



## DESIGNING AND IMPLEMENTATION OF ELECTRONIC PAYMENT GATEWAY FOR DEVELOPING COUNTRIES

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### ABSTRACT

In this paper a brief overview of electronic payment gateway is provided. This paper addresses the requirements for an electronic payment gateway from both the customers' and the merchants' point of view. Most of the population doesn't trust on the local existing online payment gateway because it is not very secure. Mostly people want to adopt electronic payment system as it has lots of advantages. They need such a gateway that fulfill their all requirements and provide security, privacy etc. On the basis of these requirements and the local infrastructure, we propose an electronic payment gateway for local environment.

**Keyword:** *E-Commerce, Electronic Payment Gateway.*

### 2.CONTRIBUTIONS

On the basis of proposed architecture of e-payment system of third world countries and the requirements related to any electronic payment gateway, we design and develop a Secure, reliable and efficient electronic payment gateway.

### 3. RELATED WORK

In USA about \$3.5 trillion pours daily through three major payment networks that dwarf the Bank of New York's. The networks, run by banks and the government over high-speed phone lines, converge at just 10 secret data-processing centers nationwide. They transmit everything from direct-deposit paychecks to utility bill payments to huge corporate transfers in the USA and abroad. PayPal in the US, which was recently purchased by Ebay, is one of the most frequently used e-payment gateway. [1]

In China payment gateway is the single biggest unmet demand because of lack of trusted and secure mechanism. [2]

Turkey's payment gateway is difficult to use, insecure and highly expensive.

### 1. INTRODUCTION

Online shopping allows customers to sit in their homes and buy goods from all over the world. Similarly allows Merchant to sell their products to all over the world from home. Most of the population will use online payment in near future.

Most of the Third world countries lagged behind in making a good Internet architecture. There is need of a secure online payment gateway in developing countries. On the basis of proposed architecture of e-payment system of third world countries, this paper gives a brief overview of existing electronic payment gateway. It also mentioned the requirement for an electronic payment gateway from customer and merchant's point of view. And on the basis of these facts and figures a new secure e-payment gateway has been designed and developed. The payment gateway would provide secure transactions.

In Nepal there are around 3three banks that are offering Internet Banking Services and majority of middle class are out of such services.

#### 4. PRELIMINARIES

##### Online customer:

A customer is an entity who will buy products by making payments in timely manner.

##### Merchants:

A merchant is a seller who will receive payments made by customer.

##### Banks:

Two banks are involved.

1. Client bank
2. Merchant bank

##### Client bank:

Client bank holds client's bank account and validate customer during account registration.

##### Merchant bank:

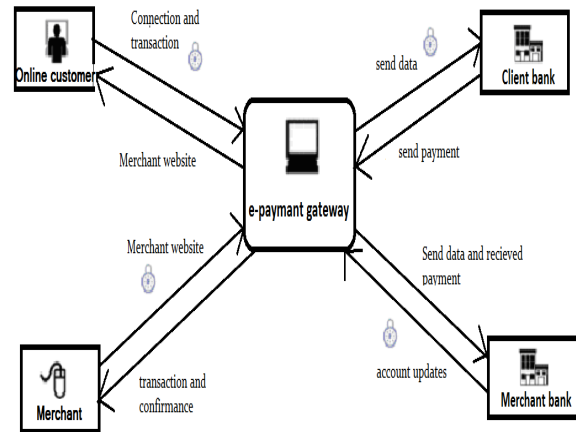
Merchant bank holds merchant bank account. It is responsible of management, fraud control etc

##### Payment Gateway:

A payment gateway is connected to all customers, merchants and banks through Internet and responsible for the speed and reliability and security of all transactions that take place.

#### 5. FRAMEWORK OVERVIEW

We proposed a model of electronic payment gateway on the basis of requirements of an electronic payment gateway in developing countries.



**Figure no. 1:** Proposed Model

There are five interfaces.

1. Customer Interface
2. Server (e-payment Gateway) Interface
3. Client Bank Interface
4. Merchant Bank Interface
5. Merchant Interface

Online Customer will connect to e-payment gateway through Internet. Gateway will connect to the Bank and check whether its bank accounts is enough to buy the required product. Online customer can also visit Merchant's website through Gateway.

#### 6. FLOW DIAGRAM:

Flow diagram of proposed gateway is given below.

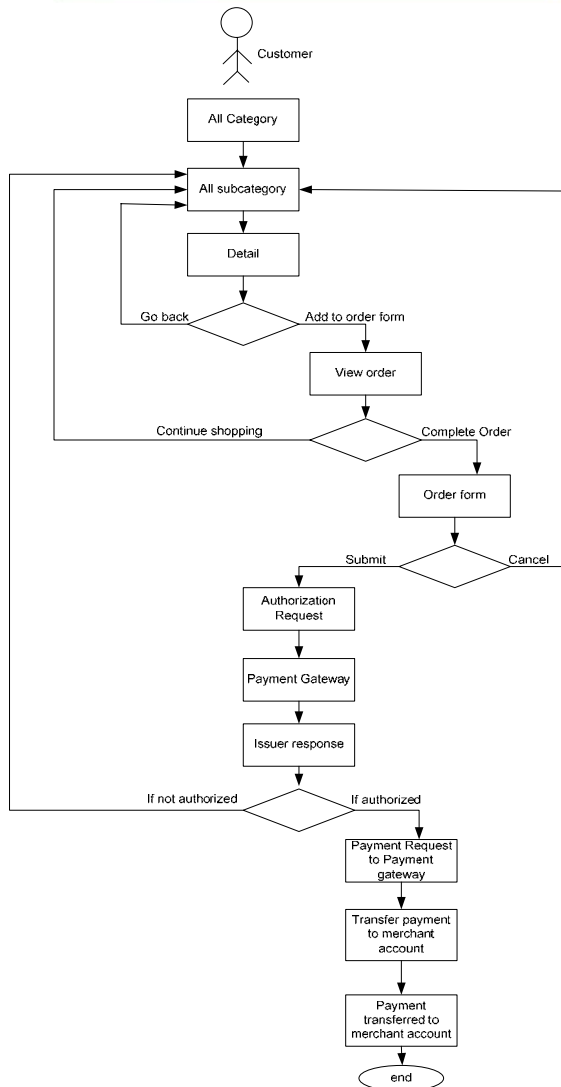


Figure no. 2: Flow diagram of proposed gateway

**7. TECHNIQUES AND ALGORITHM:**

**Privacy:** It is necessary to assure privacy in the payments like bank accounts.

**Naming:** There should be a way of identifying the customers bank accounts and the merchant bank accounts.

**Security:** In gateways security should provide to protect data of transactions.

**Integrity:** Data should be difficult to change.

**Confirmation:** When transaction took place customer must have notification and merchant must have confirmation

**Confidentiality:** Any third parties should not be able to access or view such payments.

**Settlement:** Separate banking institutions must have a way of settling their accounts.

Following diagram will explain working of electronic payment gateway in detail.

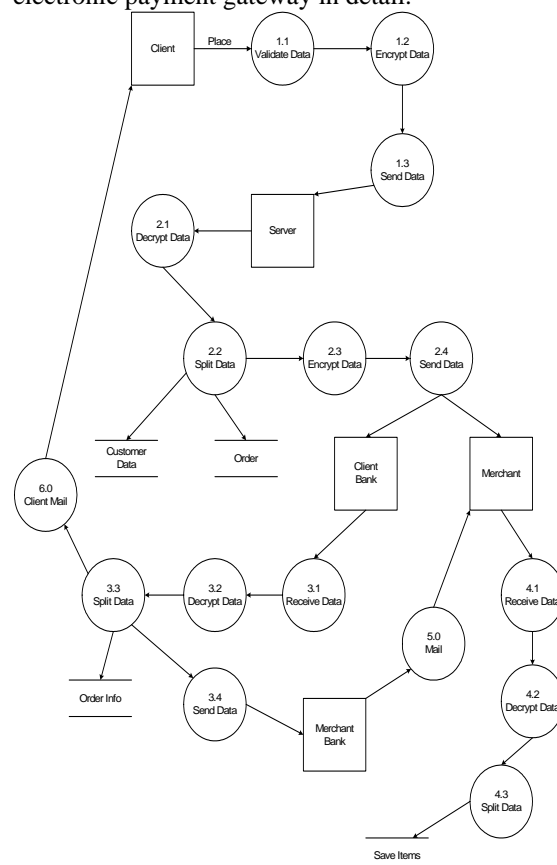


Figure no. 3: Detailed model

If new user wants to do transaction then he/she should register himself/herself first through registration form then browse merchant website using e-payment gateway. Select item and encrypt payment request and send it to Server. Server receives encrypted message from sender, decrypt message, read, encrypt it using its own keys and send it to Client bank. Client bank transfers the required amount to the merchant bank through secure network. After receiving the fund Merchant bank sends the payment capture response to merchant through e-payment gateway.



**Algorithm of Client:**

**Client:**  
Start and connect  
Start Customer browse merchant website  
If select Category then  
Go to Item list of selected category  
If Select Item  
Then Show detail of selected item  
If Want to buy selected item  
Then select Add to order form  
Else Go back to category  
If select add to order form  
Do AddToOrder SubCategoryId  
go to Order form and fill required fields like credit card No., expiry Date, and telephone no, Address  
Select Submit  
Else Continue shopping  
Else Cancel  
If select submit Display Authorization  
If Credit card no.Text is equal to Credit card no.  
display This Customer is Authorized From Bank.

**Figure no. 4:** Algorithm of client  
Client can browse merchant's website. After selection of items he can send payment order to e-payment server after filling required fields e.g Credit card no., expiry date etc

**Algorithm of Payment gateway**

**Payment gateway:**  
Start connection  
If connected  
Receive payment message  
Else display Not Connected  
If receive payment message  
{Decrypt message  
Split and send it to different textboxes  
Add to database  
Sent it to Client bank}  
Else Cancel  
If client bank is sending message  
{Receive it  
Send it to merchant bank}  
Else wait  
If merchant bank is sending message  
{Receive it  
Send it to Merchant}  
else wait

**Figure no. 5:** Algorithm of payment gateway

Server receives payment order sent by clients, decrypt and encrypt that message and send it to Client bank. Client bank will send a payment deduction message to server and server will send it to Merchant Bank. Merchant bank will send an acknowledgment message to Server and server will send it to merchant.

**Algorithm of Client Bank**

**Client Bank:**  
Start connection  
If connected  
Receive payment message including client's info  
If client's info is present in database of bank  
Send message to server This customer is Authorized  
Else Send message This customer is not Authorized  
If customer is Authorized  
{Save payment request into database  
Deduct amount from Client bank  
Send that amount to Payment Gateway}

**Figure no. 6:** Algorithm of Client bank

Client bank receives payment message and verify client. Deduct amount from client bank and send that amount to payment gateway.

**Algorithm of Merchant Bank**

**Merchant Bank**  
Start connection  
If connected  
Receive payment message including merchant account no.  
If merchant's account is present in database of bank  
{Receive payment  
Add payment to Merchant's account}  
Else Send message Invalid account no.

**Figure no. 7:** Algorithm of Merchant bank

Merchant bank verifies merchant, receives payment message from Client bank through payment server and add payment to Merchant's account.

**Algorithm of Merchant**

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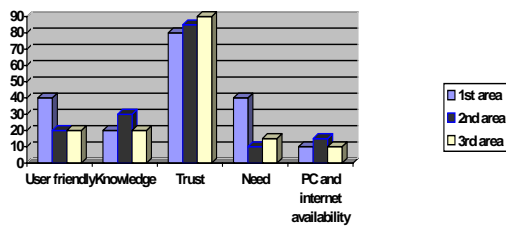
Merchant
Start connection
If connected
{ Make and update website
If server is sending message
Receive message and decrypt it}
Else retry to connect
    
```

**Figure no. 8:** Algorithm of Merchant

Merchant makes and updates website and receives acknowledgement messages from payment gateway.

**8. EXPERIMENTAL RESULTS:**

**1. Graphical result of survey** A survey was carried out of various users in three different areas for finding the reason that why people don't use payment gateway and wrote it by compiling the average results of mentioned questions.

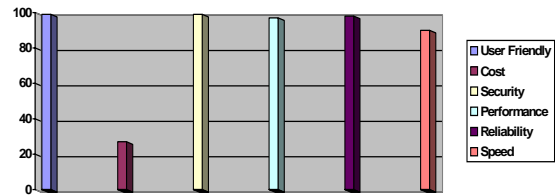


**Figure no 9:** Graphical result of survey

- User Friendly:** People wants a payment gateway which should be easy to use.
- Knowledge:** Some people don't know anything about payment gateway.
- Trust:** Mostly people don't use it because of lack of trust.
- Need:** Some people thinks there is no need of e-payment gateway.
- PC and Internet availability:** Limited access of PC and internet.

**2. Graphical result of proposed gateway**

Graphical result of proposed gateway is following



**Figure no.10:** Graphical result of proposed gateway

As compare to other e-payment gateways our proposed system will be more secure and do transactions in less time as compare to other gateway. Proposed system will be inexpensive as compare to existing systems

**3. Table of comparisons with various countries**

	Time	Cost	Availabi l-ity	Securit y
USA	Low	Mediu m	High	High
China	Mediu m	Low	Low	Low
Turkey	High	High	Low	Low
Nepal	High	Mediu m	Low	Low
Africa	Mediu m	High	Low	High
<b>Propose d System</b>	Low	Low	High	High

**Figure no. 11:** Table of comparision

- Time:** Time of transaction
- Cost:** E-gateway's charges per transaction
- Availability:** The degree to which e-gateway is operable
- Security:** Overall security related to electronic gateway

**4. Comparison between TDES and other Techniques of encryption.**

DES (Data Encryption Standard) is a 56 bit key encryption standard. But it was problematically short. Therefore, its improved standard was developed, called Triple DES. It uses 168 independent key bits. That has been used in Proposed gateway. There is latest improvement known as AES (Advanced Encryption Standard)

but it is very slow. So, Triple DES is considered to be more secure and fast.

Experiments were carried out to compare DES, TDES and AES encryption standards. The results are as follows: Time was compared for encryption. If there is large number of transactions, time assumes importance.

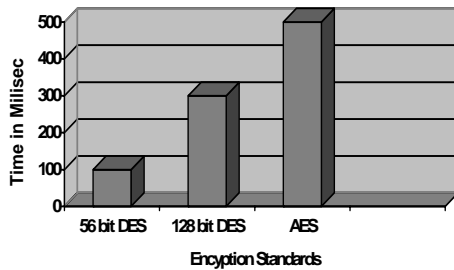


Figure no. 12: Comparison of Encryption standards

## 9. CONCLUSION AND FUTURE WORK

Electronic Payment Gateway is present in our country but it's not very secure. The proposed payment architecture was also lacking the security factor. That proposed architecture is made secure by the implementation of secure electronic transaction methods. Because of this now only authentic customers can now buy products from merchant's site whose bank accounts is enough to buy the required product. At first it's checked if the customer is authorized one or not then the whole transaction takes place. The electronic payment gateway is made secure enough that any authorized customer can easily trust on it and fearlessly or confidently make payments over the Internet.

If this system is to be implemented in developing countries then strong support of government of that country is required as there is not much awareness of electronic transaction in developing countries.

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