



The Empowered Internet Payment Gateway

Ved Prakash Gulati^{1*} and Shilpa Srivastava¹

ABSTRACT

Electronic delivery of products/services and government services are gaining due to the reach and affordability. An Internet E-Commerce Payment Gateway is a critical infrastructural component to ensure that such transactions occur without any hitches and in total security over electronic networks. This component has multiple benefits with critical ones being multiple payment options, secure transmission, multi currency settlements and rapid processing. While there are several payment gateways, the paper proposes a National Internet e-Commerce Payment Gateway that can support all banks and transactions. Many parties are involved in the gateway, but government has a critical role to play as facilitator, owner and user. The Gateway can be used for e-governance, e-procurement, inter-departmental purposes and microfinancing. Ultimately, the gateway results in several benefits for the economy and the common man.

Key words: Payment Gateway, e-governance, government.

1. Introduction

International economy is being increasingly “electronized”, with more and more transactions occurring online and electronic payments increasing significantly to the extent that they are surpassing paper-based payment instruments. In addition, governments worldwide, particularly in India, are targeting electronic delivery of public services and banking activities. Also, the Internet is being tapped for servicing the rural populace due to significant cost benefits and the reach afforded. However, to facilitate increasing volumes, security and efficiency are essential and so is the required infrastructure. An Internet E-Commerce Payment Gateway is a critical infrastructural component to ensure that such transactions occur without any hitches and in total security over electronic networks. A Payment Gateway is the access point to the national banking network. All online transactions must pass through a Payment Gateway to be processed. In effect, Payment Gateways act as a bridge between the merchant’s website and the financial institutions that process the transaction.

A Payment Gateway authenticates and routes payment details in an extremely secure environment between various parties and related banks. The Payment Gateway functions in essence as an “encrypted” channel, which securely passes transaction details from the buyer’s Personal Computer (PC) to banks for authorisation and approval. On gaining the approval, the Payment Gateway sends back the information to the merchant thereby completing the “order”, and providing verification. A Payment Gateway is immensely justifiable on account of the multiple benefits it offers including:

- The obvious 24x7x365 convenience

¹ Tata Consultancy Services Limited, 1, Software Units Layout, Madhapur, Hyderabad, India

* Corresponding author: (Email: vp.gulati@tcs.com, Phone: +91-40-66673003)

- Real time authorisation of credit/debit cards
- Rapid, efficient transaction processing
- Multiple payment options
- Secure flow of transaction details among buyers, sellers and financial institutions
- Flexible, powerful real-time reports generation
- Multi-currency settlements, if the need be
- Facility for customer refund
- Merchants can get rid of large databases, extensive processing and complex software
- CA (Certifying Authority) authenticated secure servers
- Collection of bulk data in a cost-efficient manner, with the additional benefit of being checked for card validity
- Access to card “hot-list” to filter out fraudulent deals
- Ability to provide value-added services to merchants, acquiring and issuing banks
- Provision for multiple host interfaces
- Comprehensive, simple administrative control
- Stringent security measures to gain customer and merchant trust

With boom time predicted for e-commerce, the financial sector has to be prepared to handle various kinds of payment instruments. Further, worldwide payment systems are increasingly becoming web-based and web-enabled with a drive towards paperless transactions. If Indian industry wants to be in the global reckoning then it has to adopt electronic transactions and build the requisite infrastructure. Buyers and sellers may have accounts with different banks, and there has to be a mechanism to manage such transactions. In addition, with transactions in India being more of “volume-based” rather than “value-based”, there has to be a mechanism that can address both micro as well as macro payments. It is a time consuming and extremely expensive task for each and every bank to build its own Payment Gateway. A better option, instead, would be to build a secure National-level Payment Gateway, which will be shared by various banks and which can handle a multitude of payment instruments. Therefore, the need of the hour is a “*National Internet E-Commerce Payment Gateway*”, which will function as an integrated payment service.

2. Existing Scenario in India and World

Payment Gateway as a concept in India is not new. Quite a few banks and service providers are offering Payment Gateway services, albeit in a restricted fashion. Most of them support only credit card transactions and do not take into account other evolving payment instruments including Electronic Funds Transfer (EFT), E-cheques, etc. If the full potential of e-commerce in India is to be exploited, customers have to be provided with a complete range of payment options such as E-cheque, EFT, ATM Cards and others. Another limitation of the existing Payment Gateways is that they enable only B2C (Business-to-Customer) or B2B (Business-to-Business) transactions. They are overlooking the lucrative government business. In addition, there is no single service for all kinds of transactions and across various banks. There are some critical issues hampering proliferation of payment gateway. First of all, payments may not happen at all simply because the customer may not have an account with the banks supporting the payment gateway. A payment gateway today has only limited number of banks. There are problems of reliability, delivery, and limited payment avenues and general lack of trust among customers, and doubts about the service provider.

Some of the Payment Gateways in India include:

- Transecute Pvt. Ltd.
- PaySeal (ICICI)
- Eliteral Payment Gateway

- Payment-Gateway-India.com
- Team VII Payment Gateway
- CitiBank
- HDFC

On the international front, there are innovative initiatives such as NETS in Singapore, which stands for Network for Electronic Transfers (S) Pte Ltd. (NETS). This is an example of collaboration of banking community to create payments infrastructure in Singapore. The company's offerings are tailored for customers, merchants and banks. NETS aims at creating payment solutions so as to develop an integrated multimedia platform, which enables seamless payments via wireless, mobile and physical modes.

A similar exercise exists in Belgium where banks came together to set up ISABEL (Interbank Standards Association Belgium) represents a premier multibank electronic banking platform, providing a joint network, service provider and customer software with regard to remote banking (EDI) for companies. ISABEL offers two payment gateways with the intent of processing high-volume transactions

3. Basics of Payment Gateway

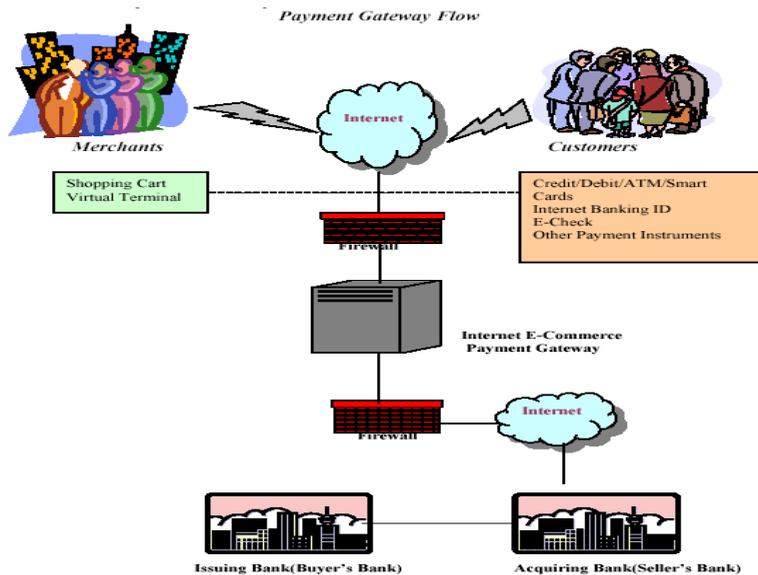


Figure 1: Payment Gateway Flow

Whenever a customer buys something from a virtual shopping mall, the Payment Gateway comes in the picture for the following functions:

- Authorising – Verifying the buyer's credit/debit card details
- Clearing – Transferring the transaction to merchant's bank
- Reporting – Recording all transactions

Steps Involved in a Payment Gateway Transaction

- Step 1 – Consumer visits a shopping website and selects the goods or services and clicks on the "Buy" button. A message is sent to the website regarding the consumer's desire to buy and make payment.

- *Step 2* - The Web store's server, after receiving the message from the buyer, adds its digital certificate to identify the mall. This message is now called a "Digital Order" and also includes the consumer's IP address and transaction amount. The Digital Order is now sent to the Payment Gateway over a secure network. Security is ensured by data encryption.
- *Step 3* - Based on the Digital Certificate, the Payment Gateway authenticates the web store.
- *Step 4* - The Payment Gateway offers various payment options on a screen to the buyer.
- *Step 5* - Buyer chooses the desired payment option, which is transmitted via the secure link to the Payment Gateway.
- *Step 6* - The Payment Gateway sends the payment details to the acquiring bank (in case of card transactions) or seller's bank (as termed for other instruments).
- *Step 7* - The acquiring bank sends the information to the buyer's issuing bank (in case of card transactions) or buyer's bank (as termed for other instruments) over a secure link.
- *Step 8* - Based on the credit limit and the payment instrument's validity, the issuing bank either accepts or rejects the transaction. The confirmation/rejection message is transmitted to the Payment Gateway through the acquiring bank.
- *Step 9* - The Payment Gateway then transmits digital receipts to the shopping site as well as the buyer.
- *Step 10* - The web store can ship the goods/services to the buyer.

As opposed to the lengthy offline process, the online version may at the most require 30-40 seconds.

4. Interaction with Other Payment Systems

In the process of its functioning, a Payment Gateway may have to interact with a number of other Payment Systems and Gateways. Take the example of CC Avenue – it has links with two other Payment Gateways PaySeal and Citibank, exclusively for processing VISA and Mastercard credit card transactions. This shows that a Payment Gateway can harness other existing Payment Gateways to cut down on the work-load and increase efficiency. This will help reduce time lag and speed up the transactions. A series of Payment Gateways maybe involved for converting payment instructions from one payment system to another.

Worldwide, there are endeavours to create regional level payment systems, which may connect various Payment Systems. For instance, the ASEAN Regional Electronic Payment Gateway Solution envisages "a regional payment infrastructure to enable cross-border e-clearing of retail payments in ASEAN using agreed currencies by clearing through existing efficient national clearing houses and/or payment processing centres in the various ASEAN countries."

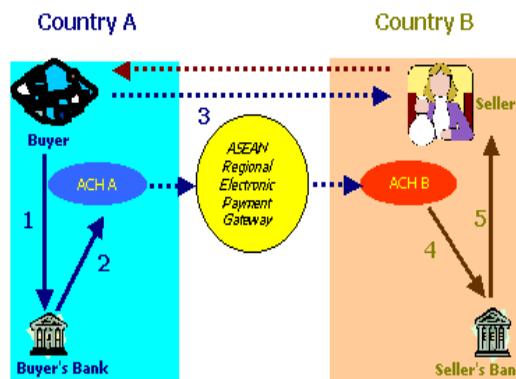


Figure 2: The ASEAN Payment Gateway Cross Border Retail Payment Flow
(Arrows with numbers denote the payment flow sequence)(Source: BCS Information Systems Pvt. Ltd.)

This kind of scenario may take some time to conceptualise in India, but the need of the hour is a national level Payment Gateway. Once the electronic payment systems develop further in India, a series of Payment Gateways may develop which need to be linked. CCAvenue has included two Payment Gateways in its platform for credit card processing. However, in future, the National Payment Gateway could require different Payment Gateways to handle different payment instruments. This could be one scenario. Another scenario could be when the Payment Gateway has to interact with the Payment Gateway of another financial institution or bank. For instance, ICICI Bank and HDFC Bank each have their own Payment Gateways. Therefore, the National Payment Gateway will have to interact with such individual Gateways. As payment instruments evolve and the transaction volumes up, the complexity of interaction will also increase.

In the real world transaction, who are all involved in a transaction? Obviously, the buyer, and the seller. But there are many more parties involved - product manufacturers, service providers, banks and financial institutions, the shop personnel, the shop infrastructure, providers of the shop infrastructure, the delivery service personnel and equipment, the government, etc. If we migrate this to the Internet world, then apart from the buyer and seller, the following are broadly involved:

- Product/service manufacturers
- Banks – acquiring and issuing
- Payment Gateway infrastructure providers
- Providers of the software involved
- Hardware and networking vendors
- Maintenance personnel
- Delivery infrastructure
- Internet Service Providers
- The Government

Manufacturers and service providers are the obvious participants as it's their goods and services that are up for sale. They have a key role to perform and efforts must be made to enlist their participation in the Payment Gateway. Banks and financial institutions have recognised the potential of e-commerce and several are moving towards Internet Banking. However, they must go a step further and adopt a Payment Gateway for their transactions. Banks have unwittingly become participants in transactions initiated by others as acquiring and issuing banks. However, they need to take a more proactive approach, rather than being reactive. Some banks such as HDFC Bank, ICICI Bank have established their own Payment Gateways. However, very few public sector banks have moved in this direction and this needs to be rectified. An important step of the banks is to come together and collectively work towards a national payment gateway as has been done in other countries.

For transactions completed online, there must be concrete, “brick-and-mortar” delivery channels. In most cases, delivery is effected by courier companies and postal departments. Therefore, their involvement is a must. Hardware vendors, software vendors and developers and networking specialists must be enlisted in the development of the National Payment Gateway for they provide the core systems and solutions necessary for functioning of the Payment Gateway. All transactions and communications are facilitated by Internet service providers, without whom it would be difficult to get a Payment Gateway underway. Hence, they have a critical role to play in the construction and operation of a Payment Gateway. The Government, it goes without saying, has the key role of facilitator. It must set in place appropriate rules and procedures for the development of e-commerce and hence, Payment Gateway. Policies must be developed to ensure smooth functioning of Payment Gateways and the role of the latter in the national economy needs to be recognised.

5. Role of Government

As mentioned earlier, the government must function as a facilitator. However, the government must also endeavour to encourage all government transactions and payments to be routed via the Payment Gateway. This could be a good example for other sectors. Government payments could be the first step in encouraging citizens, who would be willing to make online payments to avoid the long queues at the counters. The tax structure on online transactions will have to be worked out in such a manner as to promote the use Payment Gateway. Rules and regulations have to be defined to encourage only genuine players and ensure security. Policies have to be developed that help increase Internet accessibility, and affordability. Appropriate networking infrastructure must be promoted. More importantly, steps must be taken to ensure there is adequate support infrastructure in the form of electricity, transport logistics, postal and customs systems.

Other government initiatives could be:

- Promote e-commerce and internet culture among masses as well as government employees
- Organise seminars and workshops to educate about Payment Gateway
- Encourage government departments to tie up with Payment Gateway
- Create an environment of security and trust by passing stringent laws
- Promote use of Payment Gateway among the merchants through suitable incentives by way of tax concessions, etc.
- Create a conducive environment for ISPs and Payment Gateway hardware and software companies by appropriate legal and tax policies
- Help develop the required infrastructure through computerisation initiatives, HR development and other support measures
- Make efforts to bring in unconventional sectors such as agriculture and animal husbandry into the fold of Payment Gateway.

The electronic payment gateway would serve as a gateway for national and international electronic transactions. Volumes would be phenomenal and there would be need for compliance and strict standards. This can be facilitated with government intervention. The government may explore PPP (Private-Public Partnership) avenue for creating and running a payment gateway. This kind of model has successfully been implemented in several countries worldwide. Oman has a National e-payment gateway designed mainly for public services delivery and for e-commerce purposes. Even Malta has a Payment Gateway.

The government can also double up as a user of the gateway. With e-governance initiatives gaining ground, several services are available to citizens. These can be charged nominally. Also, in several cases such as licenses, forms, etc., customers need to make payments. In addition, government may have to pay various parties such as refunds to citizens, scholarships, inter-department fund transfers, etc. A payment gateway will create the required infrastructure to facilitate such payments. In addition, payment gateway will help e-procurement and result in substantial savings. The payment gateway would also be an effective tool in rural and microfinancing activities. It would provide the much needed infrastructural element and with the government owning it, acceptance among merchants, and customers would be high.

6. Benefits

It is hard for banks and financial institutions (more so microfinance organisations) with limited capital expenditure budgets to develop a Payment Gateway on their own. It makes more sense for them to look towards third-party providers. Therefore, a national-level Payment Gateway will be the ideal solution for them, with government ownership. Through a Payment Gateway, one bank can connect with another, making it easier to effect international transactions. There would be several benefits to the economy and common man as shown below:

Benefits for the Economy

- Freeing up on precious resources viz, human capital and money, for investment in other important areas
- An efficient, homogenous payment mechanism in a country with vast number and kinds of banks and customers
- Reduced instances of security lapses and fraud
- Emergence of new payment instruments
- A single platform for a variety of payment needs, infrastructures and instruments
- Ability to track transactions and maintain a record of the same, which is useful in checking financial irregularities
- Instant information flow enabling rapid decision making
- Ability to keep pace with international payment systems and undertake transactions at a global level, in a fraction of time required earlier
- Decreased number of intermediaries and thereby reduced costs
- Instantaneous authorisation and settlement, implying no risk of defaults and bounced cheques
- A more streamlined approach for government-related payments
- Savings for the government and business for not needing to maintain an expensive shop/office infrastructure
- Emergence of a completely new line of service providers for developing web sites, integration services, maintenance, etc.
- Development of a payment infrastructure which can be scaled for future applications and payment instruments
- Easier to process exports

Benefits for the Common Man

- Payment system within easy reach of customers, who can make payments from the comfort of their homes
- Ability to access multiple counters from one location
- Reduced time for making transactions
- Maximum security for transactions
- Ultimate fallout could be reduced prices of goods and services due to lower number of intermediaries and savings passed on by the merchant for not maintaining a shop infrastructure
- Lower prices could attract new consumers hitherto reluctant to let go of traditional transaction modes, leading to a greater population of Internet-savvy people in India
- Greater reach to the rural areas and interiors of a vast nation like India
- Greater willingness of service providers to offer their products/services in rural areas due to the cost benefit and infrastructure availability

Worldwide, there are a number of collaborative arrangements of banks which have resulted in innovative systems – NETS and ISABEL are examples. In India also, banks have come together and established CCIL, NSE, etc. So, why should they lag in terms of the payments infrastructure? There have been isolated cases of payments innovation, but have failed due to lack of co-operation and collective will. The regulator also took some steps, but the National Payments Corporation as envisaged has yet to take off. Hence, the onus is on banks to take the initiative and then involve the government as a facilitator.

7. The Challenges

- U.S. retail e-commerce expenditure (excluding travel) in second quarter of 2007, increased 23% to US\$27.2 billion. Overall U.S. e-commerce spending grew 19% to \$47.5 billion during the same

period. Online Consumer spending was about US\$170.8 billion in 2006, and is set to reach US\$200 billion in 2007 (source: comScore)

- Indian e-commerce market is estimated at \$500 million per annum, which is a 300% increase over 2004-05. (NASSCOM)
- E-commerce volume in the UK was GBP1.54 billion in Aug.2005 (Interactive Media)

These statistics point towards rapid growth of e-commerce and associated businesses. There is a lot of potential to exploit, but there are several challenges that need to be addressed. There is a lack of a reliable payment infrastructure. The buyer must honour the payment obligation and the seller must keep up the promise of goods delivery. Also security, reliability, authentication and authorisation must be taken care of. All of these would be possible through a Payment Gateway, which while taking care of payment modalities would also ensure maximum security.

However, there are other issues at a macro level, which need to be addressed through international and inter-agency co-operation. The key issues which require such intervention are: Lack of support for all kinds of international currencies

- Lack of standards
- Interoperability problems
- Regulatory conflicts
- Legal hassles
- The charging for international deals
- Gaining consensus for a national level payment infrastructure
- Ownership and maintenance issues

A lot of research effort maybe required to come up with a solution for global standards and interoperability of e-commerce tools and platforms, and gateways.

8. Recommendations and Conclusion

As seen in the above section, e-commerce offers huge potential. But e-commerce will work only if payment happens. Hence payment infrastructure is critical for e-commerce transactions, and payment gateway is the base for all payments. Without an efficient payment gateway Indian organisations may find it hard to partake in the rapid growth and compete globally. The key question with Payment Gateway as defined in the paper is – who should do it? The government may have to take up this issue with either the Central Bank (Reserve Bank of India) or the Indian Banks Association (IBA). We suggest that various groups including government, central bank and individual banks to come together to discuss the modalities and implement the Gateway. For example, this happened with the Clearing Corporation of India Ltd. (CCIL), which has implemented online trading of government trading. Similarly, the government may ensure that the Central Bank/IBA comes up with a solution just as in the case of CCIL. A separate organisation called “e-Payment Corporation (EPC) maybe set up, which could be owned by the banks and government. Some time back, the central bank had planned a similar exercise (called National Payments Corp.) but nothing concrete happened – the main issue was that NPC wanted to begin operations migrate all older structures into new. Banks were wary to be a party to this without NPC proving its capabilities. However, with EPC we suggest, it takes care of all electronic payment systems and instruments. EPC may take ownership of the Payment Gateway. Individual banks may have 2-5% share in EPC, and government 10-15%. Once EPC is established, a specific timeline maybe set to initiate operations. We suggest that EPC take a maximum of one year to implement the gateway. For this purpose it may explore tie ups with technology companies on BOT (Build Operate Transfer) basis, with ownership retained with EPC.

The Payment Gateway would be an essential component for all kinds of international e-commerce and e-

governance transactions including B2C, B2B, B2G, G2C, G2G, etc. It would need to comply with all international standards so as to work in conjunction with international businesses, governments, customers, etc. In addition, EPC may also need to explore the option of linking the payment gateway with other payment systems (domestic as well as international), international payment gateways, and financial networks (such as SWIFT). However, all transactions and linkages must comply with central bank norms. In addition, it is suggested that EPC undertake extensive marketing initiatives and negotiations with merchants and banks to enlist maximum participation. It is recommended that the Payment Gateway begin with government transactions, which would be critical for proliferation of several government services and provide the much needed infrastructure element in rural initiatives. The gateway can then target corporate payments as well, thus helping cut down their procurement and logistic expenses. However, online transactions can lead to heightened vulnerabilities. Hence stringent security management is essential and the services of established Certifying Authorities (CAs) maybe used.

Other key recommendations are:

- The Government, it goes without saying, has the key role of facilitator. It must set in place appropriate rules and procedures for the development of e-commerce and hence, Payment Gateway. Policies must be developed to ensure smooth functioning of Payment Gateways and the role of the latter in the national economy needs to be recognised.
- The tax structure on online transactions will have to be worked out in such a manner as to promote the use Payment Gateway. Rules and regulations have to be defined to encourage only genuine players and ensure security. Policies have to be developed that help increase Internet accessibility, and affordability. Appropriate networking infrastructure must be promoted. More importantly, steps must be taken to ensure there is adequate support infrastructure in the form of electricity, transport logistics, postal and customs systems.
- For transactions completed online, there must be concrete, “brick-and-mortar” delivery channels. In most cases, delivery is effected by courier companies and postal departments. Therefore, their involvement is a must.

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About the Authors

V.P. Gulati, is Consulting Advisor and Head, Financial Technology Centre, Tata Consultancy Services, and former Director of Institute for Development and Research in Banking Technology (IDRBT). He has a PhD from Indian Institute of Technology (IIT) Kanpur and in his 25 years experience has worked with Indian Institute of Management (IIM) Kolkata, Institute of Rural Management Anand, and National Institute of Bank Management, as Professor. Dr.

Gulati has been involved in intensive research & development activities, and has been instrumental in transforming research projects into national infrastructure initiatives such as Indian Financial Network (INFINET), National Financial Switch (NFS), Structured Financial Messaging System (SFMS), Mail Messaging System (MMS) directed towards the financial sector. He has guided several M.Tech and PhD., students, and is a sought after research referee, and has been part of several financial and technology committees including Payment Systems Advisory Committee (RBI), e-business Task Force, Inter Bank Payment Gateway (FICCI), and National Payment Council. Dr. Gulati is a fellow of Computer Society of India, and has more than 110 research papers, 3 books, and 37 consulting reports to his credit.

Shilpa Srivastava is Systems Analyst at Tata Consultancy Services, with over 8 years of experience in research and consulting. She was also a Project Manager at a US-based research firm and analyst at a reputed knowledge management firm. Her professional interests include research, banking, banking technology, E-Governance, and content management.