Cross Border Payments for a Multinational Bank

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1. Business Context:

Cross border payments for multinational / Global banks are done with correspondent banking systems with the help of market makers using swift messaging infrastructure.

2. Problem Statement:

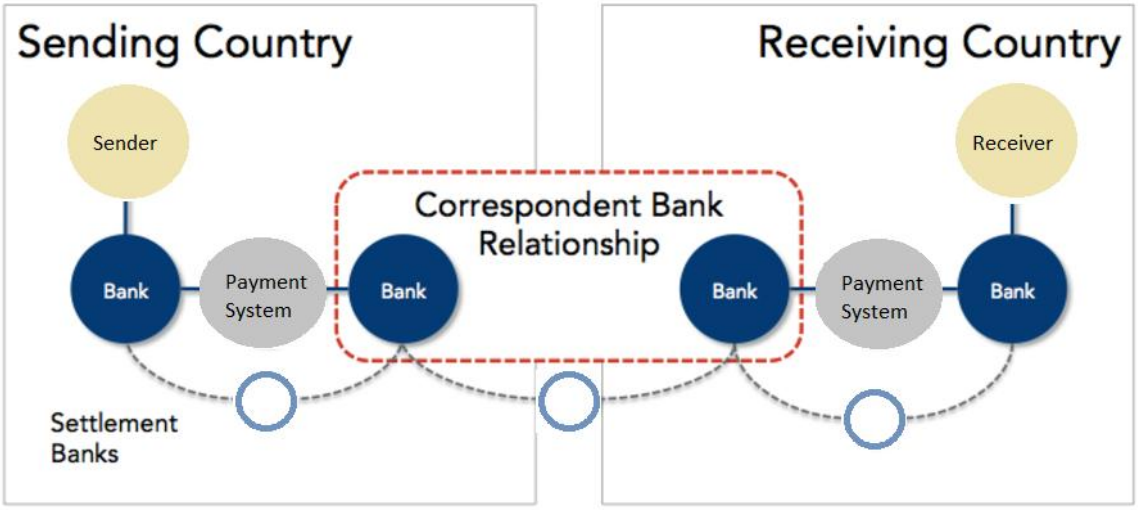
Can we have a platform common for multiple cross border banks (or an individual bank in cross country) an optimized cross border payment processing solution which can eliminate the processing time and cost and operational overheads involved in the reconciliation in the correspondent banking system with option to eliminate the dependencies and cost effective solutions provided by payment messaging infrastructure like swift.

2.1 Scope:

Cross border payment for a multinational bank between its multiple countries using blockchain infrastructure

3. Challenges with the existing system:

- Region/ country specific payment systems
- Only banks that are licensed and regulated in a country have access to its payment system
- Banks are dependent on each other
- Each bank is making an independent decision about how to send, receive, and settle payments
- Time and cost to realize the payments.
- Barriers to change
- Dependency on the payment processing infrastructure like swift.



4. Why Blockchain

Blockchain / Distributed ledger technology features which have transformative potential to challenge the existing systems and can provide solutions to these concerns which were used by the conventional businesses

- Distributed ledger network can solve the need for individual books of record maintained by individual banks by providing a common blockchain platform solution
- Shared ledger will provide the single source of truth in common to eliminate the need for reconciliation of the records and the transparency between businesses

Features provided by blockchain and its impact and potential applicable to the in scope business problem is detailed in section below

5. Blockchain Benefits

Blockchain has characteristics and solution abilities that can provide solution to eliminate already mentioned challenges above, how blockchain characteristic are impacting each of the existing concerns and provides the value addition to the business problem is detailed below

Value Drivers	Blockchain Characteristic	Transformative Benefits
Operational simplification	Shared Ledger	DLT reduces / eliminates manual efforts required to perform reconciliation and resolve disputes
Security	immutability	Eliminates need for reconciliation, Provides historical single version of the truth, also safeguard the data manipulations and tampering
Regulatory efficiency improvement	Platform based compliance	DLT enables real-time monitoring of financial activity between regulators and regulated entities
Counterparty risk reduction	Autonomy	DLT challenges the need to trust counterparties to fulfill obligations as agreements are codified and executed in a shared, immutable environment
Clearing and settlement time reduction	Platform based Trust	DLT eliminates the need of third parties that support transaction verification / validation and accelerates settlement
Liquidity and capital improvement and ease of currency conversions	Crypto-Currency	DLT reduces locked-in capital and provides transparency into sourcing liquidity for assets and fiat to fiat currency conversion needs by provide global single conversion currency
Fraud minimization	Single Source of truth	DLT enables asset provenance and full transaction history to be established within a single source of truth
Legacy Technology up-gradation	Blockchain network	Can be used eliminate cost effective messaging infrastructure available in the market today

6. Solution approach:

Core banking solution today is used to perform the existing system and in order to evaluate blockchain adaptability in cross border payment system will have a sub system developed around blockchain to record the cross border payment processing transactions only, subsequently it would synchronize its data with the conventional banking systems.

Proposed solution approach will mainly have 3 major subsystems as detailed out below in the business architecture diagram

Initiate Remittance:

Existing Banking frontend channel systems will be used to process the for payment initiation for the Remittance, payment initiation, validation and KYC will be done along with AML and currency conversion process and then processing will be routed to the blockchain platform for the actual processing of transaction

Process Remittance:

Blockchain network infrastructure solution which will be common decentralized platform where cross border banks will be member of this peer to peer network

This platform would

i. Accept all the payment instructions received

ii. Validate the payment transaction

iii. Record the payment instruction on the shared ledger

iv. Notify / invoke counter party banks channel to process it further

Realize Remittance:

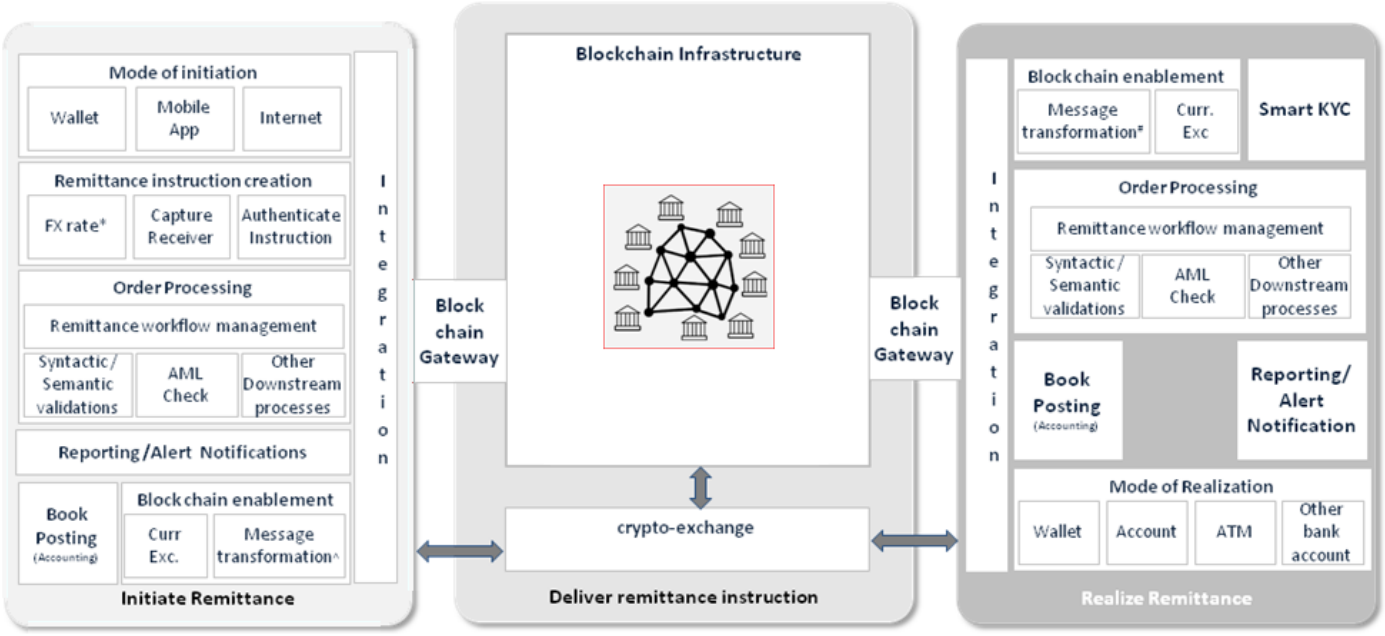
Upon receiving the notifications from the blockchain platform to process the payments, conventional banking systems would be

i. Convert the payment messages to the required formats required based on the payment to be processed with the existing infrastructure availability of standards

ii. Perform payment validations

iii. Realize the payment thru the existing payment gateway

6.1 Business Architecture:



6.2 Specific Alternatives:

Two specific alternatives are proposed in order to compare the current availability and the maturity of the enterprise blockchain platforms to provide the solution ability

6.2.1 Option1: (without Crypto-Currency) Using existing bank solutions for currency conversion and liquidity management

Business Implications:

- Focus on using existing Banking solutions without reinventing new solutions to manage core banking aspect
- Phase wise elimination of payment messaging infrastructure like swift for cross border payment and subsequently adopting the blockchain based infrastructure in core banking
- Improved settlement time between country specific banks
- direct interaction between sender and beneficiary banks, and eliminate the role of correspondents
- Reuse of existing liquidity management and currency conversions solutions
- Reduced complexities to define and adopt regulatory needs.

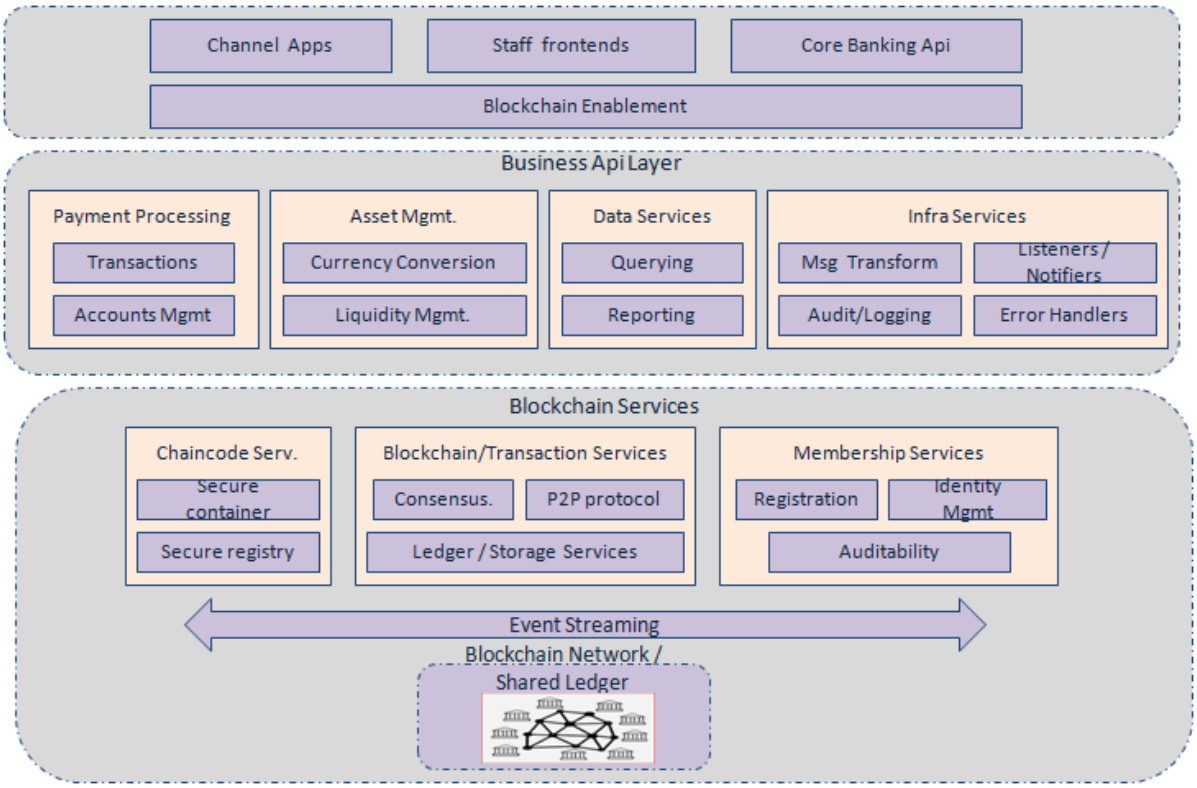
6.2.2 Option2: (with Crypto-Currency) Using Blockchain based crypto currency for single uniform currency exchange between fiat currencies

Business Implications:

- Crypto currency based conversion will eliminate the complexities in multiple currency conversions needs across multiple fiat currencies.
- Cost saving on currency conversions
- Single crypto currency based account will help optimized liquidity management.
- Faster payment processing timelines
- Reduced operational burden of correspondents and settlements
- Eliminate cost of external payment messaging infrastructure.

6.2 Logical Architecture

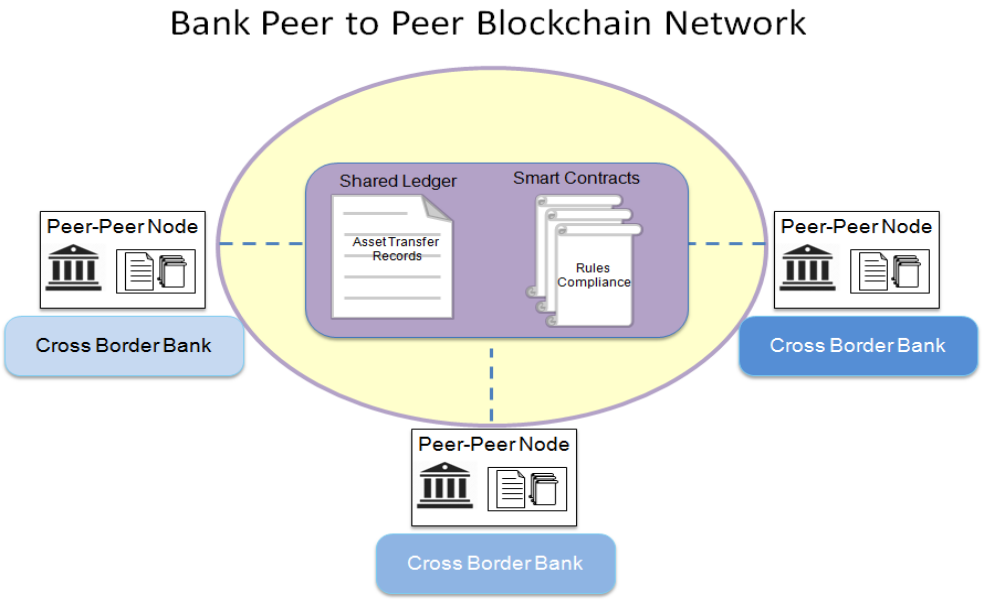
Logical architecture view of the business solution as follows



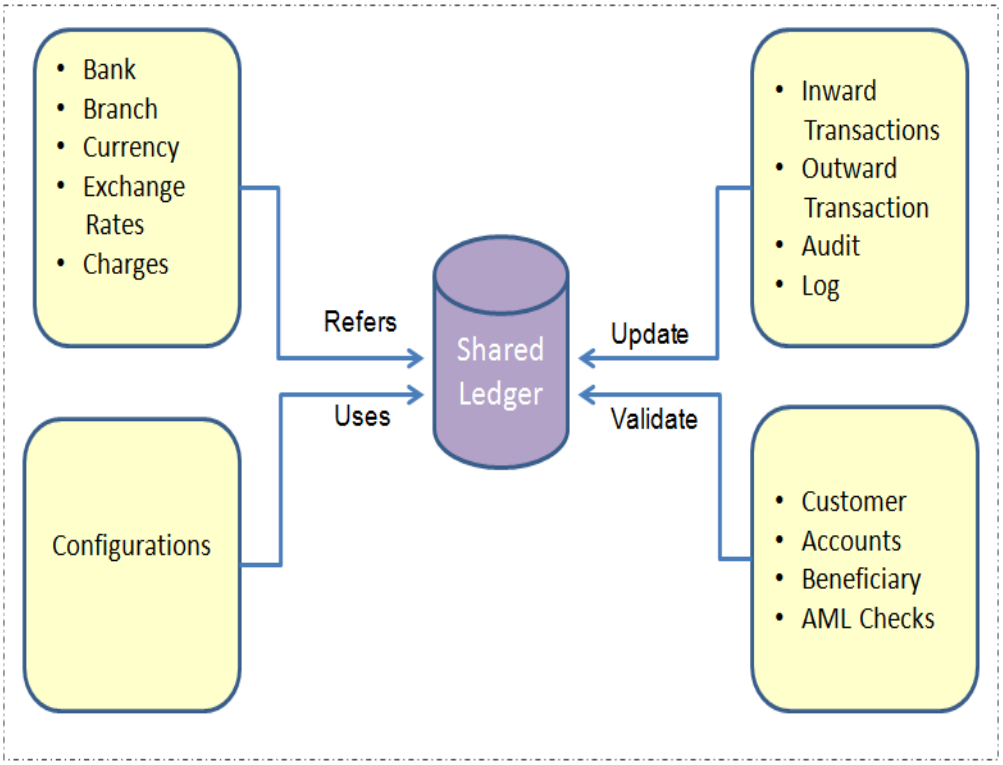
6.3 Physical Architecture:

Proposed Blockchain network that would be formed is between the same banks between 2 or more countries private to the data centers of the banks infrastructure.

Each country specific bank would be hosting a peer to peer blockchain node consisting of the shared ledger and the common business smart contracts.



6.4 Data Model:



6.5 Solution Features:

- Real-time settlement of international money transfers can increase profitability by reducing liquidity and operational costs
- Utilizing DLT will enable direct interaction between sender and beneficiary banks, and eliminate the role of correspondents
- Smart contracts can capture obligations and drive reporting, minimizing operational errors and accelerating outcomes

7. Tools and Technologies:

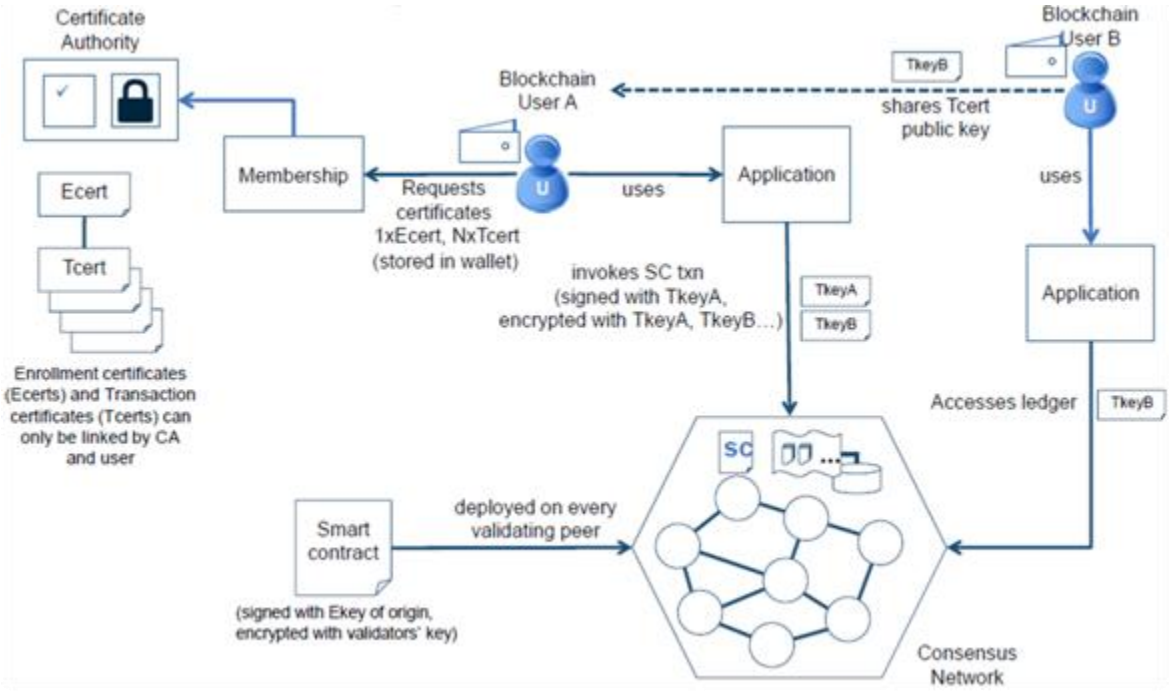
Technology Stack				
User Interface	API	Blockchain Network	Smart Contract	Deployment
AngularJS	spring	Hyperledger		docker
Bootstrap	node	CouchDB	Java	Vagrant
HTML5 CSS3	Java	levelDB		

8. Hyperledger Fabric Platform Features:

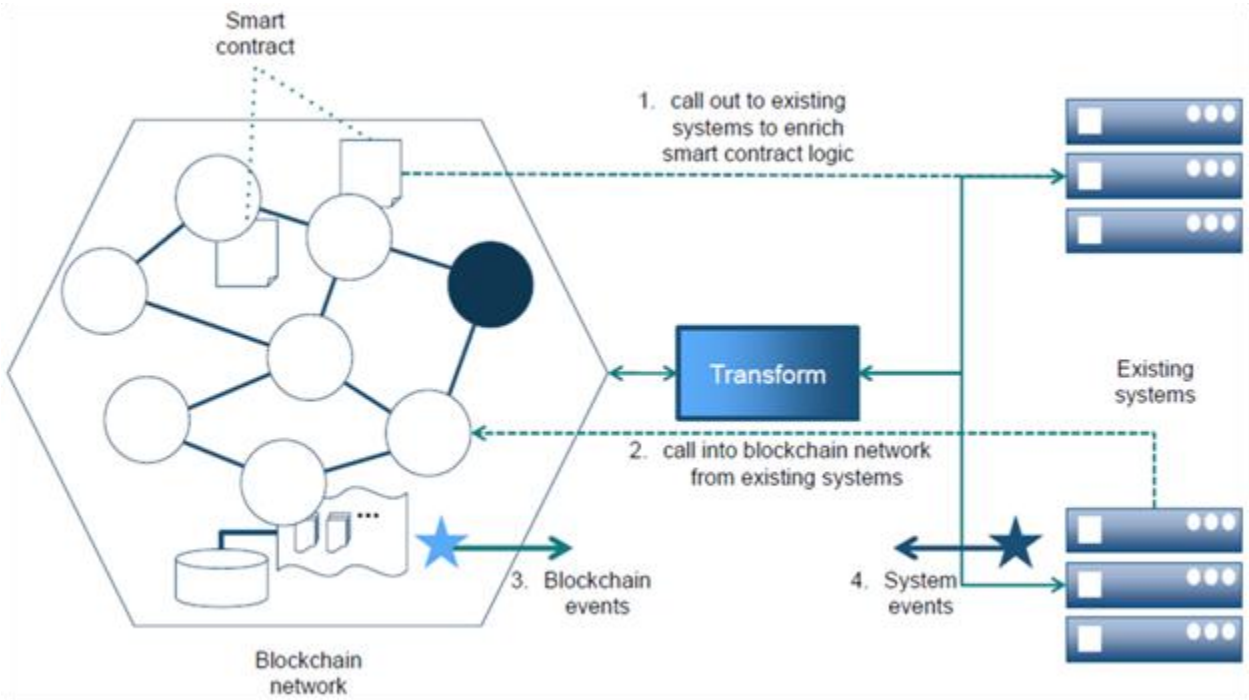
- Permissioned shared Ledger with Need to know basis data sharing
- Identity Membership provider to manage members and permissions
- Separate Membership and Transaction certificates to members for security
- Chaincode (smart contracts) to endorse and validate the transactions on the shared ledger
- Enterprise grade and modern technology support like Rest / APIs with Docker containers.

Permissioned Ledger Access:

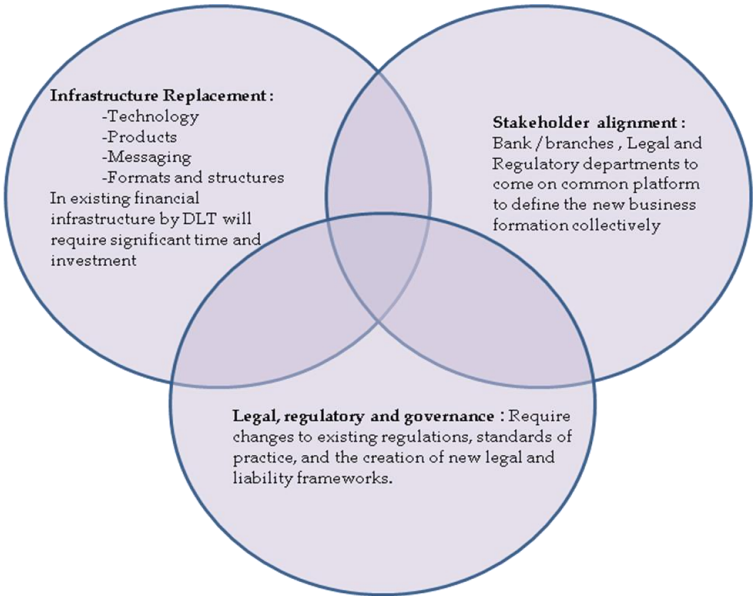
- User registers on the network. In return the membershipsrvc will create 1 Enrollment Certificate and n Transaction certificates
- Blockchain Developer User creates a Smart Contract (SC) and deploys it by signing with his Enrollment Certificate. The SC is deployed on every VP
- Blockchain User A invokes SC using his Transaction Certificate
- Blockchain User B (Auditor) queries SC using Blockchain User A's Transaction Certificate (keys)



Blockchain Integration with existing applications:



9. Challenges in realizing solution



10. Conclusion

A blockchain-based solution offers a unique set of advantages over the current crop of technology solutions, given its immutable ledger that can be replicated across different nodes and use of cryptography to convert information to hash codes for secure distribution over peer-to-peer network. These features enable seamless and secure exchange of information between different trusted entities. Cross border payments can take advantages of the transformative abilities of the blockchain platform.

