicated and experienced teams, delivering ahead or on time always within budget ensuring success.

In all of our service lines or verticals, we adhere to the strictest project management principles to ensure that projects are delivered on time, on budget, and with high quality results. Many of our professionals have earned either PMP® or SAFe certification.

Our Mission

CyberBahn's mission is to be an integral part of our client's efforts to achieve their strategic business goals. We adopt proven business processes, Agile methodologies including risk mitigation strategies, user-centric approaches that are fully compliant to foster cost reduction and on-time delivery with seamless integration in every project.

24+ countries currently investing in DLT

Global interest

Research

2,500+ patents filed over the last **3** years

Bank experimentation

80% of banks predicted to initiate DLT projects by **2017**

DLT activity

Consortium efforts

90+ corporations have joined blockchain consortia

Venture capital

Over **US$ 1.4 billion** in investments over the past **3** years

Central banks

90+ central banks engaged in DLT discussions worldwide

Awareness of DLT has grown rapidly, but significant hurdles remain to large-scale implementation

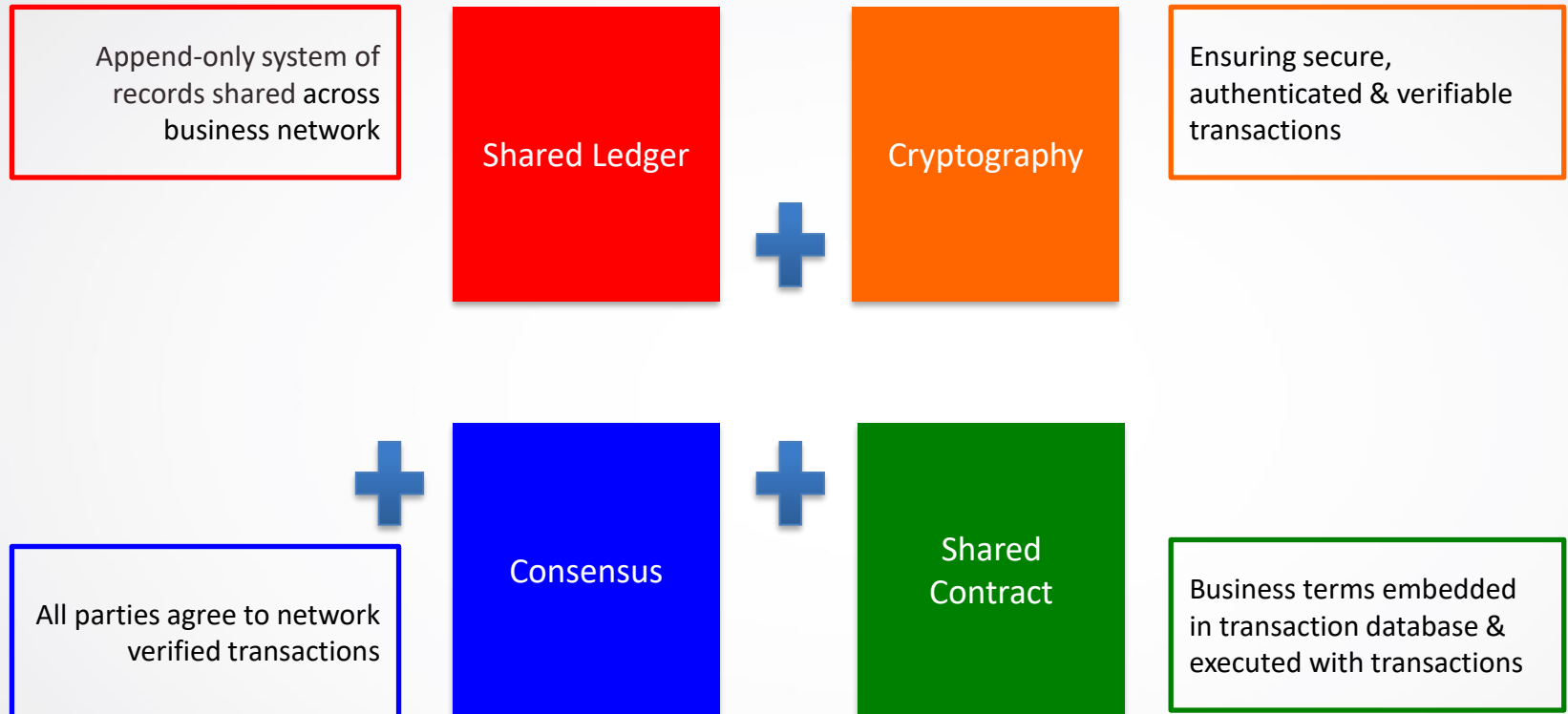An uncertain and unharmonized regulatory environment

Nascent collective standardization efforts
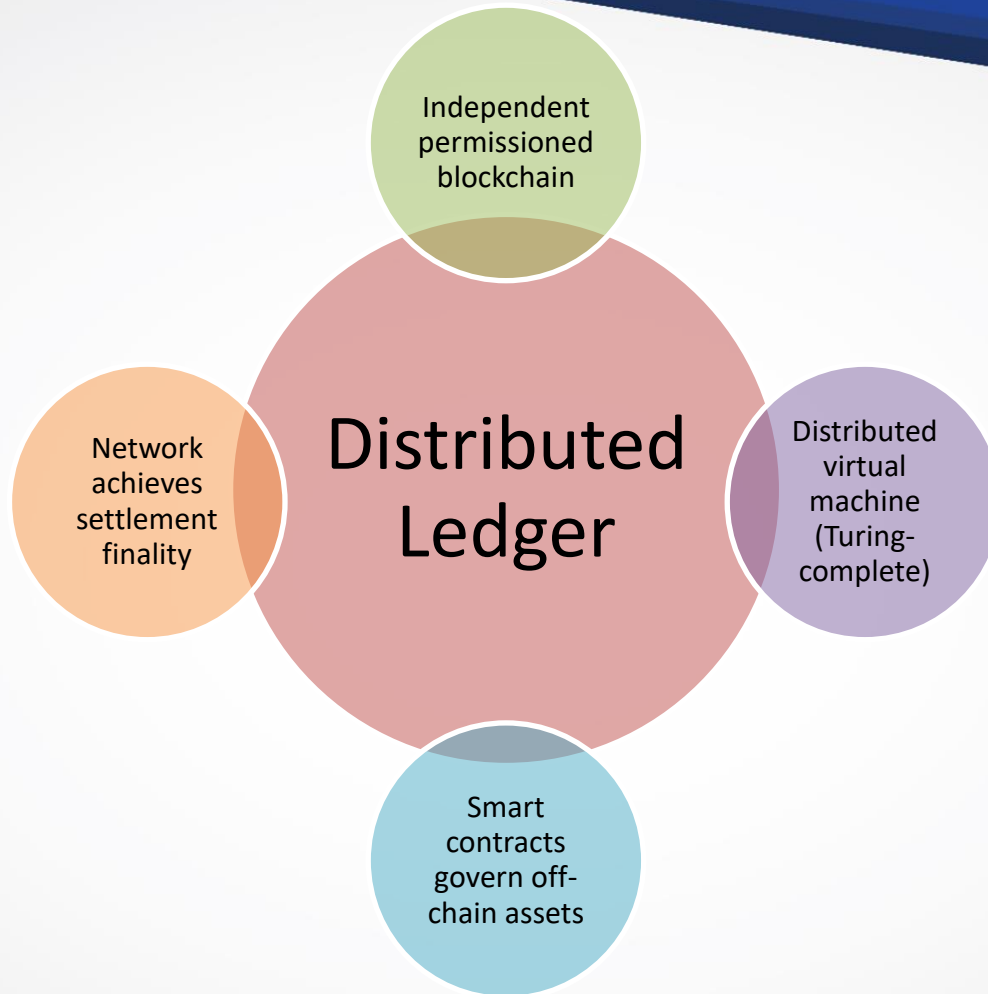
An absence of formal legal frameworks

Source : World Economic Forum – Aug 2016

Blockchain in a nutshell

Append-only system of records shared across business network

Shared Ledger

+

Cryptography

Ensuring secure, authenticated & verifiable transactions

+

All parties agree to network verified transactions

Consensus

+

Shared Contract

Business terms embedded in transaction database & executed with transactions

Broader participation, lower cost and increased efficiency

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Blockchain is an emerging technology that can radically improve banking, supply-chain and other transaction networks, giving them new opportunities for innovation and growth while reducing cost and risk.
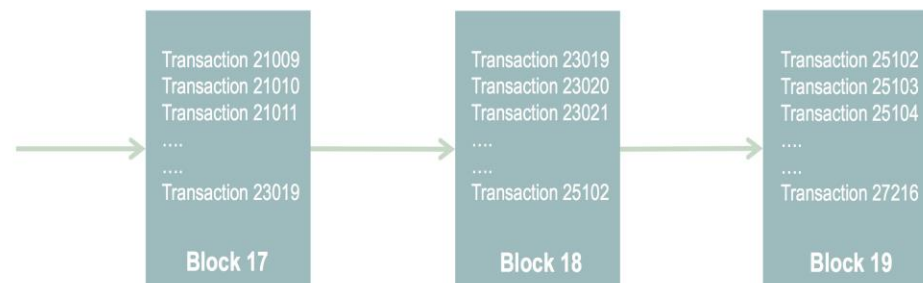
Economic transactions on a distributed ledger can be programmed to record virtually anything of value: your identity, a will, a deed, a title, a license, intellectual property, and also almost any type of financial instrument.

"How seriously should we take this? I would take it as seriously as we should have taken the concept of the Internet in the 1990s."

—*Blythe Masters, DAH* http://bit.ly/1JENgb4

Secure and trusted record keeping

By design, no one party can modify, delete, or even append any record to the ledger without the consensus, making the system useful for ensuring the **immutability of transactions, contracts, and other legal documents**.

Transaction 21009 Transaction 21010 Transaction 21011 .... Transaction 23019	Transaction 23019 Transaction 23020 Transaction 23021 .... Transaction 25102	Transaction 25102 Transaction 25103 Transaction 25104 .... Transaction 27216
Block 17	**Block 18**	**Block 19**

Blockchain

Transaction	Block	Blockchain
Inputs from network participants that describe changes in asset control, or insertion of contracts and/or related legal documents.	Among other things, a block contains a list of validated transactions defined around the time frame when the block was created.	A **record repository** of ordered collection of blocks. It records the **history** of asset control and state changes, as well as creation of contracts and legal documents.

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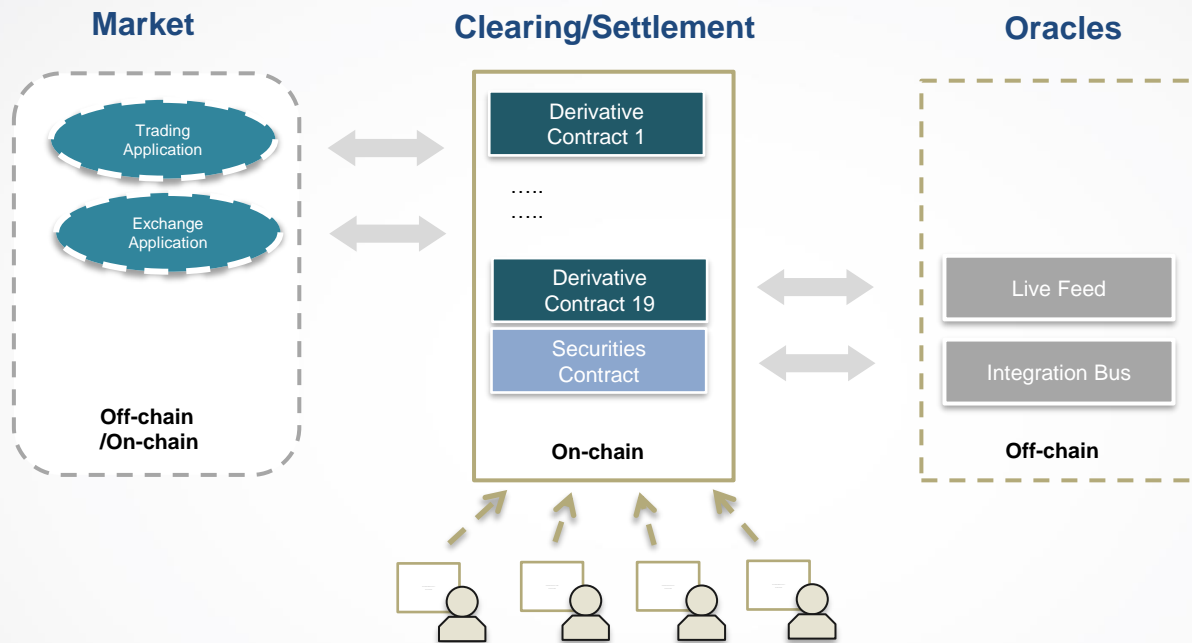
Financial Instruments

- Payments – Cross Border, P2P, Corporate and Interbank
- Private Equity
- Bonds
- Derivative Commodities
- Trading Records
- Spending Records
- Mortgage/Loan Records
- Microfinance
- Servicing Records

Stack of Processes

- Clearing Networks
- International Transfers
- Clearing and Settlement
- Auditing, Reconciliation, Reporting and Settlement
- Asset Ownership

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Blockchain for Financial Market

Trading, clearing and settlement functions can all be automated on a blockchain network using smart contracts and oracles.

Market	**Clearing/Settlement**	**Oracles**
Trading Application	Derivative Contract 1	
Exchange Application	....	
	Derivative Contract 19	Live Feed
	Securities Contract	Integration Bus
Off-chain /On-chain	**On-chain**	**Off-chain**

Market	**Clearing/Settlement**	**Oracle**
Trading/exchange applications can live either on-chain or off-chain (i.e. off-chain applications are often more centralized, but likely offer better latency).	Final clearing/settlement of financial assets can be automated through smart contracts, which have direct access to assets defined on chain.	Oracles are off-chain services that integrate on-chain contracts with existing systems. Network participants do not interact with oracles directly.

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Financial Service use cases for Blockchain

Blockchain for Banking

Letters of Credit
Blockchain Technology provides banks that handle letters of credit (LOC) for their clients with a common ledger that allows all parties to have the same validated records of transactions and fulfilment of conditions, which can increase trust and execution speed from 4 days to <1 day.

Corporate Debt
Banks can use Blockchain-based systems to pay vendor invoices for corporate clients immediately upon receipt for the highest net discount, while enabling clients to validate the payment transaction in real-time. Banks don't need to build another system for innovative factoring use cases and government oversight measures; the system can be built at a market-level, which means that one system can be built that handles all client relationships, which reduces the cost of building and maintaining the system.

Repurchase Agreements
As a repurchase agreement trader, banks need a transparent marketplace of bids and asks so that they can discover, trade and execute agreements with relative assurance that there will be no repudiation or other issues. Blockchain enables equality among trading partners in the network, direct trade, and shared costs/risks.

Supply Chain and Self-Executing B2B Contracts
Corporate buyers may submit their purchase contract to a network shared with suppliers, which converts the agreement into a validated, trusted, self-executing process so that when the PO is appended to the ledger, supply has been received, or other events occur, the terms of the contract are automatically executed. The supplier, the buyer, their banks, logistics partners and other stakeholders all have visibility and can be assured of proper completion of the transaction.

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Blockchain for Banking Consortia

Security Services	**Security Settlement:** Once financial assets are dematerialized on a shared ledger, all stakeholders will have direct access to the asset repository and the power to settle trades, without always going through intermediaries needlessly. **Post-Trade Operation:** Post-trade processes such as trade capture, enrichment, confirmation/affirmation, clearing and settlement can be automated on a shared ledger, potentially reducing post trade operation time from days to seconds. **Trade Repository:** By design, Blockchain is a secure record repository of ordered collection of financial transactions. It records the history of asset control and state changes, reducing the need of maintaining a separate trade repository for record keeping.
Capital Market	**Derivative Trading:** Connect potential buyers and sellers on a decentralized network. Offers placed on Blockchain network can be automatically seen by all participants, the network will be cheaper and potentially bigger than ECNs today because the risk and the cost of maintaining the network is spread across all participants (there will not be a single owner charging premium for maintaining the service.) **Derivative Post-Trade Management:** Derivatives contracts can be managed and automated through smart contracts on a shared ledger, significantly cutting down the management cost and time while reducing the intra-day risk. **Syndicated Loan:** Help borrowers and arrangers to broadcast their offers to all potential investors on a Blockchain network and to automate the syndication process.
Trade Finance	**Cross-Currency Payment:** Automatically connecting market makers and bypassing intermediaries to significantly reduce the time taken for cross currency payment from days to seconds.
Card Operation	**KYC:** Credit card issuers can record customers' credit histories on a shared ledger so that customer information can be easily shared (or sold) between companies.

We bring the expertise capabilities as well as necessary tools …
- Experts in Blockchain, identity management and cryptography technologies.
- Experts in Software product engineering and BPM.
- Domain experts in supply chain, healthcare, ERP and financial services.

…to execute in this field:

We are currently developing POCs and conducting research in

- **Proof of Concept in Banking:** Our Blockchain and product development team is currently working on developing proof of concepts in banking use cases on the Ethereum blockchain.
- **Identity, Certificates:** In order to transact on the Blockchain without exposing strategic information to others, a party's identity must be transparent to the party it's transacting with while opaque to others. Our team has developed sophisticated user identity management solutions in several of its products.
- **Inter-network services:** In addition to identity management, current Blockchain platforms are challenged in enabling cross-ledger services. Say, for example, a bank performed KYC on a merchant in one network, and now the same bank is working with the same merchant in another network. Why do KYC twice? Our team has developed innovative interoperable service components to manage inter network communication.

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Loyalty Reward Program using Blockchain

(Implementation of proof of concept)

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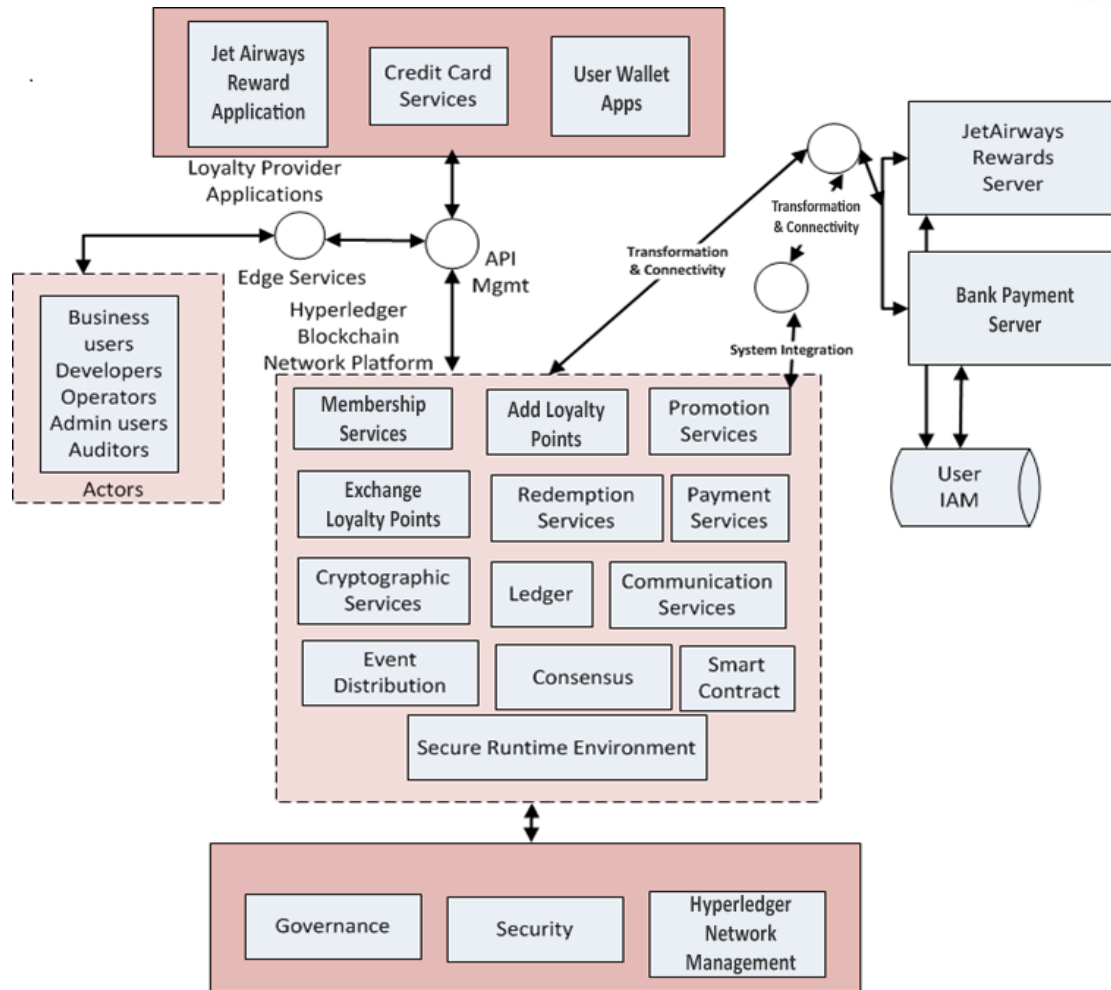# Loyalty Reward Program POC – What we are trying to solve..

- Too much fragmentation in loyalty Industry

- High rate of Loyalty rewards account inactivity and low redemption rates -unclaimed rewards are accounted for liabilities on company balance sheets

- Difficult for loyalty reward providers to setup or enter loyalty program partnership due to poor interoperability among enterprise systems

- High transaction, system management, and customer acquisition costs

- Low customer retention

- 53% of customers are unhappy with their loyalty program

- Improve customer privacy and transactional security

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Loyalty Reward Program POC – Solution Overview

Our Loyalty Reward Program POC based on Ethereum Platform:

- **Loyalty Network Platform** – Permissioned blockchain network based on Hyperledger blockchain technology that could accommodate different organizations and their loyalty programs (e.g. Jet Airways Reward Program)

- **Loyalty Tokens** – Loyalty reward points implemented as algorithm generated Ether-based crypto tokens.

- **Digital Wallets** – Multisig Digital wallets created for users and loyalty provider reward applications to connect to loyalty network platform for loyalty point earning, exchange and redemption transactions. For the purpose of POC, we use Mist, EthAccount and Geth wallets. The loyalty provider reward applications and bank were connected through their wallet accounts to the Ethereum blockchain.

- **API Management** – The API calls between reward application, bank, user wallets and blockchain platform are made using secure REST web service calls. These API calls were made as wrappers to web3.js API calls which invoke smart contract functions related to loyalty reward transactions (earn loyalty points, exchange points, redeem points and read user wise loyalty point balance and transaction history.)

- **Security/Authentication Services** – All Users, enterprise applications and the loyalty reward transactions are authenticated using PKI based authentication (X.509 certificates) backed by blockchain security layer. Enterprise users and their roles are authenticated using an open source Identity access management e.g. OpenIAM system.

Our Loyalty and Reward Program is designed to be:

- Secure in Access, Transmission and Storage of data

- Based on Modular components

- Smart contracts with fine grained ownership checking rules to secure transactions

- Smart transactions. Example:
  - when a member earns loyalty points – it updates transactions and balances, statements and transaction receipts
  - when a member redeems , it refers/updates comprehensive catalog options and fulfilment tracking

- Promotion manager with configurations e.g. SKU, Loyalty promotion, Earn x jet air miles per $ spent, first time purchase reward etc.

- Hyperledger Blockchain distributed transaction ledger to provide information on members identity and profiles, promotions and transaction history (loyalty points earnings, redemptions and transfers)

- User identity access management to control permissioned access to the blockchain

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Loyalty Reward Program POC – Results

As a result of successful POC , our team was able to:

- Setup a Permissioned Blockchain loyalty reward network based framework between merchant, bank and customer

- Near Real time transaction updates across various stakeholder systems (e.g. users, merchant, bank). For example: transactions updated in near real time in merchant and bank distributed ledger nodes

- Developed user wallets to interact with loyalty program smart contracts deployed in blockchain

- Identified further Scope of work to extend POC use cases, e.g.:
  - User wallets to be developed as android and iOS mobile apps to interact with loyalty blockchain system
  - Development of real time notifications to update fulfilment tracking and customer service updates post redemption of loyalty points
  - Updating banking and merchant statements to clear off liabilities on redemption of loyalty points with real time updates
  - Promotional management of loyalty rewards
  - Promotion and Integration of loyalty reward system on social media

Thank You

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