Article No. 2

DIGITAL TECHNOLOGIES RESHAPING CROSS BORDER PAYMENT SYSTEM

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Abstract: Cross border payments are complex in nature as a general rule as there are different parties, different currencies, different regulations, different technologies and many sub transactions involved to complete a cross border transaction. There exists various formal, semi-formal and informal channels for cross border payments and numerous technologies have been adapted to facilitate these transactions. After Globalization and due to continuous technological advancements, these transactions are becoming more and more important. Therefore, there is an increasing interest to understand the technological innovation facilitating international payments as it is revolutionizing and reshaping the financial service providers' facilities and business. This paper examines the literature to study the concept of cross border payments, to review the very popular and much talked about technology these days i.e. blockchain technology in context with cross border payments and to review the early mover XRP, a product of Ripple supporting cross border payments. Also, in this article, we will discuss the benefits and challenges of implementing blockchain technology and will explain how public and private platforms are integrating this technology.

Keywords: Cross Border Payments, Blockchain, Digital Technologies, Ripple, XRP

Introduction

Payment and settlement system in any country plays a very significant role as it gives the methods for conducting trade, business and other economic activities easily and efficiently. The system has to be safe, secure, sound, efficient and accessible as it plays a very important role in the overall growth of a country. India has a long history of payment methods and instruments ranging from barter to coins to credit instrument to currency to digital systems. Digital systems facilitating electronic/digital payments, even with related charges have its own benefits like safety, immediate settlements and more affordable in contrast to other options available in the market.

Today, India has multiple systems of payment and settlement. These includes both gross and net settlement systems. With the help of these systems like RTGS, NEFT, IMPS, ECS etc., the fund transfer has become easy and fast within the country but these systems are not able to support the entire process of cross border payments as a whole as cross border transactions involve different currencies, different regulations and different technologies supporting the fund transfer systems in different countries. It is a known fact that cross border payments are becoming more and more important because of globalization and growing economy, therefore technological innovation facilitating international payments is revolutionizing and reshaping the financial service providers'

facilities and business. In this paper we propose to study the concept of cross border payments and to review the very popular and much talked about technology these days i.e. blockchain technology in context with cross border payments.

Objectives of the study:

To study the concept of cross border payments
To review the blockchain technology in context with cross border payments
To review the early mover XRP, a product of Ripple supporting cross border payments.

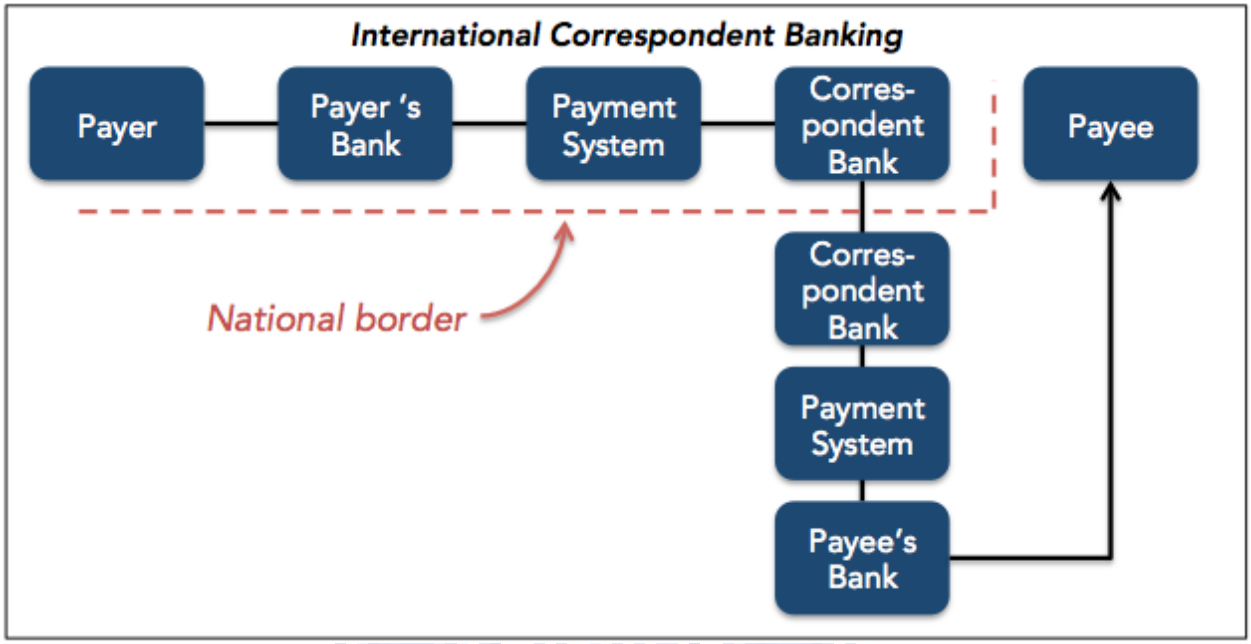
Cross Border payments:

Cross-border payment is a transaction in which a company or individual in one country transfers money to an individual or company operating in a different country. For example, a trade between India and Singapore requires a cross-border payment.

Globalization is driving organizations to execute the cross border transactions very frequently. India is among the fastest growing economy in the world doing many businesses and other economic activities with the other economies in the world. Individuals as consumers are transacting more on a global basis as they are travelling abroad and buying from foreign eCommerce sites and people who are living and working abroad send the money to their country back home called Remittances. Remittances are an important source of family and national income and also are one of the largest sources of external financing. As per World Bank statistics, India is expected to retain its position as the top remittances receiving country, with its remittances set to whopping $65 billion in the year 2017, followed by China ($61 billion), the Philippines ($33 billion), Mexico (a record $31 billion), and Nigeria (($22 billion). Because of all these growing activities, the volume of cross border payments has increased tremendously in terms of both number of transactions and value. India has emerged among the top preferred destinations for the firms to provide international payment services. Therefore, innovation in cross border payment systems are very significant for India's growth.

Cross-border payments are complex because generally direct participation by banks in other countries are not supported by national payments systems. Therefore, international correspondent banking network handles every non-cash cross-border transaction in one way or another.

In India, we have both formal and informal channels of cross border payments. Cross border payment involves a sender, a recipient, intermediaries in both countries and the payment interface used by the intermediaries; all these together constitute a cross border payment transaction. As many parties are involved in a cross border payment transaction, generally it takes too much time to transfer the funds and the cost is also high. A typical example of a cross border payment with international correspondent banking would be as follows:



Suppose, a domestic customer in India having an account in Bank A, wants to send money to a supplier in Singapore. The supplier has its bank account in Bank B in Singapore and the details of this account has been shared with its customer. The customer gives the payment instruction to Bank A (through its online banking system). Bank A, then choose a domestic correspondent in India, say Bank C, for this payment and makes a payment to Bank C through its in-country wire transfer system. At this point, Bank A task is done! Suppose, Bank C has an arrangement with Bank D in Singapore to handle such transactions, so Bank C notifies Bank D that it wants a wire transfer sent from Bank D to Bank B, to credit the customer's account of Bank B. Bank D effects the transaction and Bank B receives funds, which it credits to its customer's account.

But in this arrangement, Bank C has the money and Bank D has sent it out. So, how will these positions have settled?

In this example, it might be possible that as a part of their correspondent banking relationship, Bank C and Bank D have agreed to settle their transactions daily, on a net basis, by making funds available/withdrawing funds from a set of accounts both banks hold. In this example, let's say at Bank E, in London.

To facilitate these transactions, each bank has a correspondent banking department with the staff who is responsible to perform these settlement transactions. The accounts these banks maintain with each other are known as nostro accounts (our account with you) and vostro accounts (your account with me).

Each bank makes an independent decision about how to send, receive, and settle payments therefore, there are various combinations and options available with the

banks/financial institutions to execute these transactions, which may make these arrangements complex, unclear, time taking and costly too.

Though in this competitive global world, businesses and consumers simply need to move their money around the world as easily as they send email. The only thing stopping them might be unclear, time taking, costly international payment infrastructure/arrangements. More the intermediaries involved in an international transaction, more is the time consumed and more is the expense to execute the cross border transaction.

In present scenario, by means of innovations in new products and ways, this system is changing. There have been various advances in digital technology used cross border payment system which has improved operational efficiency to the point where payments can be sent immediate/ real time and a quick transfer of money internationally is possible. In the last one year itself, we can witness many large commercial banks, remittance companies and fintech firms introducing new products facilitating faster transactions at very competitive rates. All these innovations in this area is going to benefit India as it is a developing nation and also the largest remittance recipient in the world.

Commonly used formal channels for Cross border payments

The choice of channel for cross-border payments depends upon the availability of services, preference of the sender, receiver and the institutional environment. Further, these channels are divided into formal, semi-formal and informal channels. Formal channels are those which are officially authorized to operate in the money transfer business like banks, Money transfer Operators (MTO) and other registered and authorized institutions. Semi-formal channels are, formal institutions which are well organized but not registered or controlled by any regulatory authority and informal channels as the name suggest are not formal and not regulated by any regulatory authority but often legal. The choice to make out of these channels for the transfer of funds depends upon various factors such as ease of using the channel, institutional infrastructure supporting the transaction in the host and the home countries, speed of funds transfer, cost of funds transfer, hidden cost like foreign exchange rates, government regulations, risk involved, treatment of tax, complexity of the channel etc.

Cross border payments can be cash to cash, cash to bank account, bank to bank account, via credit and debit cards, ATM cards, online transfers, mobile transfers, wallet transfers, via mobile applications etc. Some of the most used formal channels are given below:

Banking channels are traditionally important channel for cross border payments, specially the banks which have huge network in the sending and receiving countries and the participation in the international payment and settlement system. The banks may use their own network or can have an arrangement with the various global operators offering the fund transfer services based on various technologies. The banks even use drafts, telegram, fax and telephone for facilitating the transfer of funds. Wire

transfers are often used for the cross border payments which are transferred electronically or by draft to the beneficiary bank. There are various wire transfer systems and operators providing variety of options depending upon the cost, value, volume and urgency of the transfers. The most famous is the SWIFT wire network. SWIFT is the world's largest correspondent bank network. But these wire transfers have hidden interbank fees on the top of standard service, conversion and lending fees. These transfers can days or weeks to complete. There is lack of transparency and there are chances of delayed and lost payments due to different bank requirements and regulatory laws. Banks also offer various kinds of cards to facilitate the cross border payments. For the transactions using cards, the funds are deposited into a card account with a particular bank and the subsequent transfer of the funds can be transferred to another card holder in the receiving country, which is issued by same bank. Banks also use internet interface provided by technology support providers by integrating the technology provided with their own website.

Prepaid cards, typically sponsored by Visa or Mastercard are also available to be used to make purchases or ATM cash withdrawals. The transfers using prepaid cards can be completed in 24 hours or less and also there is greater transparency in this channel of transfer but it has extra costs related to charges for withdrawal, maintenance fees, activation fees, cross border foreign exchange conversion fees etc.

ewallets or digital wallets are the most recent medium for fund transfers. These are virtual online accounts which contains funds in one or more currency that can be exchanged and stored in it in the form of virtual wallet. It is a convenient process for businesses to deliver instant funds to recipients. ewallets may charge a high fee to transfer funds from these wallets to bank accounts with varied speed of transfers. Also these are available in all the emerging markets only.

Money transfer operators (MTOs) are financial organizations usually other than banks which use their internal system or access to another cross border banking network or use their own outlets or various transfer agents like travel agencies, drug stores, exchange houses, post offices, banks etc. to deliver money to the destination. Generally, same clients approach MTOs and they have wide network and less stringent requirements to be fulfilled. MTOs are very beneficial in emerging markets where credit cards are not used widely and funds can be transferred speedily but as there is lack of transparency, there is a good amount of risk involved in these arrangements.

Blockchain: Recent technology to send money globally

Blockchain technology has the ability to optimize the global infrastructure to deal with global issues in this space much more efficiently than current systems. Blockchain technology continues to redefine not only how the exchange sector operates, but the global financial economy as a whole. A blockchain is a public ledger of all bitcoin or other crypto currency transactions that have ever been executed. A block is the existing part of a blockchain which records some or all of the recent transactions, and once completed, goes into the blockchain as permanent database. Each time a block gets completed, a new block is generated. Blocks are linked to each other (like a chain) in

proper linear, chronological order with every block containing a hash of the previous block. To use conventional banking as an analogy, the blockchain is like a full history of banking transactions. Bitcoin transactions are entered chronologically in a blockchain just the way bank transactions are. Meanwhile, blocks, are like individual bank statements. The full copy of the blockchain has records of every bitcoin transaction ever executed. It can thus provide insight about facts like how much value belonged to a particular address at any point in the past. Some developers have begun looking at the creation of other different blockchains as they do not believe on depending on a single blockchain. Parallel blockchains and sidechains allow for tradeoffs and improved scalability using alternative, completely independent blockchains, thus, allowing for more innovation.

Benefits of Blockchain Technology

- As a public ledger system, blockchain records and validate each and every transaction made, which makes it secure and reliable.
- All the transactions made are authorized by miners, which makes the transactions immutable and prevent it from the threat of hacking.
- Blockchain technology discards the need of any third-party or central authority for peer-to-peer transactions.
- Decentralization of the technology.

Banks and other financial institutions have also been active in investing time and/or money in this space.

Public and Private Blockchain concepts

Public blockchain: A public blockchain is a platform where anyone on the platform would be able to read or write to the platform, provided they are able to show proof of work for the same. There has been a lot of activity in this space as the number of potential users that any technology in this space could generate is high. Also, a public blockchain is considered to be a fully decentralized blockchain.

Examples are:

- Ethereum, a provider of a decentralized platform and programming language that helps running smart contracts and allows developers to publish distributed applications.
- Factom, a provider of records management, records business processes for business and governments.
- Blockstream, a provider of sidechain technology, focused on extending capabilities of bitcoin. The company has started experimenting on providing accounting (considered a function to be done on private blockchain) with the use of public blockchain technology.

Private blockchain: A private blockchain, on the other hand, allows only the owner to have the rights on any changes that have to be done. This could be seen as a similar version to the existing infrastructure wherein the owner (a centralized authority) would have the power to change the rules, revert transactions, etc. based on the need. This could be a concept with huge interest from FIs and large companies. It could find use cases to

build proprietary systems and reduce the costs while at the same time, increase their efficiency. Examples are:

- Eris Industries aims to be the provider of shared software database using blockchain technology.
- Blockstack aims to provide financial institutions back office operations, including clearing & settlement on a private blockchain.
- Multichain, provides an open source distributed database for financial transactions.
- Chain Inc., a provider of blockchain APIs. Chain partnered with Nasdaq OMX Group Inc., to provide a platform that enables trading private company shares with the blockchain.

Blockchain has been one of the most awe-inspiring innovations since the Internet came into existence. Blockchain technology basically allows everyone to hold and make transactions as strangers but in a completely transparent manner. There is no mediator in between two people making the transaction, and the entire process becomes easier and cheaper. This concept can be applied to the entire digital world making any kind of exchange/transactions secure (and not just bitcoin). This article will take you through numerous such business models and companies that are beginning to sprout based on blockchain tech.

The blockchain network consists of nodes, i.e., distributed servers. All the nodes can accept and process the transaction. The nodes on the network share information about the candidate transaction. As much as the logic/tech part of it sounds confusing, the business models are so much easier to understand and are really impressive.

What you have already seen is that blockchain distributed ledger is an in-erasable record of bitcoin transactions. The network of computers around the world running bitcoin software will take care of the performance and maintenance of the blockchain network. About six times per hour, a new group of accepted transactions (a block) is created, added to the blockchain and quickly published to all nodes. This allows bitcoin software to determine when a particular bitcoin amount has been spent.

It is this feature of Blockchain technology that has grown in its popularity amongst large banks, developers and entrepreneurs. Santander Bank, the world's 10th largest bank, has also been investigating blockchain technology. They have announced that an internal team is working on applying blockchain technology and distributed ledgers on various use cases in the bank. Other international banks like Citi and JPMorgan have also been showing interest in Blockchain technology.

Many startups are building their businesses around blockchain technology. Consequently, VC firms like KPCB are showing interest in investing in these startups. While startups like Coinometrics gather data and research on qualitative and quantitative behaviors on blockchains, there are others like BTCJam who provide bitcoin-based loans. A number of other startups built around blockchain technology include BlockCypher, BitPay and

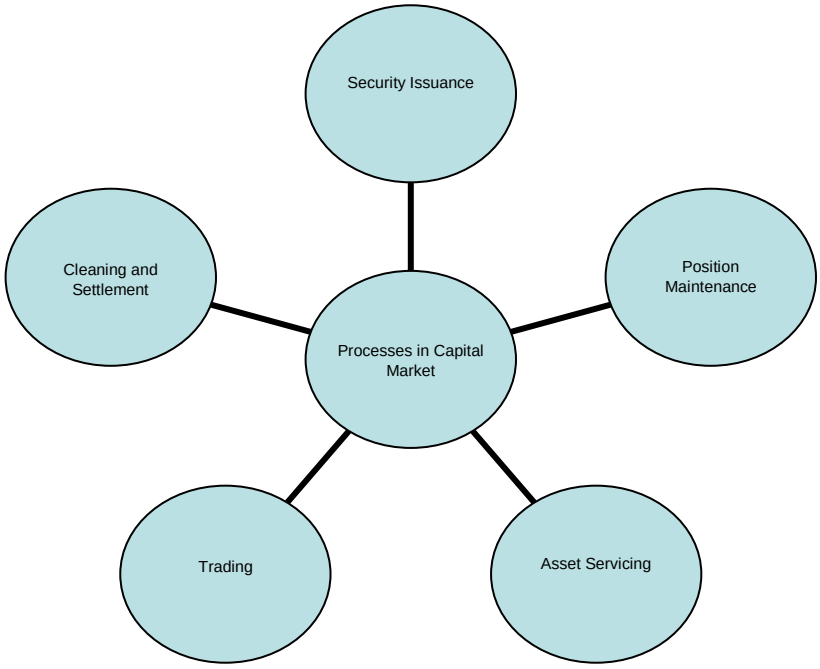
BitPagos. Another interesting startup, Chain, helps companies build financial products around blockchain technology with its bitcoin data API. NASDAQ has chosen Chain to run a pilot around blockchain technology on the NASDAQ Private Market.

Blockchain technology allows everyone to hold and make transactions as strangers but in a completely transparent manner. There is no mediator in between two people making the transaction, and the entire process becomes easier and cheaper. This concept can be applied to the entire digital world, making any kind of exchange/transactions secure.

Importance of Blockchain Technology in Capital Markets

Blockchain technology has been acknowledged as one of the most disruptive innovations since the advent of the Internet. The financial industry has also started looking to leverage it to store and transfer its value to other financial instruments. Capital Markets is one such industry in the financial space where industry experts are optimistic about the use of blockchain technology.

Different processes involved in the Capital Market



Main challenges faced in using Blockchain Technology

For the movement of assets from one institution to another, the ledger balances of these assets have to move. This is a cumbersome job. Involvement of more intermediaries in the transaction results in the exchange of more number of messages. This again results in the updation of more ledgers. There are several intermediaries involved in a trade, like exchanges, central counterparties (CCPs), central securities depositories (CSDs), brokers, custodians and investment managers. For correct accounting and to complete the business transaction, intermediaries need to update their respective ledgers based on the messages

exchanged between them. This essentially means that every time a transaction happens, additional messaging needs to be done. This creates a delay and also additional cost. Sometimes, to enable a particular transaction and the corresponding ledger updates, intermediaries may need to complete a few additional ledger transfers in the form of realignment, securities borrowing or cash management. This introduces additional delays in the transaction lifecycle and is usually referred to as a settlement cycle in capital markets (represented as T+n days, where "T" represents the transaction date and "n" represents the number of days taken for the transaction to be settled).

The use of blockchain technology for creating a shared flat ledger to process transactions between multiple intermediaries is the most important thing the capital market segment expects. The technical solution will help in reducing time and costs involved in a transaction. The solution will also be capable of facilitating the real-time transfer of assets.

Financial institutions can build a shared flat ledger using blockchain technology that can be managed by trusted processing nodes. Using digital signatures, financial intermediaries can update the ledger to complete a business transaction. The shared ledger needs to be encrypted to protect the confidentiality of the data. Key processes involved in executing a trade like security issuance, trading, clearing and settlement can be redesigned and simplified using such a solution. LTP feels that this use case of blockchain technology will be the first thing that companies operating in the capital market segment would like to implement.

Client on boarding & account maintenance is the next segment in capital markets where we will witness the surge of blockchain technology. KYC costs are very high. Reducing the KYC cost and eliminating the number of KYC checks is what companies across the world are looking for. A blockchain system that stored and facilitated KYC data is something which can be implemented that will help in reducing cost and eliminate the number of KYC checks. Blockchain startups that focus on improving identity management are already into the business.

Blockchain technology can be used as open source software to customize and further tailor business rules for transaction processing based on organizational requirements. Areas like over-the-counter (OTC) derivatives and bonds trading will immensely benefit through blockchain technology. Blockchain technology can provide a real-time, cost-effective and secure settlement model that is global and decentralized. So it's just a matter of time before we watch blockchain play an imperative role in capital markets.

Challenges in Adopting Blockchain Technology in the Capital Market

High Standards of Technology: High standards need to be set for the security, robustness, and performance of blockchains. Integration with existing non-blockchain systems such as risk management platforms will also be a requirement in the near future.

Upgrading of Regulation and Legislations: New regulatory principles need to be integrated in order to make blockchain technologies an integral part of the market infrastructure.

Standards and Governance: Industry alignment will be required on certain design point, such as: whether systems are completely open (as with Bitcoin) or use permission-based access requirements; the principles for suitability in interacting with the ledger; and the interoperability between different networks, which may potentially run different consensus protocols and safeguards against coding errors, thus creating unforeseen knock-on effects.

Managing Operational Risk of Transition: Operational risk needs to be minimized. This move will require a quick recovery of participants to revert to the traditional ecosystem as a fallback.

Ripple: Overview

Released in 2012, Ripple provides one frictionless experience to send money globally across a connected network of financial institutions and payment providers using the power of blockchain. Its aim is to enable secure, instant and cost effective financial transactions globally. Ripple's network RippleNet is growing, many financial institutions have already joined the ripple network to process their customers' payments anywhere in the world. It is a decentralized global network of banks and payment providers using Ripple's distributed financial technology, which provides real-time messaging, clearing and settlement of financial transactions. The network facilitates instant, reliable and cost-effective transfers.

Ripple provides a product called xCurrent. It is a standardized technology enabling the ability to message and settle transactions between banks with increased speed, transparency and efficiency. Banks and payment providers can use the digital asset XRP to further reduce their costs and access new markets.

Ripple is completely focused on its enterprise strategy, helping banks with real time settlement for international payments. In 2015, it has launched 2 new solutions for license Cross-Currency Settlement and FX Market Making. Some of the business that have been utilizing the Ripple Protocol are:

Fidor Bank: Munich-based Fidor Bank AG was the first bank to integrate Ripple protocol to provide faster and affordable money transfer services for its customers.

Ethereum: Ethereum provides a decentralized platform for building applications. Ethereum has seen the highest number of projects that are being built on a blockchain platform and also has several interesting, emerging use cases. The projects that are being built on Ethereum are:

Augur, Gnosis: Decentralized prediction market
BoardRoom: Blockchain governance platform

Colony: Platform for autonomous blockchain organizations
BlockApps: Tools to build decentralized apps
Airlock: Keyless access protocol for smart property
Provenance: Gather and share information & stories behind products
Slock.it: Smart locking and billing for the sharing economy
DigixGlobal: Technology to own gold assets
WeiFund: Crowdfunding platform
Maker: Autonomous bank & market maker
HitFin: OTC derivatives settlement
Solidity: Online compiler
EtherPArty: Smart contract deployment tools

XRP enables faster, cheaper and more reliable cross-border payments

XRP is a digital token that offers banks and payment providers a reliable, on-demand source of liquidity for cross-border payments. Today, it takes about three to five days to send money from one country to another through a bank, which usually involves high fees, the risk of the payment being delayed (or never going through altogether). Alternatively, businesses can pre-fund nostro accounts in the recipient's country, which ties up capital. XRP is part of a solution that fixes all these shortcomings, with an average settlement time of 4 seconds, at a fraction of the cost. By allowing financial institutions to source liquidity on demand, in real time, without having to pay foreign transaction fees or pre-fund nostro accounts, XRP will help them to expand into new markets, lower foreign exchange costs and provide faster payment settlement for its customers.

CONCLUSION

In these times of global businesses and competitive world, we can predict a high growth for cross border payments requirement. The financial sector, thus, has to be ready and equipped with various kinds of technical advancements to sustain in the market and deliver up to the customer's expectation. Globally, cross border fund transfers are becoming paperless and increasingly adopting web based and web enabled systems. Therefore, India, being an emerging economy and competitive in the world has to adopt to innovative techniques/ electronic means. In India, the transactions are more of "volume-based" rather than "value based", therefore there has to be cost effective mechanism which can address both micro as well as macro payments. All the banks cannot have their own payment gateway as it is very expensive, time consuming and require special expertise to work on these systems therefore, the banks and other financial institutions tie up with different financial institutions and payment providers to use their services to provide the better services in terms of time, cost, easiness of the transactions etc. to its customers. Keeping all this in consideration, we can conclude that electronic payment gateway are very significant in facilitating cross border payments.

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