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ONLINE PAYMENT GATEWAYS USED TO FACILITATE E-COMMERCE TRANSACTIONS AND IMPROVE RISK MANAGEMENT

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TUTORIAL

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ABSTRACT

As online transactions continue to increase and become a significant part of the global economy, the ability to accept payments online becomes more important for businesses. This paper evaluates the literature and provides current information for IS researchers and instructors focusing on electronic commerce. In this paper, we explore the components of e-credit providers (conventional, person-to-person, and third-party) and explain how each system processes a single transaction. We then analyze several market leaders in each segment and summarize the strengths and weaknesses of each company. We provide guidelines for selecting an e-credit provider and highlight the options that apply best to online businesses. Finally, we outline potential areas of future research and provide a simple tutorial on creating a business account with PayPal website Payments Standard as an example of an online payment provider.

Keywords: online payment systems, e-credit, e-commerce, payment gateway, merchant account, shopping cart, PtP payment processes, education

I. INTRODUCTION

Consumer spending via the Internet is increasing at a significant rate. Online spending recently saw global double-digit growth nearing 50% on a year-to-year basis, and within the United States alone spending is expected to reach $3.5 trillion in 2006 [Rob & Opara, 2003, p. 1]. These trends are fueled by global economic expansion. They can be expected to continue in the future.

The growth in spending on the Internet, together with the underlying need for secure transactions, increases the importance of online payment systems. Online payment systems can be broadly defined as the means and processes involved in conducting transactions online; however, this description can be expanded to include the online monetary connections between sellers, buyers, financial institutions, and intermediaries. Online payment systems have been around for several years, yet are now becoming ubiquitous with the increased common use of the Internet. Some of the benefits provided by online payment systems include improved cash flow efficiency, guaranteed transactions, reduced costs, increased protection of sensitive information, and increased protection of the payment provider. Given that fraud is a prevalent concern with online transactions, secure online payment systems are particularly important.

Despite the growth and importance of online payment in the current global economy, little academic literature exists in this area that integrates the disparate research streams about online payment systems and describes their implementation. Further, online payment processes are largely ignored by traditional textbooks, yet it is important for students to understand online payment because it represents the most significant shift in payment in the last two hundred years.

IS students are likely to be involved in implementing, purchasing, maintaining, or interacting with these processes. For example, several instructors note the need or desire to include online payments into e-commerce curriculum [Ramakrishnan & Ragothaman, 2001; Rob, 2003; Shaikh, 2004; Tikekar & Wilson, 2001]. However, attempts to develop relevant electronic commerce course curriculum

prove difficult [Bloss, 2001] because the subject material changes rapidly. One successful course uses a hands-on approach to study electronic payments [Dhamija et al., 1999], but the literature is sparse on the specific topics that should be covered.

Given these gaps and opportunities, we review the academic literature and typical processes currently used in practice to provide direction for future academic research and to provide a framework to help instructors teach the topic to students.

Because e-credit is the most used and accepted source of payment, representing 90% of all online purchases [Rob & Opara, 2003], this paper primarily discusses e-credit options and the benefits businesses can receive by using online e-credit payment. The discussion proceeds as follows. We briefly review the academic literature relevant to online payment systems, provide additional background on the motivations to use online payments, and define the key terms used with these systems (Section II). In Section III we describe the components of the traditional e-credit payment systems, third-party, and person-to-person (PtP) e-credit providers. Next we present several of the main e-credit providers in each area to reflect the benefits and disadvantages of subscribing to that type of e-credit (Section IV). We conclude by outlining future online payment opportunities for businesses and research.

II. BACKGROUND ON E-CREDIT ONLINE PAYMENT

CURRENT LITERATURE

The online payment options available on the Internet mirror those provided by physical retailers. Many payment methods can be used for online purchases [Hsieh, 2001; Roberts, 2004a; Roberts, 2004b]. Of these methods, Meng and Xiong [2004a; 2004b] categorize online payment options into three categories:

- e-credit (electronic credit cards),
- e-cash (electronic cash), and

- e-check (electronic checks).

E-cash is not commercially popular, but some institutions allow the payment of bills by e-check. Table 1 provides a brief overview of these categories of payment. Each category in this model represents proven methods of payment in the physical world applied to their digital use on the Internet [Peffers & Ma, 2003]. Because of existing electronic infrastructure surrounding e-credit, these types of processes have been the easiest for businesses to adapt for viable commercial use online. E-credit payments are the focus of this paper.

Table 1. Overview of e-cash, e-check, and e-credit

Payment	Advantages	Challenges
e-cash	Solves anonymity problems by allowing users to transact without presenting personal information. Can be used offline.	Difficult to Implement anonymity due to problems with fair traceability [Hou & Tan, 2005b], which can prevent fraud and allow for dispute settlement.
e-check	Based on public key cryptography to provide security.	Overlooked due to the popularity of e-credit. Can take longer for transactions to take place.
e-credit	Most widely used and trusted electronic payment system both online and offline. Leverages existing credit accounts.	Cannot provide anonymity. Some security concerns due to fraudulent activity.

Much of the academic literature proposes models [Hou & Tan, 2005a; Mjølsnes & Rong, 2003], protocols [Dani et al., 2005; Kinateder & Rothermel, 2004; Meng & Xiong, 2004b; Varadharajan & Mu, 1996], and architectures [Knospe & Schwiderski-Grosche, 2002; Liu et al., 2002; Zhang et al., 2004] to facilitate online payments. Other studies provide mathematical proofs of specific protocols [Backes & Dürmuth, 2005; Bella et al., 2002]. These models, protocols and architectures focus on providing security, accountability, atomicity, anonymity, non-repudiation, and fairness to transactions [Meng & Xiong, 2004b]. For online payment systems, the most vital of these may be security [Mavridis et al., 1999]. Sahut & Galuszewska [2004] identified identification, confidentiality,

authentication, data integrity, non-repudiation, and customer solvency as key levels of security surrounding payment alternatives..

Several researchers analyzed the future trends in electronic commerce. Three areas that potentially increase the use and flexibility of online payments are (1) micropayments, (2) mobile payments, and (3) distributed payment systems.

Micropayments are small electronic payments of only a few cents or fractions of cents. They are seen as an important and potentially fruitful way businesses can charge for content online. Instead of micropayments becoming popular, most popular websites resort to earning income via advertising or subscriptions rather than micropayments [Treese, 2003]. This result could be due to the difficulty in charging transaction fees on such small payments, yet maintaining a revenue stream for the content provider.

Mobile commerce is an expanding area of importance for both researchers and users [Kreyer et al., 2002; Zheng & KeFei, 2002]. Although online payment systems from mobile devices generate great excitement, it is difficult to establish security and trust [Siau & Shen, 2003], and standards are lacking [Kreyer et al., 2003; van der Heijden, 2002]. Some research has investigated the potential use of mobile devices in short range wireless networks for commerce [Chen & Adams, 2004; Knospe & Schwiderski-Grosche, 2002], in conducting online mobile banking [Herzberg, 2003], and coupled with smart cards for added security [O'Mahoney, 2004]. Like micropayments, challenges still remain for the mainstream use of mobile commerce, but mobile commerce is gaining momentum as the devices become ubiquitous.

One research stream has described the benefits of leaving a centralized client-server payment system and moving toward distributed electronic payment systems using Peer-to-Peer (PtP) networks [Schmees, 2003]. Yang & Garcia-Molina [2003] describe a micropayment system protocol that is built upon a PtP network and provides superior performance to standard micropayment protocols.

This new research stream is not yet commercial but provides insights into the future of online payment.

REASONS TO USE ONLINE PAYMENT

Most businesses seek online payment to increase purchases by accepting bankcards. In addition to expanding the payment options available to customers, certain inherent risks faced by businesses can be reduced by using online credit payment. This section reviews five ways providers bring value to businesses: improved cash flow efficiency, guaranteed transactions, reduced costs, increased protection of sensitive information, and increased protection of the payment provider.

Improved Cash Flow Efficiency

Online payment providers assist businesses in keeping costs of receiving payments low while enhancing and improving the company's ability to collect funds. Finding an efficient and cost-effective way to collect money is of great importance for any company. Hundreds of methods exist for a business to create a dynamic website and collect customer information, but far fewer allow for the easy collection of funds [Sims & Tikekar, 2001].

Online payment providers improve cash flow efficiency for small incremental costs. Many services offer the ability for customers to make a one-time payment or to pay by subscription. Both methods tend to involve corresponding transaction fees, depending on the type of account the customer selects. Transaction fees facilitate more sales without large upfront costs.

Guaranteed Transactions

Online payment providers help reduce some of the risks associated with online purchasing by guaranteeing transactions with proper support and by protecting sensitive information [Wright, 2002]. If customers are not confident that a company will provide them with guaranteed transactions, they may refuse to conduct business with the company, with devastating effects on revenues. Online

payment providers offer straightforward ways of assuring business transactions over the Internet. One way is by collaborating with larger companies and major financial institutions to obtain the resources necessary to guarantee payments. For example, PayPal teamed up with Wells Fargo to provide greater functionality and stability to its service [Bills, 2002].

Another way providers of online payment offer customer assurance is by maintaining highly reliable equipment and technical processes. By purchasing an online payment package, businesses avoid the need to become technically proficient and adept at handling such matters as cryptography, server configuration, redundancy, and load balancing [Wright, 2002]. In hiring an online payment provider, business owners are essentially tapping into best practices and expert knowledge on online payment practices, software, and hardware.

Online payment providers also protect their customers by implementing policies in which the provider bears a portion of the transaction risk. For example, PayPal implements a "seller protection" policy that allows eligible parties to obtain a PayPal refund up to $5,000.00 annually for any reversals[1] that result from unauthorized use of a credit card or false claims that goods were not sent. Other companies offer additional fraud packages for purchase. For example, VeriSign offers a basic fraud package, as a normal part of their service, which will filter risky customers and provide a security audit for the business.

Trust is an essential factor that facilitates these transactions. McKnight et al. [2002] show trust to be essential for the success of online transactions. Stewart [1999] described the ability of websites to receive transference of trust from another site that is seen as trustworthy. Thus, using a reputable e-credit vendor could increase the customer's perception of the trustworthiness of a small business website.

[1] That is, when a transaction is reversed and the buyer is credited his/her money in return

Reduced Costs

Online payment providers help reduce costs on both the business side and the client side of a transaction by reducing the paper work, processing time, and human resources needed to complete it [Rob & Opara, 2003]. More important, they may also reduce data-entry errors because customers enter their own information into the system rather than relying on a customer service representative to enter the data for them.

Online payment providers also allow companies to eliminate the need for expensive servers, software, and administrative staff. Many businesses do not possess the capital to purchase and configure their own servers, nor do they want to worry about maintenance. Furthermore, using an online payment provider can reduce costs associated with server downtime. Since small businesses are particularly susceptible to losses caused by system downtime (much more than larger businesses [Ball, 2001]) reducing of downtime is important in these environments. Using a provider also greatly reduces the need for technically proficient developers and administrators assuring the reliability, timeliness, and efficiency of the payment system.

Increased Protection of Sensitive Information

Online payment providers can also decrease the potential for payment fraud by increasing the security of sensitive information. Payment fraud is 30 times more likely in the virtual world than in the physical world [Valentine, 2003]. Accordingly, consumers conducting business over the Internet are extremely concerned with the security of their personal information [Wright, 2002]. Using an online payment provider should decrease employee access to financial information, reduce internal employee theft, and protect sensitive customer information[2]. An online payment provider allows a business to control sensitive information without having to invest in a complex web application. Once a client's personal

[2] However, in 2005 a significant number of payment providers experienced massive data thefts from their files.

information is stored in the payment provider's database, it will not be transferred again over the Internet [Wright, 2002]. To decrease the costs of fraud further, online payment providers typically assume the risk of credit card fraud, identity theft, and other financial fraud [Quinn & Roberds, 2003]. Online payment providers typically are well-equipped to provide increased data security during transmission processes through techniques such as cryptography [Wright, 2002][3]. Virtually all major online payment providers maintain sophisticated fraud control groups that conduct cyber sleuthing to reduce the amount of fraud committed with their services.

III. THREE MAJOR TYPES OF ONLINE E-CREDIT

CONVENTIONAL E-CREDIT PROCESSING

Before PtP and third-party services were developed, the only way to accept online payments was for a business to obtain a merchant account from a bank, implement a virtual shopping cart, and program an interaction with a credit card gateway. These components interact with the customer, merchant, merchant bank, and credit card issuer during a typical transaction[4].

Merchant Bank/Merchant Account

A merchant account is a bank account established at the merchant's bank that is capable of accepting funds from credit card customers' banks. A merchant account is sometimes described as a reversed credit card account where, instead of funds flowing out of the checking account to the credit card account, funds flow from the credit card account to the checking account. Internet merchants usually do not hold funds in an account like the average customer's

[3] A description of the various cryptographic methods used in online payment methods can be found in [O'Mahoney, 2004].
[4] A complete listing of relevant terms is given in the glossary in Appendix I.

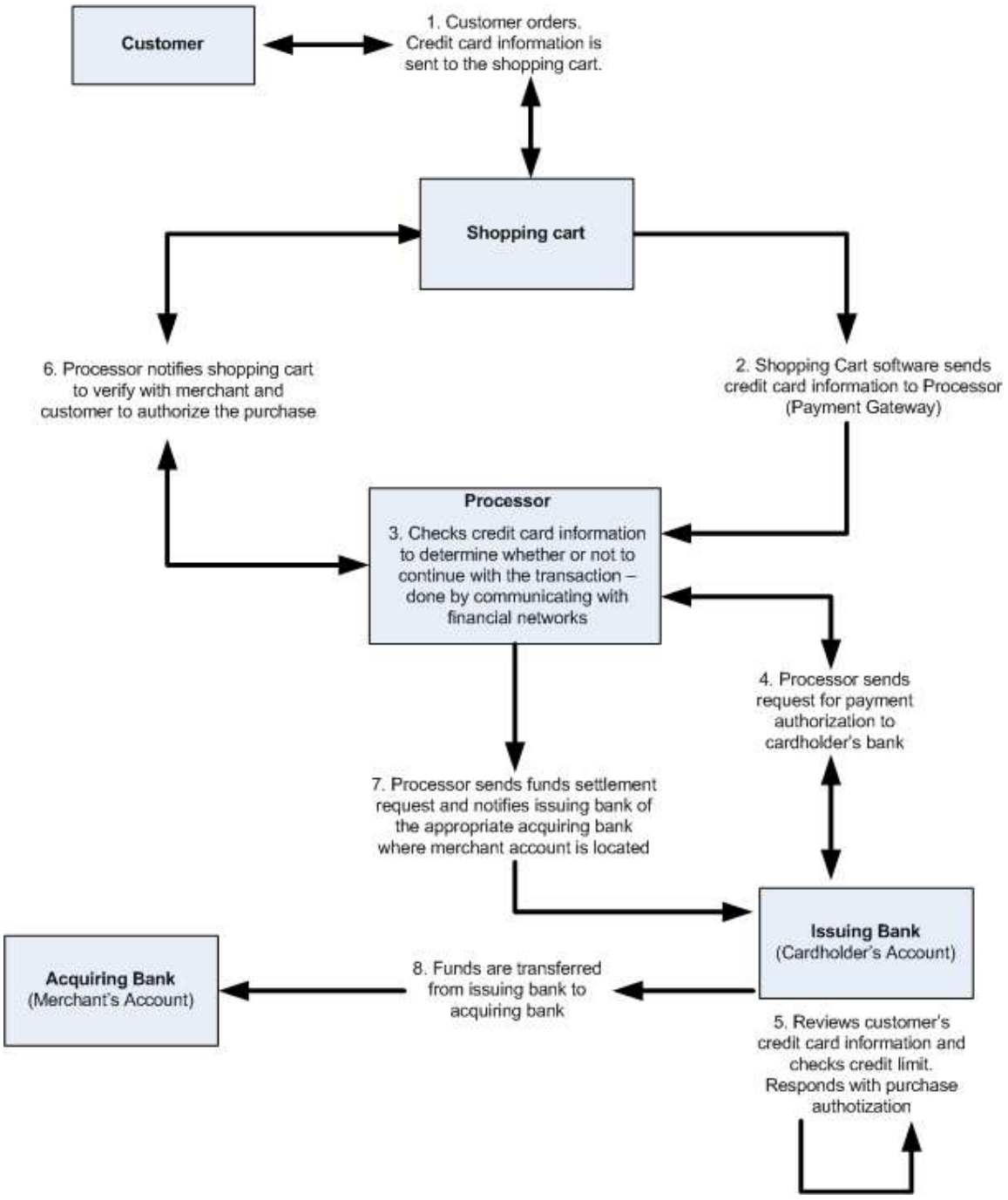

Figure 1. Conventional Credit Card Processing

typical savings or checking account Instead, the merchant transfers the funds daily to another bank account.

Shopping Cart Software

Shopping cart software involves a complex transaction processing system that maintains a link between a particular client and a set of selected items on the website This virtual shopping cart allows a customer to purchase more than one product at a time from a given website because all selected items are stored within the cart. A variety of different shopping carts are available, from simple ones that do not require any technical background to advanced ones that support programming and database functions[5]. The shopping cart acts as a link between the merchant's website and the credit card processing network (payment gateway). Information entered by the user on the merchant's website is transmitted to the payment gateway to begin a transaction. Upon approval from the cardholder's bank, the payment gateway sends an authorization approval to the shopping cart. The shopping cart then relays this information to the website so that the customer can see the transaction approval. Care needs to be taken to ensure that the shopping cart package is compatible with the selected payment gateway because each shopping cart package supports only a selected number of gateway choices.

Payment Gateway

A payment gateway, also known as the processor or credit card processor, connects the merchant's website and shopping cart, the acquiring bank (merchant's bank), and the issuing bank (cardholder's bank). The payment gateway handles all communication messages between these entities. By handling the two key parts of credit card processing, authorization and payment settlement, the payment gateway is the key link in an online transaction. During

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[5] For an example of a shopping cart package, see http://smallbusiness.miva.com/products/merchant/

authorization, credit card information from the merchant's website is sent to the payment gateway by the shopping cart, which verifies the card information and then sends a request to the cardholder's bank for the card to be charged. If the card information is valid and the customer's credit is sufficient, then the credit card company sends an approval to the payment gateway, which in turn communicates with the shopping cart and confirms the authorization for the purchase. The payment gateway then initiates a payment settlement (funds transfer) to allow the transfer of funds from the customer's credit card account to the merchant's bank account.

How e-credit Systems Work

Figure 1 shows a transaction in this system. The system is a simplified example of the complex transaction network that connects financial institutions to allow the online processing of credit cards. It is necessary that all the components of the network are compatible with one another for the transaction to be approved by all the entities. As a result, most merchant account providers offer merchant accounts that are already integrated with a payment gateway service to ensure that transactions can be performed seamlessly. Though it is possible to set up each of the different accounts separately, it is far easier, more convenient, and often more economical to find a merchant account provider that maintains an established relationship with a payment gateway provider.

THIRD-PARTY E-CREDIT PROVIDERS

The third-party e-credit payment systems are similar to conventional e-credit payment systems, but eliminate the need to open a merchant account. In a third-party process, the third-party merchant processes all the funds in the transaction. These funds can then be transferred to the merchant's bank account just as funds can be transferred to and from the merchant account in the conventional approach. The system follows similar procedures as outlined in the conventional system, with a few exceptions. Figure 2 illustrates a typical transaction in a third-party solution.

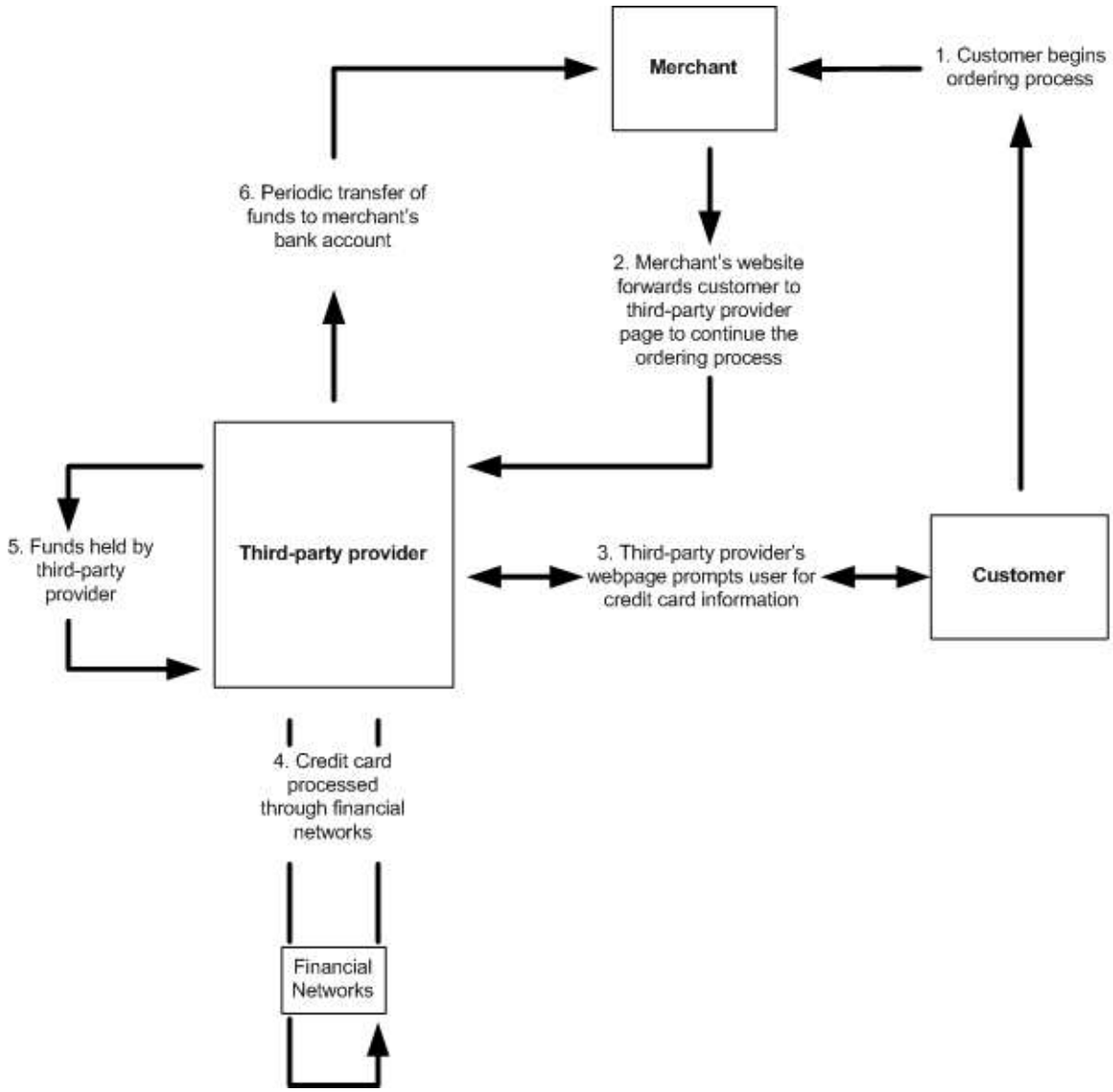

Figure 2.Typical Third-party Process

As in the conventional e-credit processing system, the shopping cart in a third-party e-credit payment system is still responsible for maintaining a connection between the customer and their selected items on the server. Once the customer opts to pay for their items, the shopping cart forwards the customer to a webpage maintained by the third-party provider to collect credit card information. The merchant's website never processes any credit or personal information because the third-party e-credit provider manages this portion of the transaction.

However, the payment gateway within this system is quite different from the traditional system. Instead of looking for immediate authorization of the credit card information that would be sent back to the shopping cart, the third-party provider receives authorization and holds the funds in trust for the subscribing business. Thus the merchant's internal account with the third-party provider instantly receives funds once a transaction is authorized. Transfers of this balance to the merchant's local bank account occur on a regular basis as predetermined in the subscription contract. For the time being, the third-party provider "purchases" the sale from the merchant and receives payment from the customer in lieu of the subscribing business. The purchases are final unless the customer's credit is found to be bad—in which case, the previous "purchase" of the sale would be voided and all charges would be passed back to the subscribing business.

In a third-party system, the concepts of a merchant account and provider are different from the conventional system. The merchant's account is an internal account created by the third-party provider. Once the financial network approves a transaction, this account is credited and held in trust until the next transfer to the merchant's bank account. As a result, the merchant account provider is not the merchant's financial institution, but the financial institution of the third-party provider, which provides a number of accounts for the provider to use for its business. An additional benefit with third-party packages is that separate components (e.g., shopping cart, gateway) are always 100% compatible.

PERSON-TO-PERSON E-CREDIT

A form of online payment that provides an inexpensive way to accept online payments is called person-to-person (PtP) payment services. Most prominent among these PtP services is PayPal, due largely to this company's connection with the auction site eBay. Although Paymate (http://www.paymate.com.au/) and Clickbank (http://clickbank.com/) compete with PayPal, PayPal is the largest PtP provider. In this section we examine the PtP payment process and general PtP attributes.

With a PtP service, it is necessary for both the merchant and the customer to maintain an account with the PtP provider. This duality greatly simplifies the payment process because all processing is handled internally through the PtP provider. The external banking network does not need to be accessed during transactions. However, compared to credit card use, only a limited network of members subscribe to the PtP service. The only way a customer can make a payment is by having an account with the same PtP provider. Figure 3 illustrates how this system works.

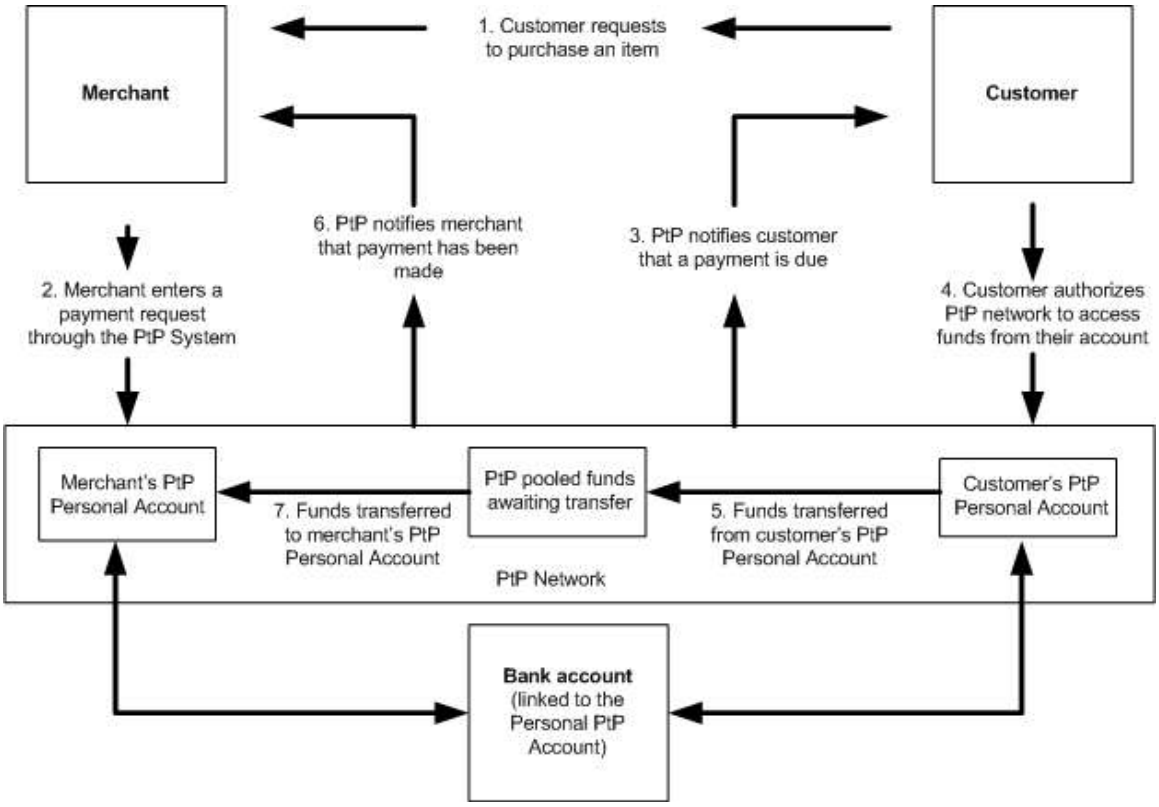

Figure 3. Typical PtP Transaction

The simplicity of the system illustrated in Figure 3 makes it a good method for low-volume sellers, or merchants who sell via web auctions. Neither the buyer nor the seller incurs monthly fees, as is standard in conventional and third-party

services[6], for the ability to accept online payments. The following are other general features and benefits of a PtP account:

- Send and receive non-credit card funds
- Automatically invoice your buyers
- Accept instant payments from your website
- Send and receive payments with other members of the same PtP provider

However, because the system illustrated in Figure 3 does not process credit card transactions without upgrading to a premium or business account we do not consider it further in comparing online payment packages for small businesses. Without processing credit cards, the potential growth that a business may expect from this type of plan is limited to the number of similar users that would be potential customers. Many PtP providers offer an upgrade, called a premium, or business account. This type of account is discussed in the next section.

IV. ONLINE PtP PAYMENT OPTIONS

Even with an understanding of the basic e-credit payment options, businesses must still decide on their vendor. One popular approach is to purchase the individual services from separate providers and ask programmers to integrate them into the business website. In doing so, two opposite approaches can be evaluated:

1. Acquiring a merchant account as the first step or
2. Acquiring a merchant account as the last step.

If a business chooses to acquire the merchant account as the first step, the business receives a list of supported gateways to choose among as part of the second step. In the third step the business chooses either to build or buy a shopping cart compatible with the gateway selected. The alternative approach to

[6] Monthly fees typically range from $10.00 to $40.00, yet are often bundled in package deals

choosing the merchant account first is to choose the shopping cart first, then choose a gateway that is compatible with it, and finally to choose a merchant account that is compatible with the chosen gateway. Each of the three services that are integrated into a complete solution has pros and cons associated with it. A business should carefully consider if they prefer certain pieces. Choosing a shopping cart first may ultimately lock the business into using a merchant account with unusually high fees, while choosing a merchant account first could require the use of a costly gateway service and force limited choices in shopping cart software.

A popular way to acquire all of the components of e-credit is to purchase the components in bundles, often from resellers who guarantee their compatibility. This option can lead to higher costs, but fewer integration issues. Whether purchasing by individual payment component or in bundles, businesses should expect to pay fixed setup costs and monthly or yearly fees associated with these products. One way to eliminate these monthly fees is to use an integrated system such as PayPal, where the only costs associated with selling items is a transaction fee.

MERCHANT ACCOUNTS

Most major banks offer Internet merchant accounts for businesses. For example Wells Fargo and Bank of America provide merchant accounts that can be linked to many different payment gateways. Merchants must be careful in their selection process because some merchant accounts are only compatible with certain payment gateways. Often merchant accounts are bundled with payment processing or a particular payment gateway integrates its services with preferred financial institutions. For example, VeriSign's payment processing lists a few merchant accounts as "Premier Partners." Merchants may find integration between preferred partners to be simpler.

PAYMENT GATEWAYS

Three of the largest payment gateway vendors are:

- Authorize.net,
- Cardservice International, and
- VeriSign.

Their offerings are described in Appendix II.

SHOPPING CARTS

Two of the largest shopping cart vendors are:

- Miva Merchant and
- osCommerce.

Their offerings are discussed in Appendix II.

INTEGRATED BUNDLES

Four integrated bundles are discussed in Appendix II:

- PayPal,
- World Pay,
- iBill, and
- Online Store Builders

PayPal, for example, offers both PtP accounts and third-party accounts. Its third party accounts are offered at two levels that differ in the amounts of integration.

OUTSOURCING E-COMMERCE DEVELOPMENT

Some merchants choose a customized e-commerce website created for them by software developers. The motivations for a customized site include control over the appearance of the shopping cart and having the widest possible choice of credit card gateways and merchant accounts. Depending on the number of

products selected and the complexity of the website, the cost to implement a customized solution, can range from a few thousand dollars to whatever the merchant wishes to spend. Merchants face similar decisions about implementing payment processes when outsourcing as when putting together the payment system themselves. They must select compatible shopping carts, a payment gateway, and a merchant account. This approach would be suitable for businesses with little technical expertise, those who want an online payment solution quickly, or those companies that find outsourcing more efficient and cost effective. Particularly large or complex payment systems can require the expertise of external specialists.

WHY USING A PAYMENT PROVIDER IS IMPORTANT

Using an online payment provider such as PayPal, VeriSign, or Cardservice International allows businesses, particularly small businesses, to conduct business online. It increases their customer base and allows them to be recognized and patronized from all over the world. If a business does not use an online payment provider of some sort, it limits its customer base and the ease in which transactions can occur.

SELECTION OF THE SERVICE PROVIDER

With so many options available for online payment[7], it can be difficult for merchants to determine which vendor's offering best fits their business needs and business model. Important issues to consider are budget for initial setup fees, monthly fees and transaction fees, the ability to deal with risk, transaction volume, and support for multiple currencies. Table 2 lists questions for merchants to consider.

[7] Appendix II lists major providers.

Table 2. Decision Guidelines on E-Payment Methods for Small Firms

Important Questions to Consider	How the Decision is Affected
How does the institution establish credit?	This issue can be important for establishing a merchant account. If the company relies on the business owner's personal credit, the options for accounts may be different than if the account will be based on the company's credit.
What is a realistic available installation budget?	Companies with limited budgets may want to consider services that charge transaction costs rather than monthly fees and installation costs.
What is the company's online sales profile?	Businesses with large volumes of transactions benefit from services with lower variable transaction fees. Conversely, businesses with minimal transactions may achieve cost savings from using services without high fixed costs.
What is the nature of the business's cash flow?	The time needed to access revenue from sales depends on the particular service. Businesses with high cash flow needs should obtain a service where money from the transaction is available quickly.
What is the ability to manage risk internally?	Many services offer fraud protection and risk management packages included with their service or as an additional purchased feature. Generally smaller businesses do not have the experience or resources to manage all risk internally and benefit from a larger, external institution handling risk management.
How important is the ability to accept payment in multiple currencies or languages?	Some gateways provide the ability to accept payment in multiple currencies and some shopping carts provide multiple language support. Companies who sell globally, however, need to consider the greater expense of these features.
How important is a customized shopping cart or web site design?	Many businesses want complete control over the design of their website and are willing to pay the additional costs. Other merchants would be satisfied with a lower-cost store builder site.

VI. THE FUTURE: GROWTH, CHALLENGES, AND CHANGES OF E-PAYMENT SYSTEMS

As the Internet continues to grow and develop in the coming years, new services and technologies will also emerge. Information Systems instructors and students need not only to understand the current online payment options and their implementation, but also upcoming trends. Thus far, this tutorial focused on the e-credit payment methods currently available. Yet, other types of systems that may become more prevalent in the future such as e-cash or micropayments [Herzberg, 2003; Treese, 2003; Valentine, 2003] or options not even envisioned. This section describes potential areas of change and associated future research opportunities. We examine three topics:

1. The important challenges to the use of online payment: fraud and security.

2. The emerging payment technologies of e-cash, micropayments, mobile commerce, and new architectures or protocols.

3. Two emerging issues related to online payments: electronic bill payment and the legal issues associated with new forms of payment.

FRAUD AND SECURITY

Beyond the type of system used by merchants to collect payments, one of the most significant challenges to online payments are high concerns about fraud and the security of transactions [Radcliff, 2002a; Radcliff, 2002b; Roberts, 2004a; Roberts, 2004b; Valentine, 2003].

New standards and procedures are continually developed as hackers and e-criminals develop new ways to steal sensitive personal and financial information. As e-criminals become more proficient in their ways, the industry needs to develop new methods and procedures to ensure the security of their clients and online information. For example, to combat this problem, some credit card companies are now providing temporary credit card numbers. These numbers can help increase the consumer's trust in the merchant because the actual card number is not revealed. Many banks require more information than a username and password to protect accounts online due to phishing and other scams. Online payment providers need to continually update their security and anti-fraud measures to maintain the integrity of transactions. Companies that provide secure, reliable online transaction systems for merchants should increase consumer trust and facilitate the growth of e-commerce.

EMERGING PAYMENT TECHNOLOGIES

E-cash

E-cash was envisioned in the early work on e-commerce [Panurach, 1996] yet they experienced little commercial success. One exception is the Octopus

system used in Hong Kong [Chau & Poon, 2003; Poon & Chau, 2001]. Although this system did not provide online payment capabilities, research could examine the success of this system and the web-based PayCash e-cash system [Peha & Khamitov, 2003] to provide guidance to the future use of e-cash online. As a variation on e-cash, Lee, Yu, & Kuo [2001] suggest that smart card based e-cash may eventually replace other varieties of e-cash. Smart cards were patented in the 1970's and first used by the French telephone system in 1983 [Wikipedia, 2005]. They are not yet widely adopted. One of the earliest e-cash smart card projects, Mondex, was acquired by MasterCard and experienced modest success [Yakal, 1997]. Due to the increased security and functionality provided by smart card cryptographic features and processing capabilities, smart cards are still seen as promising for e-cash systems. Further research could focus more specifically on overcoming the lack of widespread smart card adoption for electronic payments. In particular the problem of maintaining security while providing anonymity in e-cash solutions could be addressed so that e-cash solutions can approach the liquidity of traditional cash payments.

Micropayments

The concept of online micropayment[8] systems to facilitate the payment for content online has been theorized and debated, but only limited commercial success has been realized. For certain products, such as music or art, micropayments are seen as a way for content creators to obtain revenue and avoid the free riding problem. Some research addressed the failure of micropayments [Párhonyi et al., 2005], but future research could address new methods to implement micropayments, find ways to relieve consumer discomfort with paying micropayments, and analyze the strategic factors involved in the business use of micropayments.

[8] Micropayments are defined in Section II.

Mobile Payments

Wireless technologies, including mobile commerce or mobile payment provide opportunities for future research. Although the mobile transactions do not represent a large percentage of e-commerce [Stroborn et al., 2004], this growing area should not be ignored. Researchers identified some of the early characteristics of mobile commerce [Herzberg, 2003; Kreyer et al., 2003], how businesses can gain trust from wireless users [Siau & Shen, 2003], and critical success factors in wireless e-commerce [van der Heijden, 2002]. Recent research described the integration of smartcards and wireless technology [Dandash et al., 2005]. The new wireless technologies introduce added security risks that need to be addressed so that customers are comfortable using the technology to do business.

Architectures and Protocols

Even though previous work identified architectures and protocols for conducting online payments, many of the findings were never implemented in practice. Research could address the difficulty in developing payments systems based on theoretical protocols and suggest new protocols or architectures related to e-commerce. For example, Schmees [2003] describes how distributed digital commerce could take the place of the current client-server type e-commerce systems. Zhang, Chung, and Chang [2004] proposed some initial research in migrating to a web services payment architecture, but future research could expand on their work.

EMERGING ISSUES FOR RESEARCH

Electronic bill payment use is growing. However, many companies are waiting until a larger share of their customers are regular users of electronic bill payment [Au & Kauffman, 2001]. Currently most of them are tied to bank accounts, handled via email (e.g. PayPal], or treated as typical e-credit transactions. The potential of e-check, e-cash, mobile, or distributed PtP methods for electronic bill payment could influence current payment schemes.

VII. CONCLUSION

As businesses increasingly adopt online payment technologies, researchers, faculty, and students need to understand the resulting benefits and problems. The systems currently available should decrease costs, provide risk management, and help provide competitive advantage to users. Electronic payment technologies offer both opportunities and challenges. The largest challenge to the use of online payments is security and fraud prevention. This challenge is expected to become greater as e-commerce becomes more prevalent. The potential of e-cash, micropayments, wireless commerce, and new architectures for online payment offer fertile ground for future research.

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APPENDIX I. GLOSSARY

Term	Definition	Synonymous Terms
Application Fee	Fee charged for the privilege of requesting an account with a company	
Chargeback	A fee that is assessed for fraudulent transactions, or client disputations	
Discount Rate	Percentage deduction for each transaction	
Issuing Bank	The bank that is represented through/with the credit card	Customer's credit card's Bank
Merchant Account	A bank account established at the merchant's bank that is capable of accepting funds from credit card customers' banks	Reverse-checking account
Merchant Account Provider	Institutions that offer merchant accounts to merchants	
Merchant Bank	The bank that operates the merchant account	Acquiring bank
Monthly Minimum	Minimum charged per account, regardless of sales volume	
Payment Gateway	Handles all communication between the merchant's website and shopping cart, the merchant's bank, and the cardholder's bank	Processor, gateway, credit card processor
Reserve	Required balance that must be maintained to cover potential chargebacks	
Setup Fee	Fees and charges associated with the creation of an account	Installation fees or charges
Shopping Cart	Link between the merchant's website and the payment gateway	Cart
Statement	Monthly charge allotted for administrative costs associated with creating a monthly bill for all transactions	
Transaction Fee	A flat-rate fee assessed for each transaction	

APPENDIX II. E-PAYMENT PROVIDERS

Name	URL	Product
Access Merchant Services	http://www.accessmerchant.com/	Merchant accounts
Authorize.net	http://www.authorize.net/	Payment gateway
Cardservice International	http://www.cardservice.com/Merchants/default.aspx	Payment gateway, merchant account, management software
Cardstreet.com	http://www.cardstreet.com/	Merchant accounts
CentralBANCARD	http://www.cbancard.com/	Smart card migration, scanner hardware
Charge.com	http://www.charge.com/	Payment gateway, shopping cart package
ClearCommerce	http://www.clearcommerce.com/	Gateway with fraud protection
CyberSource	http://www.cybersource.com/	Payment gateway
eBay Stores	http://stores.ebay.com/	Store builder solution
FreeAuthNet.com	http://www.freeauthnet.com/	Merchant account, payment gateway
Global Merchant	http://www.globalmerchant.org/	Merchant account, payment gateway, hosting
GoDaddy Quick Shopping Cart	www.godaddy.com/gdshop/ecommerce/cart.asp	Store builder solution
Guardian Financial Services	http://www.guardianfinance.com/	Merchant account, payment gateway
Harbor Merchant Advisors	http://www.onlinecheck.com/	Merchant account, gateway, risk management package
iBill	http://www.ibill.com	Merchant account, payment gateway, shopping cart
Innovative Merchant Solutions	http://www.freequickbooksaccountingsoftware.com/	Merchant account, QuickBooks software
iTransact	http://www.itransact.com/	Payment gateway.
Ivan Merchants	http://www.ivanfinancial.com/home.htm	Merchant account, payment gateway, shopping cart
Jettis	http://www.jettis.com/	Merchant account, fraud software, SSL, data warehousing, management tools
JustGateways	http://www.justgateways.com/	Merchant accounts, payment gateway
Merchant 2020	http://www.merchant2020.com/	Merchant accounts, payment gateway
Merchant Warehouse	http://www.merchantwarehouse.com/	Merchant account, co-sponsored gateway
Merchants America	http://www.merchantsamerica.com	Merchant accounts, payment gateway
Miva Merchant	http://smallbusiness.miva.com/products/merchant	Shopping cart software
Money Tree Services Inc.	http://www.merchantacct.net/pages/1/index.htm	Payment gateway
MonsterCommerce	www.monstercommerce.com	Store builder solution

NetBanx	http://www.netinvest.co.uk/ncr/netbanx/	Payment gateway
osCommerce	http://www.oscommerce.com/	Shopping cart software
Payment Online	http://www.paymentonline.com/	Merchant account, payment gateway, shopping cart
PaymentOnline	http://www.paymentonline.com/	Merchant accounts, gateway, shopping cart, management toolkit
PayPal	http://www.paypal.com	Credit card processing, PtP network, shopping cart
ProStores	http://prostores.com/	Store builder solution
SourceONE Payment Solutions	http://www.sourceonepaymentsolutions.com/	Payment gateway
Total Merchant Services	http://www.merchant-account-4u.com/paypointusa.htm	Payment gateway, shopping cart
United BankCard Payment Systems	http://www.merchant1usa.com/	Payment gateway
VeriSign	www.VeriSign.com	Gateway, shopping cart software, fraud toolkit, SSL, VeriSign logo, and more
WorldPay	http://www.worldpay.co.uk	Merchant account, payment gateway, fraud prevention
Yahoo! Small Business	http://smallbusiness.yahoo.com/merchant	Payment processing, hosting, site builder software, domain name, shopping cart

PAYMENT GATEWAYS

Authorize.net

Authorize.net is the one of the largest payment gateways, although their services are often sold by resellers or bundled with other packages. They provide flexibility by interfacing with many shopping carts. The company reports that they certified over 87 different shopping carts as “preferred” carts that integrate with Authorize.net. The company also offers additional services such as fraud protection and customer support.

Cardservice International

Cardservice International provides a wide range of products and services. The collection of products analyzed here are the LinkPoint products that allow a merchant to link their website to the Cardservice International Secure Payment Gateway. The LinkPoint package allows customers to select only the options they require, customizing the product to their business model. The LinkPoint

package also includes online tools for managing and monitoring the account. Cardservice International offers increased security and fraud protection with their LinkPoint package. Its features, however, can increase costs because they require more technical expertise or understanding of the merchant's system. Cardservice International also provides a 24-hour toll-free service number, an online merchant area where information is stored particular to the merchant's account, and advanced tools to incorporate this package with any system.

VeriSign

VeriSign offers multiple payment gateways. Although the company provides e-cash and e-check, here we evaluate their standard package for third-party e-credit: Payflow Link. This basic package offers payment processing and integrates with various shopping carts. VeriSign offers one of the least expensive basic payment methods on the market, but charges extra for features such as fraud control, account monitoring, and increased customer support that are standard in some other packages. VeriSign provides toll-free technical support number for the first 30 days and use of the well-known VeriSign Secured Seal for all business transactions

SHOPPING CARTS

Miva Merchant

This ~$1000 package provides customizability, flexibility, and modularity in creating online shopping carts. The package also provides inventory tracking, administrative, and customer management tools integrated with the software. Businesses can choose from templates for their shopping carts or customize the HTML source code to their website's design. The software integrates with most major payment gateways.

osCommerce

This software package is the open source competition to Miva Merchant. The software is free and customizable under the GNU public license. Although not as

feature-rich as Miva Merchant, osCommerce provides some administrative and customer management features and is implemented in many websites.

INTEGRATED BUNDLES

PayPal

PayPal offers both PtP accounts and third-party accounts. In 2005, PayPal split its offering to merchants into two products: PayPal website Payments Standard and PayPal website Payments Pro. The products are similar, but website Payments Pro can be more tightly integrated into a merchant's website and requires programming knowledge. Accounts with PayPal are simple to set up and manage. Fees are dependent upon a seller's transaction volume. Once a merchant meets PayPal's basic requirement of $3000 in monthly revenue and is in good standing, the merchant is able to receive a discounted rate. PayPal maintains a large set of online tools which are provided free with an account.

One of PayPal's advantages over other providers is its internal fraud prevention team. This team leads the industry in fraud detection; PayPal reportedly receives 60% to 80% less fraud claims than the industry average of 1.3% to 2.6% of transactions [Radcliff, 2002b]. Radcliff claims this low rate is the result of antifraud measures that the company implemented that reduce the ability of criminals to commit fraud. Even with the lower fraud rates, some customers complain that because of PayPal's large size, the fraud prevention team's efforts can become diluted. To receive benefits from PayPal's fraud protection, sellers must report fraudulent activity and prove it, much like they would with a traditional insurance claim. In addition, if a merchant falls short of the $3,000 monthly revenue quota mentioned above or has unresolved charge backs, then higher fees apply. These measures are designed to help eliminate fraudulent activity.

One of PayPal's competitive advantages that can benefit merchants is the ability to accept payments from its 71 million PtP accounts. These accounts represent over 56 countries and 6 currencies (Canadian dollars, euros, pounds sterling, U.S. dollars, yen, and Australian dollars).

WorldPay

WorldPay provides more support for businesses transacting globally than other providers. In addition to availability in 54 countries, WorldPay can perform transactions in each of their customer's local currency and language, which their competitors cannot. For large or small businesses that operate or sell in many countries with various currencies, WorldPay offers customization to the particular business's needs. The most common package is the WorldDirect package that includes payment processing and merchant account. Options can include repeat billing or fraud protection. Customers are charged a one-time setup fee and initial fees paid at the time of application. After that, customers are billed a flat monthly rate plus transaction fees.

iBill

iBill's software package, iBill Complete, provides tools for online transactions with all major credit cards, e-checks, and even phone orders through their own call center. This package allows firms to accept charge payments under iBill's merchant account, rather than creating their own merchant account. This feature can make the services slightly more expensive but more convenient, especially if obtaining a merchant account is difficult for the business. iBill also provides complete customer service functions and fraud controls. iBill, merchants are given access to customer relationship management software, multilingual support, multiple payment plans, and online user/password management tools.

Online Store Builders

Online Store Builders offers several packages with processing, shopping cart, and merchant accounts with website design and hosting to provide merchants with tools that do not require web design abilities. Although individually, these options do not allow for much flexibility in design, dozens of companies offer templates and other tools (such as custom logos) to tailor the design to a particular business. Online Store Builders generally include a merchant account and a payment gateway in their package. Often these payment providers charge higher monthly fees than would be incurred in piecing the components together.

However, businesses do not need to worry about compatibility issues. The only downsides are the lack of complete control of the design and the potential for slightly higher prices. Examples of these include:

- Yahoo Stores - smallbusiness.yahoo.com/merchant/
- eBay Stores - stores.ebay.com/
- ProStores (operated by eBay) - www.prostores.com
- MonsterCommerce Manager – www.monstercommerce.com
- GoDaddy Quick Shopping Cart - www.godaddy.com/gdshop/ ecommerce/ cart.asp

APPENDIX III. FEATURES AND SETUP OF A PAYPAL WEBSITE PAYMENTS STANDARD ACCOUNT

To help instructors and students familiarize themselves with one of the largest and most well known online payment providers, we provide this simple tutorial to explain the setup and use of PayPal's website Payments Standard account[9]. Additional information can be found in PayPal's internal documentation about further customization options:

- Integration Guide - https://www.paypal.com/en_US/pdf/merchantOverview_interactive.pdf
- Merchant Overview - https://www.paypal.com/en_US/pdf/PP_WebsitePaymentsStandard_IntegrationGuide.pdf

BENEFITS AND FEATURES

- Accept credit card payments for a low transaction fee
- Allow sellers to charge subscription payments for content or business services
- Provide limited instant access to the funds in the PayPal account
- Make payments to many people at once using the Mass Payment feature
- Limit employee access to the account by using Multi-User Access feature
- Customer service call center

SETUP

Figure A-1 shows the information required to create an account with PayPal. To setup a PayPal merchant account users can find the correct page by selecting

[9] The information in this Appendix comes from multiple sources as well as the Integration Guide and the Merchant Overview. Most of the information can be found at https://www.paypal.com/us/cgi-bin/webscr?cmd=_wp-standard-feature-list-outside

"Merchant tools" from PayPal's home page. Businesses can next add bank account information to their account for fund withdrawal.

INTEGRATION AND CONVENIENCE

After the business account is set up, PayPal provides tools to integrate their secure payment solution into a small business's website. Where businesses previously needed to hire programmers to create the e-credit, PayPal provides wizards (which they call "factories") for anyone who understands how to copy and paste HTML code into a webpage. Users can follow a wizard to enter in the product information for an item; PayPal will then automatically generate the HTML code to create the purchasing button. All the user must do is copy the code into his or her source code. The wizard gives users the option of using unencrypted fields, which allows for ease of editing of multiple items or encrypting some of the fields for better security. The drawback to this is that the user must always create buttons for their site using the wizard.

Adding the generated code into its existing site allows a business to collect funds from its website. Figure A-2 shows a "Buy Now" button generated by a PayPal wizard integrated into the business's website. When a customer clicks the button, the order information is submitted to PayPal's secure server where he or she can enter payment information. Figure A-3 shows a how a small business can add some customization to the checkout process on PayPal's servers. At checkout, customers can use a credit card or can transfer funds from a PayPal PtP account. Aside from the generated code on the user's website, all forms, shopping card, web programming, and fraud detection tools reside on PayPal's secure web servers. Thus, the implementation of a payment is simplified for business owners who are less technologically oriented.

WITHDRAWING FUNDS

PayPal provides business owners flexibility in managing funds received from sales transactions. Although most businesses will want the funds from their PayPal merchant accounts credited to their bank accounts, Figure A-4 shows the options that are available to business owners. Figure A-5 shows the simple

process of transferring funds from a PayPal account to an account at a bank. This process may take three to four business days, while some of the other options allow for immediate use of the money.

Figure A-1. PayPal Account Sign-up

Figure A-2. “Buy Now” Button Integrated with Screen-Scraper.com

Figure A-3. Customized Checkout on PayPal's Servers for FixaPicture.com

Withdraw Funds Secure Transaction

PayPal offers the following options for getting funds out of your PayPal account. Don't forget: You can **earn a return** on your PayPal balance with the PayPal Money Market Fund.

Options	Processing Time	Cost
Transfer funds to your bank account	3-4 Business Days	Free!
Request a check from PayPal	1-2 Weeks	$1.50 USD
Shop with a PayPal debit card	Instant (once you get a card)	Get cashback!
Get cash out of an ATM	Instant	$1.00 USD
Shop online with a PayPal virtual card	Instant	Free!
Buy from over 30,000 PayPal Shops	Instant	Free!
Pay your bills online with PayPal BillPay	Instant	Free!

Figure A-4. Options for Withdrawing Funds

Figure A-5. Withdrawing Funds to a Bank Account

ONLINE SHOPPING CART

To make implementation easier, many online payment providers (including PayPal) offer website shopping cart services for their subscribers to implement. This feature allows customers to select multiple items and pay for them all at the same time. Figure A-6 shows how a user can enter details about an item, such as name, cost, and shipping fees. Just as with the "Buy Now" buttons, a wizard then generates the HTML code for "Add to Cart" and "View Cart" buttons that can be copied and pasted into the business's website. When customers click the button to add an item to the shopping cart, they see a list of items in their cart

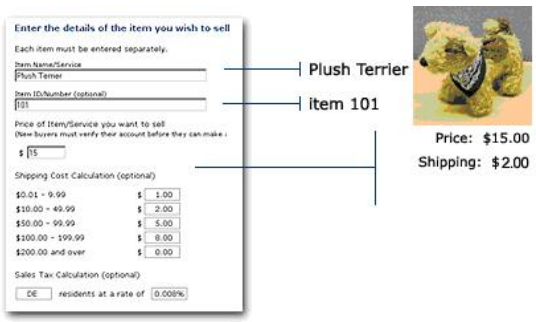

Figure A-6. Wizard - Enter Item Details[10]

[10] Source : https://www.paypal.com/cgi-bin/webscr?cmd=p/dmo/demo_sc_3-outside

together with their payment information (Figure A-7). Customers may then navigate from the shopping cart to a webpage where they can enter credit card information on PayPal's servers. These payments go directly to the business's corresponding PayPal account. (Users who want a more customized experience can also purchase a third-party shopping cart that integrate with PayPal)

Figure A-7. Wizard: HTML Generator for Cart Buttons[11]

SUBSCRIPTION OPTIONS

PayPal allows a business to offer subscription services to their customers. A subscription allows businesses to charge customers recurring payments each month for content or services. Using this service, companies can choose how often and how much they want their customers billed for a particular service. After the wizard creates the HTML code for the subscription button, users may place the button on a company's website or send them out in e-mails.

[11] Source: https://www.paypal.com/cgi-bin/webscr?cmd=p/dmo/demo_sc_9-outside

TRANSACTION FEES

Business accounts are set up at no cost, but a fee is assessed for each transaction processed through PayPal. Based on sales volume, a merchant will qualify for either the merchant or the standard rate. Table 3 summarizes of these rates. If it is necessary to perform foreign currency exchange during the transaction, PayPal applies the current exchange rate together with a 2.5% fee.

Table 3. Merchant and Standard Rates by Currencies for Domestic Payments

	Standard Rate	Merchant Rates			
Monthly Received Payment	$0.00 USD to $3,000.00 USD	$3,000.01 USD to $10,000.00 USD	$10,000.01 USD to $100,000.00 USD	Over $100,000.00 USD	
USD	2.9% + $0.30 USD	2.5% + $0.30 USD	2.2% + USD$0.30	1.9% + USD$0.30	
GBP	3.4% + £0.20 GBP	2.9% + £0.20 GBP	2.7% + £0.20 GBP	2.4% + £0.20 GBP	
AUD	3.4% + $0.40 AUD	2.9% + $0.40 AUD	2.7% + $0.40 AUD	2.4% + $0.40 AUD	
JPY	3.4% + ¥40 JPY	2.9% + ¥40 JPY	2.7% + ¥40 JPY	2.4% + ¥40 JPY	
Monthly Received Payment	$0.00 CAD to $3,000.00 CAD	$,3000.01 CAD to $12,000.00 CAD	$12,000.01 CAD to $125,000.00 CAD	Over $125,000.00 CAD	
CAD	2.9% + $0.55 CAD	2.5% + $0.55 CAD	2.2% + $0.55 CAD	1.9% + $0.55 CAD	
Monthly Received Payment	€0.00 EUR to €2,500.00 EUR	€,2,500.01 EUR to €10,000.00 EUR	€10,000.01 EUR to €50,000.00 EUR	€50,000.01 EUR to €100,000.00 EUR	Over €100,000.00 EUR
EUR	3.4% + €0.35	2.9% + €0.35 EUR	2.7% + €0.35 EUR	2.4% + €0.35 EUR	1.9% + €0.35 EUR

Sources for Japanese yen, Canadian dollar, and Euro are given in https://www.paypal.com/cgi-bin/webscr?cmd=_display-receiving-fees-outside&countries=, where the equal sign is followed, respectively, by JP, CA or EU

MULTI-USER ACCESS

Multi-User Access provides increased security for PayPal merchant accounts by giving different users various levels of access. Each account may create 200 different users, each with varying access. Thus, an employee responsible only for withdrawing funds can be limited to that function within the account. This feature becomes helpful as businesses grow and the owner of the PayPal account no longer manages all of the account's transactions.

ADDITIONAL OPTIONS

Instant Payment Notification

PayPal offers many capabilities that basic users may not be skilled enough to implement, but should be aware of as the business grows. Instant Payment Notification (IPN) is one of those features. IPN involves the business's server communicating with PayPal's servers to receive real-time information about purchases. This feature can be helpful as the quantity of transactions goes up. It should not be necessary for most businesses initially using an online payment method.

Mass Pay

Payments can be sent to many people at once. To do so, the user must create a tab delimited flat file (i.e., created with a spreadsheet application) including e-mail addresses and payment amounts; this file is then uploaded to PayPal using the form in Figure A-8. This payment method can save time and eliminate the need for writing paper checks.

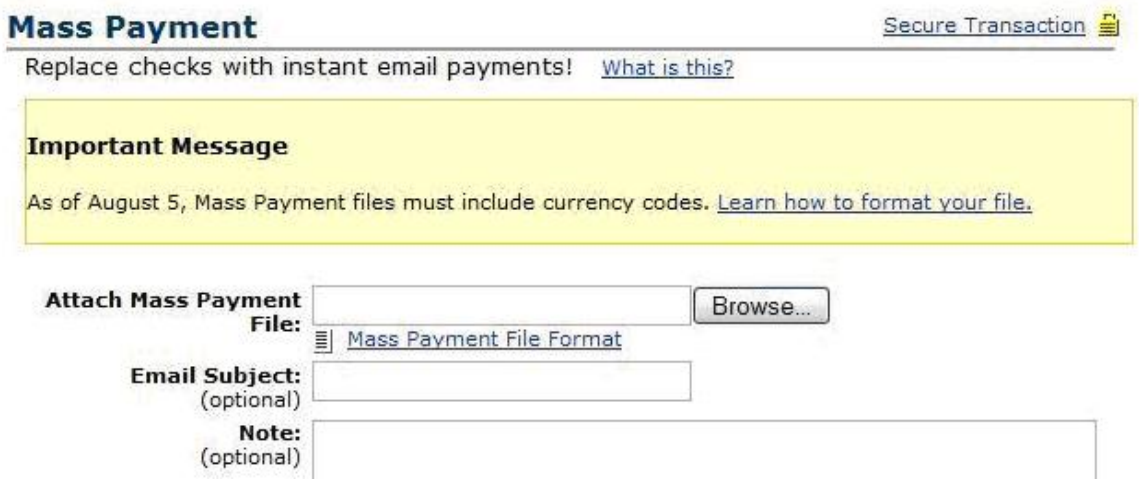

Figure A-8. Subscriptions and Recurring Payments Setup Option

Shipping labels

Through partnerships with the United States Postal Service (USPS) and United Parcel Service (UPS), businesses can print shipping labels for purchased items.

The only requirements to use this service are a clear printer and a scale. After a package has been weighed, businesses can print shipping labels purchased through their PayPal merchant account. This process allows for convenience in shipping and the ability to track shipments.

SUMMARY

PayPal offers the tools necessary for small businesses without the resources or time to implement their own payment process. Setting up simple features such as “Buy Now” buttons or a shopping cart is simplified with PayPal and is adequate for a small to moderate number of transactions. As the company grows, PayPal offers more advanced features, such as IPN, that may be implemented to provide increased real-time functionality.

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EDITOR'S NOTE: The following reference list contains the address of World Wide Web pages. Readers, who have the ability to access the Web directly from their computer or are reading the paper on the Web, can gain direct access to these references. Readers are warned, however, that

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3. the authors of the Web pages, not CAIS, are responsible for the accuracy of their content.

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