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Mobile Bill Presentment System (MBPS) Enabling Secured QR-Code based COD Payment in Online Shopping Cart -replacing the POS Machines with a Mobile Application

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Abstract: ***In Online shopping cart COD (Cash on Delivery) and POS (Point Of Sale) is the most widely accepted method of payment worldwide. There are plenty of limitations in these methods which includes mainly the risk behind handling hard cash where chances of getting fake notes are at the high point, the service charges which has to be paid by the merchant during every transactions in a POS machine is considered as a loss in the merchant's perspective and getting the network connectivity in every location of the POS machine is also very challenging task. Here a new technology known as MBPS (Mobile Bill Presentment System) is getting introduced which overcomes all these above said limitations and also provides additional features which is helpful for the merchant as well as the customers by scanning the Quick Response (QR) Code of the bill through a Smartphone.***

Keywords: Cash on Delivery (COD), Point of Scale (POS), MBPS (Mobile Bill Presentment System), Quick Response (QR) Code

1. Introduction

Mobile Bill presentment System is a Mobile Application which enables the user to pay bill by scanning the QR code present in the Bill. The mobile acts as an intermediate which scans the QR code and takes the user to the payment gateway and enables the user to pay the bill without much difficulty.
It is a unique and new product present in the current market scenario. The bill has a unique QR code present in it, which could be only read using the Mobile application and comes with a secure mode of payment.

This is an electronic version of the traditional bill payment system which would help our customers to make the payment of their bills by scanning the Quick Response (QR) Code of the bill through a Smartphone
Existing Technology on cod:

a. COD: This is one of the most common and simple methodology which is existing among the customer for making their payment in the current online shopping market scenario. Once the customer places their order, the merchant provides the facility of home delivery to the customer to avail their ordered product. The customer has to pay the amount of their product only at the time of delivery of the product. The main feature of cash on delivery which attracts the customer to make their payment using this method is that the customer need not worry about their ordered product and also need not track the destination of the product since he is not losing his penny even if the product does not reach him on time. Again once the product reaches the customer, this method plays a very simple role as he can pay the required amount to the merchant and very easily avail the product with no other further complications. Due to all these features COD still remains to be the most widely used method to make payments for online shopping applications worldwide.

b. POS: Most of the shopping cart is widely using POS machine or collecting hard cash for their COD facility. POS or EPOS is the place where a retail transaction is completed. It is the point at which a customer makes a payment to the merchant in exchange for goods or services. At the point of sale the retailer would calculate the amount owed by the customer and provide options for the customer to make payment. The merchant will also normally issue a receipt for the transaction.

The POS in various retail industries uses customized hardware and software as per their requirements. Retailers may utilize weighing scales, scanners, electronic and manual cash registers, EFTPOS terminals, touch screens and any other wide variety of hardware and software available for use with POS. For example, a grocery or candy store uses a scale at the point of sale, while bars and restaurants use software to customize the item or service sold when a customer has a special meal or drink request.

The modern point of sale is often referred to as the point of service because it is not just a point of sale but also a point of return or customer order. Additionally it includes advanced features to cater to different functionality, such as inventory management, CRM, financials, warehousing, etc., all built into the POS software. Prior to the modern POS, all of these functions were done independently and required the manual re-keying of information, which can lead to entry errors.

Limitation of existing technology:

a. COD: There are many risks associated with cash handling. Theft or misappropriation of cash may be assisted by the suppression, falsification or destruction of accounting records, or where no initial records are created at all. This method may appear to be very simple and accessible for the customers to make their payments, but there exists a lot of risk in cash handling. The main problem which is faced in

cash handling is the high risk of getting fake notes which is not easily caught by the sales executives at the time of delivery. Providing amount by tendering the exact change is again a difficult task faced by the customer as well as the sales executive at the time of delivery which can make loss at the customer's as well as the merchants side. Carrying cash in hand is always risky and this may lead many fraudulent activity as well as misplacing, accounting etc. major issues may occur.

b. POS: Many people have remained with their cash registers not because of their benefits over POS, but because of they want to avoid the cost of purchasing all brand new POS systems. Replacing old technology can be pricy, especially if the business has multiple retail locations. Small business owners in particular tend to avoid upgrading to a new cash register system because of this.

2. Methodology

To overcome the above mentioned limitations of the existing payment system we have introduced an innovative application which makes a hassle free payment and is known as Mobile Bill Presentment system (MBPS). This application contains four modules: 1. An EXE application which has to be integrated on the merchant software to generate QR bills. 2. An android Mobile application to read this QR image and make payment. 3. Server Application Programming Interface (API). 4. A website for merchants to generate various MIS Reports.

Figure 1: Block Diagram of the System

1. EXE Application: Firstly an EXE application has to be created using certain mandatory parameters which has to be displayed as the bill details to the customer. For e.g. Customer id, Bill number, bill date, bill amount, description etc. The QR image differs according to the values passed to the parameters. While creating the QR image we have to consider certain security mandates to secure the bill. Using an appropriate key, the information will be made available after applying the necessary encryption. The bill data in the QR Code is secured through MD5 hashing technique (Message –Digest algorithm) wherein the data is in form of 128 bit (64 byte) hash value. To ensure reliability of the client bill data, it is further encrypted in the URL of the application. The entire URL data is further provided encryption to 64 bit data. This secures the QR image from getting read and decrypted from a third party application. Finally this application has to be integrated on the merchant's software to generate secured QR image on Bills.

2. Android mobile application: An android mobile application is being created to read the QR images from bill using standard QR Library which will be available in android. Since the QR image is secured by encryption methods on bill, it has to be decrypted using the appropriate key. After extracting the required information from bill the same will be displayed on the handset and be made available for the customer to make the payment. For making the payment using credit/debit card or net banking, the payment gateway has to be integrated in this mobile application. After this customers will be able to make their bill payments using the mentioned mode of payment.

3. Server API: This application acts as an interface between the mobile application and the database. All authentication mechanism will be happening at the server level. Mobile application will sent a request to the server and which further performs the action and send back the response to the mobile. Mobile application will display the result based on the response given by the server. It is basically a handshake between the mobile handset and server using JSON Method which is more compact, secured and light weight. Certain information will be made available in database for further requirements.

The Application Server (App server) forms the Service layer architecture, where Windows Communication Foundation (WCF) service is deployed. Windows Communication Foundation (WCF) is a framework for building service-oriented applications where in data is sent as asynchronous message from one service endpoint to another. The WCF listener accepts the request from Client layer through End Point service. The design features of WCF - Service Orientation, Interoperability, Service Metadata, Security ,Encodings and multiple transport, reliable queued durable messages offer manageable approach to create Web service and web service clients.

Request initiating from smartphone -> Server receives the request and process -> server is using database to store the details -> after processing the details, server will give response to smartphone -> smartphone reads the response and display appropriate message.

4. Website for merchant to generate MIS Reports: Website will be made available for the merchant's administrators to generate various MIS reports such as successful/unsuccessful bill paid reports, date wise reports, item wise reports etc. We can generate the reports even based on the bill id. These information will be fetched from database and generate respective reports after successful authentication to the server.

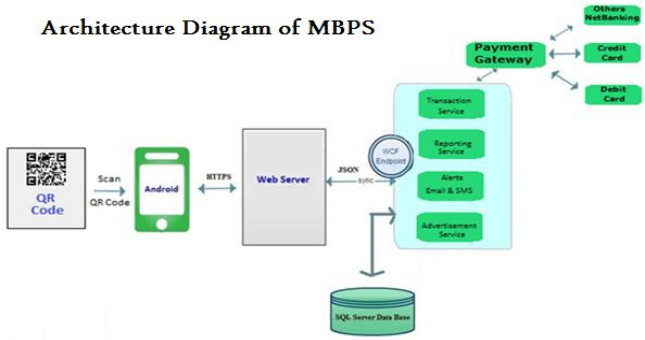

Figure 2: MBPS Architecture

3. Output and Code

SERVICE: TRANSACTION
INPUT

```
{
   "BillerName": "MERCHANT NAME",
   "CustomerID": "10240522",
   "MobileNumber": "9986829509",
   "BillNumber": "352162566682",
   "BillPeriod": "01.04.2014 to 30.04.2014",
   "TotalAmount": "9200.50",
   "Channel": "G"
}
```

3.1 Output

3.1.1. Success:

```
{
   "ResponseCode": "000",
   "PaymentID":"Q24072014000002"
}
```

3.1.2. Payment Failed

```
{
   "ResponseCode ": "999"
}
```

c. Duplicate Payment

```
{
   "Response Code ": "997"
}
```

d. Error in Request

```
{
   "Response Code ": "998"
}
```

The description of each key value pair is detailed below –
Input parameters -

- The operation requested is Transaction to mobile application.
- Biller Name - Name of the Merchant.
- Customer ID - ID of the Customer registered with Merchant.
- Mobile Number - Mobile number of the Customer registered with Merchant.
- Bill Number –ID of Customer's bill.
- Bill Period – Billing Period of the Customer.
- Total Amount –Total Amount of Customer's bill
- Channel –Payment Channel selected by the Customer to pay the bill i.e. Either V (V-NetBanking) or G (Payment Gateway)

All data representation is an encrypted Hash value of the Payment Channel selected by the Customer for making payment.

Output parameters –

For success case -

Response code: 000 – Response code value to indicate that operation performed is success.

Payment ID – Payment ID of the Transaction

For failure case of transaction –

Response code: 999 - Transaction has failed.

For duplicate payment –

Response Code: 997- The bill has already been paid by the customer.

For Error in Request –

Response Code: 998 – Invalid parameters in the payment request.

4. Results and Conclusions

A new innovative dimension of all types of bill payment has been invented here which is named as Mobile Bill Presentment System (MBPS). Using various technology, we have evolved with a very useful and compact way of bill payment which is highly convenient for the customer and economically feasible for merchants. This innovative product overcomes all the limitations of the present bill payment scenario. MBPS is completely travelling on a secured electronic channels which does not involve any sort of paper receipts. This product is highly useful for the customer and the merchant as it is user friendly and economic. MBPS is also an ecofriendly product as it completely avoids all kind of paper wastage because no hard cash and no paper receipts are provided in MBPS which will give us a greener environment.

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Author Profile

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