A Proposed Mobile-Online Payment Processing System

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Abstract: Payment processing systems has evolved over the years, ever since the introduction of e-Business and e-Commerce applications back in the 1990's. In this study, the reseracher introduces a proposed mobile-online payment processing system that is envisioned to provide the actual process for the transfer of payments between online buyers and online sellers using an online mobile payment gateway linked to customer's and merchant's banks, credit card accounts and mobile service providers. The proposed system is designed to serve both micro and macro payments side by side. In micro payments, the actual players are the buyers, sellers, payment gateways and mobile service providers. For macro payments the main players are buyers, sellers, payment gateways and banks. The system can be used by all type of online e-Commerce websites, e-Commerce applications and person to person payment platforms. Micro payments deals with low cost and low volume products or services purchases such as buying a soft drink or purchasing a movie ticket while macro payments deal with high to moderate cost transactions with high volume trading model. Based on the need for an aggregated payment processing system the reseracher proposes anmobile-online payment processing system that handles micro and macro payments in a secure and easy to use fashion.

Key words: Mobile payments, payment processing systems, e-Commerce, gateway, platform

INTRODUCTION

The internet has brought new exciting services to the world especially after the introduction of web 2.0 tools and services. Now, it is easier to conduct virtually all type of business and personal transactions online including buying and selling products and services (Blankenhorn, 1999). People can buy and sell products online and through mobile devices. There are around 4.77 bln. mobile users worldwide (Holst, 2012) in comparison to 3.45 bln. internet users from non-mobile devices)(ILS, 2016)

Payment for goods and services purchased online requires a reliable and secured online payment processing system. A payment processing system that takes care of the actual transfer of money from the buyers account to the merchant account. The system also needs to be secure and trustworthy in addition to its ease of use by the end user and to be easily integrated into the merchant shopping cart and online store (Aldridge *et al.*, 1997; Blankenhorn, 1999).

Online payment processing systems does not go without a cost for the merchant; usually they charge an annual fixed fee for providing the service in addition to a variable percentage per transaction fees which ranges between 6 and 9% per transaction. Payment processing system also charges the merchant for transferring the money to their bank account. So in reality the percentage paid by merchants per sale can reach up to 11% per

transaction. Our proposed system does not deal with the costs issue of the payment processing system since this is related to the policies and business costs of each operator of a payment gateway (Statista, 2013). We shall focus solely on the technical and design aspect of the mobile-online payment processing system.

In the design of the proposed system we follow the structured analysis and design approach of software systems. We started out gathering information about the proposed system and the requirements of the end users and we moved on from functional to nonfunctional requirements in the design process. Starting with a context diagram we moved into the first level of the data flow diagram depicting the entire system processes at the highest level of the design process. We also used the graphical object model to describe the proposed system in order to give the non-technical readers of this paper a clear insight into the key players and the functionalities of the proposed system.

Proposed payment processing system: The main theme of this study is to propose a mobile-online payment processing system, one that is suitable for macro and micro payments alike. The design of the system depicts the main users of the systems starting from the customer who initiates the first step in the transaction processing system by visiting a merchant website, selecting products or services and moving to the final buying process of the
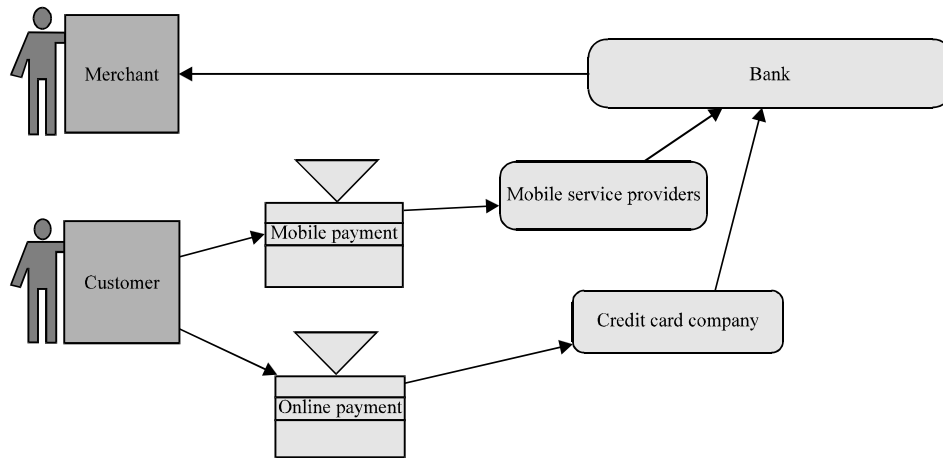
Fig. 1: Mobile online payment processing system

product or service using a secured online payment gateway through his mobile device or personal computer.

The customer may use a credit card or e-Wallet to buy products and services. Customers may also pay for low cost services or products such as a taxi fair, a bus ticket or a soft drink using the system, representing a micro payment which shall be conducted through the mobile service provider of the customer.

The system shall be designed to handle each payment differently wither it was a micro payment or a macro payment. The buying side of the system is the one that initiate the type of process to be followed by the system. The system user interface integrated into the merchant online store or shopping cart is designed to be responsive in order to accommodate both online and mobile users. Mobile service providers are a key player in this system and their integration is a key factor for the success of the proposed mobile-online payment processing system. Figure 1 shows the conceptual view of the system showing the main parts of the proposed system and the business workflow that shall lead to the actual change of hands of cash from buyers to sellers.

The system starts the process when customers complete their online shopping and move to their shopping cart to initiate one of the two types of payments displayed on the customer mobile phone based on the user interface of the merchant online business that is accessed via a mobile device. There are two business processes as explained.

MATERIALS AND METHODS

Mobile payments: This process is initiated when the customer visit the merchant online store and choose a product or service to purchase. The products or service can be added to an online shopping cart for easy transfer

of aggregated products and services when the customers choose to check out. At the checkout page the user is then provided with the option to pay using mobile payments if his mobile service provider company is connected to the payment processing system service including connection to the banking system.

Online payments: The online payments option is provided at the checkout page in order for the customer to pay by credit card as another alternative for paying for his purchased goods or services. This does not need the interaction of the mobile service providers; rather it needs the authorization of the credit card issuing company. We decided to add this option since, not all mobile service providers shall be having a connection with the payment processing system or the banking systems. Additionally, it is important for completing the purchase of macro products and services which mobile service providers are not capable of handling and moving large amount of cash from customer's accounts to merchant's accounts. Regulatory constrains play a major challenge for mobile service providers and many countries has strict rules with regards to what type of activities mobile service providers can engage with.

Although, security is an important factor in this type of systems however, the security layer was not depicted in the initial data flow diagram of the proposed system. It was left for future work to be handled by software and systems engineers. All transactions shall be conducted using a secure SSL protocol to ensure the security of the transferred data between customers, merchants, credit card companies and mobile service providers.

Proposed system data flow: Figure 2 displays the overall data flow diagram of the proposed system however, the specific flow of data processed and generated by the system is described in some details:
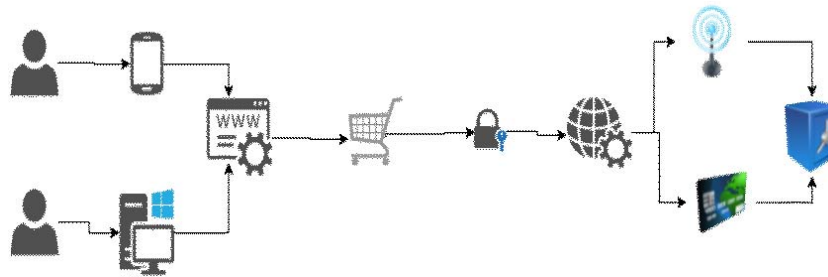
Fig. 2: Proposed system data flow

The customer visits a merchant store using a mobile phone or personal computer. Customer chooses products and/or services to purchase. Products and services are added to a shopping cart. Customer is directed to a secure payment processing system using HTTPS protocol (Aldridge *et al.*, 1997). Two options are presented to the customer (pay by credit card or though mobile service provider). All information that is flowing from the merchant site to the payment gateway is secured point to point under a secured session layer.

If the customer chooses mobile payment the order is sent to the mobile service providers to handle the transfer of money from the user account to the merchant bank account through the payment processing system (in this case the payment processing system acts as a clearing house between the merchant and the mobile service provider). The money changes hand form the customer account with the mobile service provider to the merchant bank account through the proposed online payment processing system.

The customer can recharge his account with the mobile service provider using his online banking account or by scratch cards. If the customer chooses online payment the order is sent to the credit card company to handle the transfer of money from the user credit or debit account to the merchant bank account through the payment processing system (in this case the payment processing system acts as a clearing house between the merchant and the issuing credit card company). The money changes hand form the customer account with the credit card company to the merchant bank account through the proposed online payment processing system.All customer information as well as the purchase order number, date, time and IP address is passed to the merchant who shall work on shipping the products or provide the services online to the customer after receiving a notice form his bank account.

Proposed system user experience design: Although, we are focused on providing a proposed mobile online payment processing system we have made an added effort in the design of the proposed system to make it easy for customers to pay online wither they are using

their mobile phones or personal computers. The checkout page should be designed carefully to help merchant's convert customer's visits to successful sales.

The first thing that we considered when designing the system is to offer the customer the two payment methods we discussed before so that he can pay his micro payments from his balance at the mobile service provider. Offering more than one payment method makes it easier for customers to pay for their purchases online. A study by infographic from Milo indicates that 56% of online shoppers expect to have several payment options at a website checkout page.

The second criterion that needs to be addressed is that most merchants require customers to create an account in order to proceed with their payment flow. Several usability studies found that users don't like to create an account with a merchant in order to avoid receiving unwanted spam emails or promotional content. This consideration is very important in order to expedite the purchase process.

The Third consideration is keeping customers at your website and not redirecting them to another payment system to pay their fees. This involves providing merchants with white labelling and the system API for further integration. The fourth consideration is to request only needed information from customers to complete the transaction. Asking form a lot of information from customers may deter them from completing the transaction and may make the purchasing experience lengthy and annoying. The fifth and final consideration is to assure customers of the security and privacy of the payment processing system. This can be done using Secured Socket Layers (SSL) and trust certificates issued by third party trust authorities.

RESULTS AND DISCUSSION

Technical specifications: In our efforts to provide a robust secure mobile online payment processing system we took into consideration that the system should have several security standards and tools in order to prevent hacking attempts on the system. We are dealing with people's money and if the system is not 100% safe it is a

formula for disaster. There are several third party security and authentication providers that we can hire their services to make the system reliable and secure.

The database design is vital to the success of the proposed system. We need to have a fully thought of design to have the right number of tables and to store just the right amount of financial information about our customers. Securing these data should also be at the database level and extremely important financial information should be encrypted to added layer of security. Hardware and software infrastructure should be extremely efficient in terms of having a reliable internet connection and very fast dedicated systems and database servers.

Partnerships and collaborations: In order for the proposed system to succeed, we need to build lasting partnerships with global partners and collaborators including credit card companies, mobile service providers, banks and financial institutions and online merchants. Collaborations and partnerships with security providers and digital certification issuers is also an important part for the system to succeed. Partnerships between major network operators, retailers and banks shall lead to the advanced development of the proposed mobile online payment processing system.

CONCLUSION

Demand is at its peak for mobile payment processing systems, ones that can provide efficient micro-payments used for the purchase of low volume low value products and services. Available micro payment systems do not rise to aspirations of merchants of customers alike. We are proposing a proposed mobile online payment processing system model to help tackle this global problem. The proposed system is designed to serve both micro and macro payments side by side. The system can be used by all type of online e-Commerce websites, e-Commerce applications and person to person payment platforms. Our future work shall focus on the design of the security, database and usability layers for the proposed system.

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