

Study of Network Security Systems for Payment Gateways in India

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Abstract

Electronic commerce, commonly known as **e-commerce** or **eCommerce**, consists of the buying and selling of products or services over electronic systems such as the Internet and other computer networks. The amount of trade conducted electronically has grown extraordinarily with widespread Internet usage. The use of commerce is conducted in this way, spurring and drawing on innovations in electronic funds transfer, supply chain management, Internet marketing, online transaction processing, electronic data interchange (EDI), inventory management systems, and automated data collection systems. Modern electronic commerce typically uses the World Wide Web at least at some point in the transaction's lifecycle, although it can encompass a wider range of technologies such as e-mail as well.

A large percentage of electronic commerce is conducted entirely electronically for virtual items such as access to premium content on a website, but most electronic commerce involves the transportation of physical items in some way. Online retailers are sometimes known as **e-tailers** and online retail is sometimes known as **e-tail**. Almost all big retailers have electronic commerce presence on the World Wide Web.

Electronic commerce that is conducted between businesses is referred to as **business-to-business** or **B2B**. B2B can be open to all interested parties (e.g. commodity exchange) or limited to specific, pre-qualified participants (private electronic market).

Electronic commerce that is conducted between businesses and consumers, on the other hand, is referred to as **business-to-consumer** or **B2C**. This is the type of electronic commerce conducted by companies such as Amazon.com. Online shopping is a form of electronic commerce where the buyer is directly online to the seller's computer usually via the internet. There is no intermediary service. The sale and purchase transaction is completed electronically and interactively in real-time such as Amazon.com for new books. If an intermediary is present, then the sale and purchase transaction is called electronic commerce such as eBay.com.

Electronic commerce is generally considered to be the sales aspect of e-business. It also consists of the exchange of data to facilitate the financing and payment aspects of the business transactions.

The present study focuses on the learning of payment gateways in India and its network system.

Keywords: E-commerce, Payment Gateway, Security, Network Infrastructure, Merchant Account, Transaction Processing.

Introduction

A **payment gateway** is an e-commerce application service provider service that authorizes payments for e-businesses, online retailers, bricks and clicks, or traditional brick and mortar. It is the equivalent of a physical point of sale terminal located in most retail outlets. Payment gateways protect credit card details by encrypting sensitive information, such as credit card numbers, to ensure that information is passed securely between the customer and the merchant and also between merchant and the payment processor.

Working of Payment Gateways

A payment gateway facilitates the transfer of information between a payment portal (such as a website, mobile phone or IVR service) and the Front End Processor or acquiring bank. When a customer orders a product from a payment gateway-enabled merchant, the payment gateway performs a variety of tasks to process the transaction:

- A customer places order on website by pressing the 'Submit Order' or equivalent button, or perhaps enters their card details using an automatic phone answering service.
- If the order is via a website, the customer's web browser encrypts the information to be sent between the browser and the merchant's web server. This is done via SSL (Secure Socket Layer) encryption.
- The merchant then forwards the transaction details to their payment gateway. This is another SSL encrypted connection to the payment server hosted by the payment gateway.
- The payment gateway forwards the transaction information to the payment processor used by the merchant's acquiring bank.
- The payment processor forwards the transaction information to the card association (i.e., Visa/MasterCard)
- If an American Express or Discover Card was used, then the processor acts as the issuing bank and directly provides a response of approved or declined to the payment gateway.
- Otherwise, the card association routes the transaction to the correct card issuing bank.
- The credit card issuing bank receives the authorization request and sends a response back to the processor (via the same process as the request for authorization) with a response code. In addition to determining the fate of the payment, (i.e. approved or declined) the response code is used to define the reason why the transaction failed (such as insufficient funds, or bank link not available)
- The processor forwards the response to the payment gateway.

- The payment gateway receives the response, and forwards it on to the website (or whatever interface was used to process the payment) where it is interpreted as a relevant response then relayed back to the cardholder and the merchant.
- The entire process typically takes 2–3 seconds
- The merchant submits all their approved authorizations, in a "batch", to their acquiring bank for settlement.
- The acquiring bank deposits the total of the approved funds in to the merchant's nominated account. This could be an account with the acquiring bank if the merchant does their banking with the same bank, or an account with another bank.
- The entire process from authorization to settlement to funding typically takes 3 days.

Methodology

The present study focuses on the payment gateways in India and its network security system. The data for the study has been collected from secondary sources. Internet websites and Reference Books as well as handbook from various authors have been referred.

Types of Payment Gateways

The applications that are used to ease up payment in ecommerce stores are called **payment gateways**. In dealing with business transactions online, consumers usually use credit cards as a form of payment in purchasing certain products or services. The process behind this is, before receiving any payment via credit card, they first pass through a merchant account with a bank and it is then the payment gateway that connects the a certain website to the bank.

Payment gateways are classified into three different kinds.

1) First kind is payment gateway that uses an **Application Programming Interface or API**. This kind of gateway needs a secure certificate in the server and secure certificates cost a lot that is why it is somewhat expensive to maintain. On the brighter side, payment gateways with API can make the payment transactions easier for the customers and for online business owners as well for API does not need a lot of support.

2) Next type is the **third-payment gateway**. For this type, the consumer does all the choosing, purchasing and buying of the desired products in the online store and for the payment process, the customer is guided to a page wherein he or she does the actual payment.

3) The third kind of payment gateway is the **integrated payment gateway**. This type does not require a merchant account from a bank and it provides a simple means of payment which is very compatible to any online businesses. A famous example of integrated payment gateway is **PayPal**.

Payment Card Industry Data Security Standard (PCI DSS)

PCI DSS was created by the Security Standards Council as a set of rules merchants must adhere to in order to reduce fraud throughout the industry. The goals of the PCI DSS Standards and corresponding rules are as follows:

- Build and Maintain a Secure Network
 - Install and maintain a firewall configuration to protect cardholder data
 - Do not use vendor-supplied defaults for system passwords and other security parameters
- Protect Cardholder Data
 - Protect stored cardholder data
 - Encrypt transmission of cardholder data across open, public networks.
- Maintain a Vulnerability Management Program
 - Use and regularly update anti-virus software or programs
 - Develop and maintain secure systems and applications
- Implement Strong Access Control Measures
 - Restrict access to cardholder data by business need-to-know
 - Assign a unique ID to each person with computer access
 - Restrict physical access to cardholder data
- Regularly Monitor and Test
 - Track and monitor all access to network resources and cardholder data
 - Regularly test security systems and processes
- Maintain an Information Security Policy
 - Maintain a policy that addresses information security for employees and contractors

Existing Scenario in India

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

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.”

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

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

Payment Gateway Integration

Payment Gateway Integration or Online Payment is a method of receiving payment on the customers' website. It's a process wherein the customer may display his products or services on his website and the user visiting to the website can pay using his credit / debit card or internet banking account.

Few Website Links with Payment Gateway Integration

www.indamseedsonline.com
www.citizenwatches.co.in
www.indianseedcongress.com
www.gkvale.com
www.hjtwoods.com
www.sportzbazaar.biz
www.epaper.mangaloremithr.com
www.healthcashcard.com
www.indiahealthcard.com
www.citizenwatches.co.in
www.buyqandqwatchesonline.com
www.ezegetonline.com

HDFC BANK Business-to-Business

HDFC Bank's payment gateway EPI provides seamless real-time transfer of funds transacted on the portal.

It is a state-of-the-art facility which has been successfully implemented by as many as 15 B2B portals, such as VSNL, Sifymall, Fabmart, etc.

HDFC Bank has a dedicated **HELP DESK** set up in the four metro cities and Hyderabad and Bangalore along with a round the clock maintenance with efficient back-up.

The entire operation takes place through a secure channel. The security features include:
Firewalls

128 - bit encryption
SET certification for digital signature

Payment Gateway for Portals features

- State of the Art
- Successfully Applied
- Secured
- Full Backend Support

The Infrastructure: Key Features

- Well Trained and Customer Focussed personnel
- CPU : The Core
- End to End Connectivity : Seamless Operations
- Most advanced software which offers flexibility in integration
- World standard hardware
- Round-the-clock maintenance with efficient back-up
- Dedicated Help Desks

Payment Gateway : EPI

- External Interface (Through Browser) with External Entity (B2B Portal).
- Online, Real-time settlement of funds
- Portal credited Instantaneously
- Customer's a/c reflects Desirable Narration

Portal & Payment Gateway: Handshake

Basic Requirements : The Portal

- Signs off an agreement with HDFC Bank
- Is allocated a Specific Identity Code
- Opens a Specific Account for credit of funds
- Builds Logic for exchange of URLs between the HDFC Bank and Itself

❖ **Basic Requirements : The Client**

- Opens (If not already has) a/c with HDFC Bank
- Signs on with HDFC Bank as EPI User
- Maintains clear funds for all portal payments
- Can't reverse the "once authorized" transaction
- Can't part pay for the goods / services ordered (allowed if it is pre-defined)
- Can cancel the transaction before authorizing
- Taxes on Wealth
- Gift Tax (since abolished)

❖ **System Features**

- Client has no access to Portal Database
- Client has no access to Portal Data maintained with the bank
- Bank has no access to the Portal Database
- User log-in screen can be customized to display Portal name and features

❖ **The Payment Gateway Module will perform the following validations**

- Reject if invalid Internet customer id/password.
- Reject if insufficient funds in account selected by the customer to make the corresponding purchase.

The Payment Gateway provides the following advantages to the client:

- An User-friendly Interface
- An Efficient Funds Transfer Mechanism
- Facilitates Purchase of Goods online, round the clock
- Instant access to Funds Position and Account Statement
- HDFC + a/c facility --- added facilities given by the bank to the customer

The Payment Gateway provides the following advantages to the portal:

- Instant and Assured Funds
- Online Funds Confirmation
- Real Time Risk Management
- Straight Through Processing
- Automated Reconciliation Process
- Reduction in Mid/Back-Office Operations

Additional utility to the portal:

- Third Party Funds Transfer Through Net
- Opportunity to use Bank's Supply Chain Management (SCM) product for a synergy with suppliers / sellers
- Account Access Through Net for complete MIS
- Synergy between goodwill of your prominent B2B portal and the Bank: A winning combination.

Direct Pay Mode of Payment

We would like to take this opportunity to offer you - **HDFC Bank Direct Pay** . You can now accept on-line payments from your clients/customers who are HDFC Bank account holders. Your account with us will be automatically credited with the corresponding transaction amount, **instantaneously** .

Since the customer will be an HDFC Bank account holder, chances of fraud will be nil and Bank takes all the responsibility of verifying his identity.

HDFC Bank's Direct Pay facility is an e-age banking channel where the purchases are debited directly to customer's account and credited to the account of the establishment (or the website where the purchases were made). If customer is an account holder with HDFC Bank, all he has to do is to register for the Netbanking facility to use this option.

Both the Direct Pay and NetBanking facilities are available FREE of cost to our account holders. HDFC Bank offers the highest level of security available today - 128-bit SSL (Secure Socket Layer) encryption. The NetBanking details of the customer (Customer ID and Password) are kept confidential and cannot be viewed by the merchant.

The Direct Pay process flow is as follows

- Customer browsing on the merchant site finalises his/her purchase.
- Customer decides to make payments for the transaction he/she has finalised
- The customer selects "Debit my HDFC Bank A/C."
- The customer clicks on the pay button and the customer is traversed to page to make payments.
- The customer enters his/her Net Banking id and password.
- The customer then selects the account, which he wants to make his purchase from.
- The customer account with HDFC Bank is debited online and the transaction is over for the customer.
- The merchant account is credited for the transaction amount, less the transaction fee.
- The customer is honoured with the purchase made as per the terms of the merchant agreed upon by the customer.

CITIBANK payment Gateway

Citibank Online guarantees absolute safety to its online users by using special security features. For maximum security, all transactions are done in an SSL 128-bit secured environment, where all information passed on between Citibank and users personal computer is "scrambled" and "reassembled" using 128-bit encryption, one of the highest level of encryption commercially available.

All Credit Card transactions done on the Citibank Payment gateway are 3D Secure - a protocol that thoroughly checks authenticity of the Cardholder thereby reducing fraudulent usage. The 3D Secure demands an additional detail (known only to the Cardholder and the Card issuer) apart from your Card number, CVV and expiry date to complete the transaction.

All Debit Card transactions require the Unique Internet Password (IPIN), which customer have

to provide each time when log in to Citibank Online.

Protecting customer and providing a secure environment is a top priority for Citibank. While bank have taken appropriate steps and all possible measures to make his online transactions absolutely safe. Here are some safety guidelines customer have to adopt from his side to enhance his security online.

Browser Security

Although Internet browsers have built-in security, small Internet files are downloaded to your computer whenever you are online. Some of the files may pose a security risk. Enhance your security by taking some of the following actions:

- Clear your browser's cache and history after each session so that your account information is removed, especially if you are using a shared computer
- Use an Internet browser that supports 128-bit encryption.
- If you use Internet Explorer, configure the browser to not remember passwords (disable AutoComplete)

Navigate Safely

Navigate the Internet safely to reduce the likelihood of online fraud. Avoid fraudulent websites:

- To ensure that customer is going to an authentic Citibank site, type in the entire Citibank website address into his browser instead of clicking on the link directly. For this, he would have to type in "http://www.citibank.com/india" into the browser address field
- Beware of pop-up windows that ask for his account number and PIN (Personal Identification Number). Citibank Login pages are always on a web page and never in a pop-up window
- If customer suspect a website is fraudulent, leave the site. Do not follow any of the instructions it may present to you
- Citibank will ask customer to fill any account details only on either www.citibank.com/india or any Citibank URL starting with www.online.citibank.co.in

ICICI Ltd.

ICICI Ltd. (NYSE: IC and IC.D) today announced that it has tied up with Compaq led consortium for setting up a payment gateway to facilitate secured online Business-to-Consumer (B2C) and Business-to-Business (B2B) e-Commerce transactions. The payment gateway will be owned by a subsidiary of ICICI and implemented by Compaq India, subsidiary of Compaq Computers Corporation (NYSE: CPQ), QSI Payment Technologies (QSI), Australia and Financial Software & Systems Pvt Ltd. (FSS).

ICICI will be the first financial intermediary to implement an e-Commerce payment gateway within India and will be providing services to corporates, consumers, merchants and banks that plan to share the ICICI Payment Gateway.

ICICI's B2C payment gateway will interface between the Internet shopper, the web merchant and banking systems in a secured environment to facilitate online payments. The Gateway offers the flexibility of multiple payment modes including credit, debit & smart cards, direct bank debits and e-cheques. The Gateway will use strong encryption technologies and digital signatures to protect these transactions from potential attacks by hackers.

ICICI's B2B Payment Gateway will facilitate e-Commerce transactions between corporates in a virtual market place. The Gateway would also provide e-procurement services by linking corporates with their network of buyers and suppliers. The Gateway will allow processing of innovative payment instruments like e-cheques, purchasing cards, direct debits and on-account payments.

ICICI Payseal Payment Gateway -- Features and Benefits

Company Introduction and Features :ICICI Payseal

Offers 128-bit SSL encryption, an established security technology protocol.

- Can process Visa and MasterCard Credit Cards issued around the globe.
- Provides a robust, flexible and scalable solution used by some of the leading Internet merchants in India.
- Ensures real time authorisations for your Credit Card transactions and reduces your back end transaction processing requirements.

Advantages

Easy installation, operation and management

Payseal eliminates the need for complex software, large databases, and heavy-duty processing on the merchant site. Instead, all payment operations are handled by Payseal's own 24x7 secure Payment Servers. As a result, software installation, integration and management is no longer a major hurdle for merchants and their site developers.

Single platform for all payment options

Payseal's unified architecture can support the Internet's widest range of secure payment options.

Adaptability to multiple platforms

The Payment Client software is available for Microsoft® Windows NT™ and leading versions of Unix.

Optimum server utilization on your site

The Payment Client software connects the merchant's storefront to Payseal's services. It is the only software component that needs to reside on the merchant's site server, as Payseal physically hosts the rest of the software at its own sites. This leaves the merchants' server resources free for other tasks, at the same time allows them to accept multiple modes of payment from your net customers.

Fast, easy integration

The Payment Client offers developers and integrators of shop-and-buy applications a number of programming language interfaces, minimising the coding effort required. The Payment Client can be quickly and easily customised to facilitate integration with all major merchant storefront platforms.

Centralised and secure data management

To protect the integrity of merchant transactions, Payseal supports the Internet's strongest security technologies. The client software encrypts transaction information using 280 bit RSA before passing it through an SSL pipe using 128-bit encryption.

Verisign certification

The gateway server is assigned a server ID and authenticated by "Verisign", one of the leading certifying authorities for websites.

Automatic upgrades and scalability

Businesses can automatically take advantage of new payment technologies, standards and services as they emerge, without undergoing costly and time-consuming software changes to merchant site. Businesses retain the same interface, yet are able to stay abreast of the latest technologies and offer customers the widest range of options.

Smooth Transaction processing.

Payseal delivers a real time, highly scalable and reliable Internet payment platform that processes transactions in real time.

Conclusions

A payment gateway facilitates the transfer of information between a payment portal (such as a website, mobile phone or IVR service) and the Front End Processor or acquiring bank. The network security as well as data encryption techniques are provided by most of the payment gateways.

E-Commerce in India have started booming the economy. As Indian payment gateways are providing secure environment to B 2B and B2C transaction. More & More people and Companies are looking forward to use online payments through either website or mobile phone or IVR service.

As the national payment gateways are also integrated with International payment gateways , the foreign trade will also increase rapidly, which will increase the national income as well as foreign currency will increase.

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