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## Learning Objectives

Upon completion of this chapter, you will be able to:

1. Describe the situations where micropayments are used and alternative ways to handle these situations.
2. Discuss the different payment cards used online and processing methods.
3. Discuss the different categories and potential uses of smart cards.
4. Discuss stored-value cards and identify under what circumstances they are used best.
5. Describe micropayments online.
6. Describe the processes and parties involved in e-checking.
7. Understand the major types and methods of mobile payments.
8. Describe payment methods in B2B EC, including payments for global trade.
9. Describe emerging EC payment systems.

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## OPENING CASE: PAY-PER-PAGE: ALTERNATIVES TO E-MICROPAYMENTS

### The Problem

The e-book market is booming while the brick-and-mortar book market is rapidly declining. In 2013, Amazon.com released the 6th generation Kindle reader – the “Kindle Paperwhite” (also known as ‘Paperwhite 2’). Kindle books can also be read on virtually any PC or tablet device. Barnes & Noble has a Kindle competitor called the Nook. The result is that some categories of books in digital format sell better than their hard-cover and paperback counterparts, as described in Chapter 5.

For the most part, e-books are sold as “digital replicas” of their print counterparts. This approach may be fine for works of fiction, true crime, and so forth. Most fiction readers are primarily interested in purchasing the entire book, not individual pages or chapters. This may not be the case for nonfiction readers. Many nonfiction readers do not need, nor do they want, a complete book. For example:

- A reader is traveling to Rome, Italy on his or her next vacation and only wants a couple of chapters from Fodor’s holiday travel guide to Italy, not the whole guide.
- A software programmer faces a perplexing problem and discovers a solution in a particular chapter of a well-known programming book. The book sells for \$80, but the programmer needs only 5 pages from the 600-page edition.
- A professor would like to assign his students one chapter from a noncourse textbook without violating copyright laws or requiring the students to spend a small fortune purchasing the entire book.

Selling books online – either hard copies or electronic – is straightforward. Selling pages, chapters, or any other sections of a book or journal online for under \$5 is another story. There are two barriers, neither of which is technical. The first barrier is that publishers are hesitant to cannibalize their profits by selling parts of a book rather than the book as a whole. This was the

same viewpoint the music industry held before iTunes and Amazon.com began selling individual songs in addition to complete CDs.

The second barrier is that merchants incur transaction costs that are too high when they allow customers to use credit or debit cards to make purchases for less than \$5. In the online world, the vast majority of consumers use credit cards to make purchases. The financial institutions issuing credit cards charge merchants a fixed percentage and a fixed fee for each credit card purchase. Merchants who accept credit cards typically must pay a minimum transaction fee that ranges from 25¢ to 35¢, plus 2% to 3% of the purchase price. The same is true for debit cards, even though the fee is lower. These fees are reasonable for card purchases over \$10–\$12, but can be cost-prohibitive for smaller transactions.

The same problem occurs when a customer tries to make a credit or debit card purchase in each of the following situations:

- Buying a song on iTunes for \$1.29, or an application from the App store for \$1.99.
- Purchasing a copy of an archived newspaper article from a leading newspaper or news journal (such as *Forbes* or *BusinessWeek*) for \$1.50.
- Selecting an online game and buying 30 minutes of playing time for \$3.00 or buying an accessory or weapon while playing the game.
- Purchasing a couple of digital images from an online clip art store for 80¢ each.

In 2005, Amazon.com tried to remedy this problem. Amazon announced a plan called “Amazon Pages” that would allow readers to purchase sections of books online. The plan was supplemented by the release of the Kindle e-book reader and the opening of the Kindle Store. Similarly, in February 2008, Random House began testing the idea of selling individual chapters online for \$2.99. In 2011, the first, and only, title offered was Chip and Dan Heath’s *Made to Stick* (which was given away free in 2013).

### The Solution

Small online payments, usually \$10–12 each (\$10 per PayPal), are called *micropayments*. In the offline world, these small purchases are

usually made with cash because credit card companies charge merchants exorbitant fees to make the transactions profitable. Because cash cannot be used in the online world, there have been several efforts aimed at producing digital surrogates. As far back as 2000, a number of companies offered micropayment solutions designed to circumvent the fees associated with credit and debit cards. For the most part, the history of these companies is one of unfulfilled promises and outright failure. Digicash, First Virtual, Cybercoin, Millicent, and Internet Dollar are some of the micropayment companies that went bankrupt during the dot-com crash. Bitpass is an example of a company that failed in 2007. A number of factors played a role in their demise, including the fact that early users of the Internet thought that digital content should be free.

While some digital currencies have been a resounding failure, there are a series of micropayment models that do not depend solely or directly on credit or debit cards and have enjoyed some success.

## The Results

In 2012, Apple announced that consumers had downloaded over 20 billion songs and 10 billion applications from the iTunes Store. The vast majority of these songs and applications cost less than \$2.00 each. Consumers downloaded over \$150 million worth of 46 different applications on a single day in December 2011. Clearly, Apple has been able to overcome the micropayment problem, using the “aggregation” payment model (described later in this chapter). In particular, any consumer who wants to purchase items from iTunes or the App store creates an account that is associated with a credit or debit card. When she or he makes a purchase, the purchase amount is added to the prior totals until the new total exceeds a value that makes it cost-effective for Apple to submit the payment to the credit or debit card issuer. Naturally, other vendors and particularly [Amazon.com](http://Amazon.com) could follow Apple’s lead and use the same sort of system to sell book pages, chapters, and articles on demand, assuming the publishers are willing to collaborate.

Credit and debit card companies are well aware of the difficulties associated with using cards for online micropayments; therefore, they have lowered their fees in an effort to entice online (and offline) vendors to permit credit and debit card micropayments. Even with the new fee structure, purchases of less than \$10 are still cost-prohibitive for the average merchant. PayPal also has enhanced their payment system to handle micropayments (described in Section “Nontechnical Methods: from Phishing to Spam and Fraud” in Chapter 10).

**Sources:** Based on Analysys Mason (2010), Tsotsis (2011), and [en.ecommercewiki.info/payment/micro\\_payment](http://en.ecommercewiki.info/payment/micro_payment) (accessed June 2014).

## LESSONS LEARNED FROM THE CASE

Almost since the inception of e-commerce, credit and debit cards have ruled the world of e-payments. Virtually all B2C purchases are made using payment cards. As noted in the opening case, many electronic money clones have tried to solve the problem but virtually all failed. The only major company to succeed is PayPal ([paypal.com](http://paypal.com)), which is discussed in Section “The Information Security Problem” in Chapter 10. A similar situation exists in B2B where several methods were attempted, but only a few succeeded.

While the majority of B2C e-payments are made with credit and debit cards, there are a number of new situations where other alternatives are making inroads (although they still tend to be linked to cards somewhere in the payment chain). One of these is the micropayment scenario discussed in the opening case. Another is in the mobile arena. Smartphones and other mobile devices are being used to make payments both online and offline. Over time, the mobile payments may actually end up on our phone bills, not on our credit card statements. Note that globally there are big differences in the way that e-payments are made. For an overview, see [yStats.com](http://yStats.com) (2014).

In this chapter, we discuss the evolution of e-payments in B2C and B2B and the increased importance of mobile devices for e-payments. The chapter also explores the players and processes associated with the various payment alternatives along with the underlying reasons why some have been widely adopted while others have not.

## 11.1 THE PAYMENT REVOLUTION

The year 2003 was a turning point in the use of cash, checks, and credit cards for in-store purchases. In that year, for the first time, the combined use of credit and debit cards exceeded the combined use of cash and checks in the U.S. Since then, debit and credit cards have accounted for over 50% of in-store payments, with cash and checks constituting the rest. This trend is continuing. The growth in the use of cards is correlated with the decline in the use of cash. In addition, in recent years, debit card use has been spurred by a change in the U.S. Electronic Funds Transfer Act, which eliminated the requirement for merchants to issue receipts for debit purchases of \$15 or less. For a reflection on e-commerce in Europe (2013), see [www.ecommerce-europe.eu/news/reflecting-on-2013-e-payments](http://www.ecommerce-europe.eu/news/reflecting-on-2013-e-payments).

Similar trends have occurred in recurring bill payments. For example, in 2001, over 75% of all recurring bill payments were made by paper-based methods (e.g., paper checks), whereas less than 25% of these payments were made electronically. Today (2014), the percentage of recurring bills paid electronically is over 55% and growing.

For decades, people have been talking about a cashless society. Although the demise of cash and checks is certainly not imminent, many individuals can live without checks or cash. Today, almost 100% of online B2C payments are made electronically. Throughout developed countries, the vast majority of online purchases are made by using credit cards, although there are some countries where other payment methods prevail. For instance, consumers in Germany prefer to pay

with either direct debit or bank cards, whereas Chinese consumers rely mainly on debit cards and making PayPal type arrangements. As will be described later, payments for e-commerce in developing countries are being made with new methods such as PayPal. For example, according to Zawya (2014), the Cairo Amman Bank is introducing PayPal services in Jordan to promote e-commerce.

For online B2C merchants, the implications of these trends are straightforward. In most countries, it is difficult to operate an online business without supporting credit and debit card payments, despite the costs. For merchants who are interested in international markets, there is a need to support a variety of e-payment mechanisms, including bank transfers, COD, electronic checks, private-label cards, gift cards, instant credit, and other non-card payment systems, such as PayPal. Merchants who offer multiple payment types have a higher percentage of conversion of clicks to purchases resulting in increased revenues.

The short history of e-payments is littered with the remains of companies that have attempted to introduce nontraditional payment systems. One of the more recent attempts is Bitcoin ([bitcoin.org](http://bitcoin.org)). Bitcoin is a peer-to-peer, encrypted digital currency powered by the company's special software. The currency is for simple use and only by its owner. To date, Bitcoin is used fairly extensively but it has some problems (see Section 11.8). Bitcoin may be used for micropayments in the future (see [ciondesk.com](http://ciondesk.com)). For details, see links at [weusecoins.com](http://weusecoins.com). It takes years for any payment system to gain widespread acceptance. For example, credit cards were introduced in the 1950s but did not reach widespread use until the 1980s. A crucial element in the success of any e-payment method is the "chicken-and-egg" problem: How do you get sellers to adopt a payment method when there are few buyers using it? Further, how do you get buyers to adopt a method when there are few sellers using it?

The competition for e-payment systems is fierce (see Jing 2013). The success of any e-payment system depends on factors such as those listed below (based on Evans and Schmalensee (2005), Roth (2010), and the authors' experiences.

- **Independence.** Most forms of e-payment require the merchant to install specialized software and hardware to authorize and process a payment. Specialized methods may be cumbersome and costly.
- **Interoperability and portability.** An e-payment method must be integrated with existing information systems.
- **Security.** How safe is the money transfer? What if the money transfer is compromised? Only safe systems will succeed.
- **Anonymity.** Some buyers want their identities and purchase records to be anonymous. This can be done only when cash is used. To succeed, special payment methods, such as e-cash, have to maintain anonymity.
- **Divisibility.** Since most merchants accept credit cards only if the purchase price is over a certain amount, it is necessary for a successful EC transaction to address the issue of small payments.
- **Ease of use.** Credit cards are used for B2C and B2B e-payments because of their ease of use. E-payments must complement the trading methods.
- **Transaction fees.** When a credit card is used, the merchant pays processing fees. These fees make the use of credit cards for small payments cost prohibitive for the seller. Thus, a solution for a small amount of money is necessary.
- **International support.** EC is a worldwide phenomenon. An e-payment method must be easily adapted to fit buying needs and local legal requirements before it can be widely adopted.
- **Regulations.** A number of international, federal, and state regulations govern all payment methods. Any changes or new methods need approval of the regulators. PayPal, for instance, faced several lawsuits brought against them by several U.S. states for alleged violations of banking regulations.

## The PayPal Alternative

While credit and debit cards dominate e-commerce payments, one alternative that has succeeded is PayPal (and its clones). PayPal was formed in the late 1990s from the merger of two small startup companies, Confinity and X.com. Their initial success came from providing a payment system that was used for eBay transactions (PayPal is now an eBay company). How did the system work? Essentially, eBay sellers and buyers opened up PayPal accounts that were secured by a bank or credit card account. At the completion of an auction, the payment transactions were conducted via the seller's and buyer's PayPal accounts. In this way, the bank or credit card accounts remained confidential. It is important to remember that in those days, buyers were often wary of revealing their credit card numbers online. For the seller, it also eliminated the transaction fees charged by the credit card companies, although PayPal eventually began charging similar, though somewhat lower, transaction fees.

Even though eBay had a payment system called Billpoint, PayPal became so successful that eBay eventually decided to close Billpoint and acquired PayPal in October 2002. For details see [news.cnet.com/eBay-picks-up-PayPal-for-1.5-billion/2100-1017\\_3-941964.html](http://news.cnet.com/eBay-picks-up-PayPal-for-1.5-billion/2100-1017_3-941964.html).

Why was PayPal more successful than Billpoint? This is a tough question that has generated of multitude answers. PayPal had a better user interface, better marketing, a better mix of services, and is user friendly for both buyers and sellers. Regardless, neither Billpoint nor PayPal had to find the market of potential buyers and sellers; eBay had already done this. What Billpoint and PayPal had to do was convince eBay consumers and merchants to use their systems. PayPal was more successful than Billpoint.

As of December 2014, PayPal operates in 203 global markets and has 157 million active accounts (see [paypal-media.com/about](http://paypal-media.com/about) and [paypal-media.com/assets/pdf/fact\\_sheet/paypal\\_fastfacts\\_Q4\\_2013.pdf](http://paypal-media.com/assets/pdf/fact_sheet/paypal_fastfacts_Q4_2013.pdf)). PayPal supports payments in 26 currencies. In 2013, their revenue was about \$7 billion, half of which came from their global trading and approximately 65% of

which was generated by their Merchant Services unit. PayPal's revenue figures increased about 26% in one year, representing close to 40% of eBay's total revenue. PayPal's overall success is the result of a three-phase approach to e-payments that has unfolded over time. First, they concentrated on expanding services provided to eBay users in the U.S. Next, they increased the size of their market by opening the system to eBay's international sites and users. Finally, they decided to build PayPal's operations to non-eBay businesses. One such initiative was a system designed to support person-to-person payments (the online equivalent of a wire transfer service between individuals). More importantly, in 2003 they created a new business unit called Merchant Services (serving e-commerce merchants) independent of the eBay community. The analysis of revenues reveals that the growth of PayPal's international business along with the growth of the Merchant Services unit is the reasons why PayPal continues to be so successful.

Over the years, PayPal has had a handful of competitors – none of which has posed a serious threat. Today, there is a new cast including:

- Google Wallet (formerly Google Checkout; [google.com/wallet](http://google.com/wallet)). The payment processing is incorporated in the user's Google Account. Note that Google Wallet is not accepted by eBay. Google Wallet allows you to shop and pay with your cell phone.
- Wirecard AG ([wirecard.com](http://wirecard.com)). Wirecard AG offers cashless payment and other services on a one-stop basis as well as offering a vast range of e-commerce industries worldwide. This system competes with PayPal and Western Union.
- Skrill (formerly Moneybookers; [skrill.com](http://skrill.com)). Skrill is a British e-payment, storage, and money transfer system owned by Investcorp Technology Partners. Operationally, it is similar to PayPal. However, Skrill's transaction fees are lower. Skrill is not as popular as PayPal, but is a convenient electronic payment system to use with Forex brokers. It is also accepted on eBay.
- Popmoney (formerly ZashPay; [popmoney.com](http://popmoney.com)). Popmoney (a subsidiary of Fiserv, Inc.)

is an online person-to-person payment service that allows people to send and receive money directly from their bank account using text messaging or e-mail.

For more on PayPal, see Valentine (2012).

### **Person-to-Person (P2P) Payments**

A considerable number of EC transactions are conducted between individuals. Payments from unknown buyers are critical to the success of EC where transactions are conducted online and the participants are in different places and do not know each other. Additionally, money lending between individuals is becoming more popular, as discussed in Chapter 3.

The following are some of the methods used in P2P payments:

- Using PayPal (described earlier)
- Using prepaid cards
- Using the clearXchange (CXC) network ([clearxchange.com](http://clearxchange.com)). This network serves customers of participating banks (Wells Fargo and Bank of America as of 2014). Customers can transfer funds from their existing checking accounts directly to any other customer in any participating bank (see Valentine 2012)
- Using Bitcoin and other digital currencies

### **Digital Currencies**

How much is a Linden Dollar worth in U.S. dollars? How about Farm Cash? What about a Mahalo Dollar? What are these things?

These are all examples of digital (or virtual) currencies. A **digital (virtual) currency** is a medium of payment that is electronically created, stored, and used in e-commerce. It can be used to pay for either physical goods or virtual ones. Some of the better known examples of virtual currencies include:

- *Linden Dollars*. Second Life is a virtual world. It has its own economy and in turn its own currency called the Linden Dollar (L\$). The L\$ can be used to pay for any transaction made in Second Life such as purchasing land or furniture. Services include wage labor, entertainment,



custom content creation, and the like. The L\$ is purchased on the Second Life site.

- *Game Playing Currencies.* Most of the massively multiplayer online games (MMOGs) have their own virtual currencies. For example, FarmVille has Farm Cash, Habbo (previously Habbo Hotel) has Habbo Coins, Whyville has Pearls, and World of Warcraft has WOW Gold. In each case, the currency can be used to purchase whatever goods and services are pertinent to the specific game. Like L\$ and Facebook Payments, game currencies cost *real-world money*.
- *Bitcoin.* One of the most discussed global currencies is Bitcoin. It has both successes and problems. For a presentation of Bitcoin and other emerging digital currencies, see Section 11.8.

Unlike other forms of digital currencies, virtual currencies of this sort have managed to take hold primarily because of the tremendous growth experienced in social networks and social games. In both of these cases, virtual currencies represent a major source of revenue, especially in the social network and gaming worlds.

E-payments are classified depending upon their nature (prepaid, real time, and post-paid), protocols (credit, debit, check, and cash), size of payment (regular payment and micropayment), payment entities (individual and business), and platform (smart card and mobile payment). Finally, there are real world and virtual currencies. Virtual currencies are part of the coming currency revolution and its virtual social currency. For an overview, watch the video “The Coming Currency Revolution” (7:08 minutes) at [youtube.com/watch?v=ITKJoCLP9Z0](https://www.youtube.com/watch?v=ITKJoCLP9Z0).

### SECTION 11.1 QUESTIONS

1. What types of e-payments should B2C merchants support?
2. What is the “chicken-and-the-egg” problem in e-payments?
3. Describe the factors that are critical for an e-payment method to achieve critical mass.
4. What is PayPal? What business strategy did they use to build their payment services? Who are some of PayPal’s current competitors?
5. What is a virtual currency? What are some examples?

6. What is virtual social currency? (Hint: watch the video “The Coming Currency Revolution” also check VEN Commerce Ltd. [ven.com](http://ven.com)).

## 11.2 USING PAYMENT CARDS ONLINE

**Payment cards** are electronic cards that contain payment-related data. They come in three forms:

1. **Credit cards.** A credit card enables its holder to charge items (and pay later), or obtain cash up to the cardholder’s authorized limit. With each purchase, the credit card holder receives a loan from the credit card issuers. Most credit cards do not have an annual fee. However, holders are charged interest if the balance is not paid in full by the due date. Several cards where you accumulate loyalty points (e.g., frequent flyer programs) charge annual fees. Visa, MasterCard, and American Express are prime examples of credit cards.
2. **Charge cards.** These are special credit cards where the balance must be paid in full by the due date and usually have annual fees. Examples of issuers are American Express and Diner’s Club (they both offer regular credit cards as well).
3. **Debit cards.** Payments made with a debit card are withdrawn from the holder’s checking or savings account. The actual transfer of funds usually takes place in real time from the holder’s account (if an ATM card is used). However, a settlement to a merchant’s checking account may take place within one to two days. MasterCard and Visa are examples of debit card issuers. For security risks of debit cards, see Bell (2011). For four places where not to use a debit card, see [usatoday.com/story/tech/columnist/komando/2014/04/11/4-places-you-should-not-swipe-your-debit-card/7436229](http://usatoday.com/story/tech/columnist/komando/2014/04/11/4-places-you-should-not-swipe-your-debit-card/7436229).

## Processing Cards Online

The processing of credit card payments has two major phases: *authorization* and *settlement*. **Authorization** determines whether a buyer's card is valid (e.g., not expired) and whether the customer has sufficient credit or funds in his or her account. Authentication is the first step of authorization, as described in Chapter 10. **Settlement** involves the transfer of money from the buyer's account to the merchant's. The way in which these phases actually are performed varies somewhat depending on the type of payment card used. The settlement also varies by the configuration of the system used by the merchant to process payments.

The following are the processing options. The EC merchant may:

1. **Own the payment software.** A merchant can purchase a payment-processing module and integrate it with its other EC software. This module communicates with a payment gateway run by an acquiring bank or another third party.
2. **Use a point-of-sale (POS) system operated by a card acquirer.** Merchants can redirect cardholders to a POS system run by an acquirer. The POS handles the complete payment process and directs the cardholder back to the merchant's site once payment is complete. In this case, the merchant's system deals only with order information. In this configuration, it is important to find an acquirer that handles multiple cards and payment instruments. If not, the merchant will need to connect with a multitude of acquirers.
3. **Use a POS system operated by a payment service provider.** Merchants can rely on **payment service providers (PSPs)**, which are third-party companies that provide services to merchants so they can accept all kinds of electronic payments. The PSPs connect all participants in the electronic transactions. See an example at [usa.visa.com/download/merchants/new-payment-service-provider-model.pdf](http://usa.visa.com/download/merchants/new-payment-service-provider-model.pdf).

Many point of sale terminals are becoming contactless. For example, in June 2013, MasterCard deployed 410,000 contactless terminals in Japan.

For any given type of payment card and processing system, the processes and participants are essentially the same for offline (card present) and online (card not present) purchases as depicted in Figure 11.1. The major parties in processing card payments online are:

- **Customer.** The individual possessing the card.
- **Merchant.** The vendor that sells goods or services.
- **Issuing bank.** The issuer (usually a bank) of the credit (debit) card to people (or businesses).
- **Acquiring bank.** The financial institution offering a special account called an *Internet Merchant Account* that enables payment authorization and processing.
- **Credit card association.** The financial institution providing card services to banks (e.g., Visa and MasterCard).
- **Payment service provider.** The company that provides electronic connections and transaction services among all the parties involved in electronic payments (including authorizations). A payment service provider is also called a *payment gateway provider*.

Table 11.1 compares the steps taken in making an online credit card purchase with the steps taken in making an offline purchase. As the table demonstrates, there is very little difference between the two.

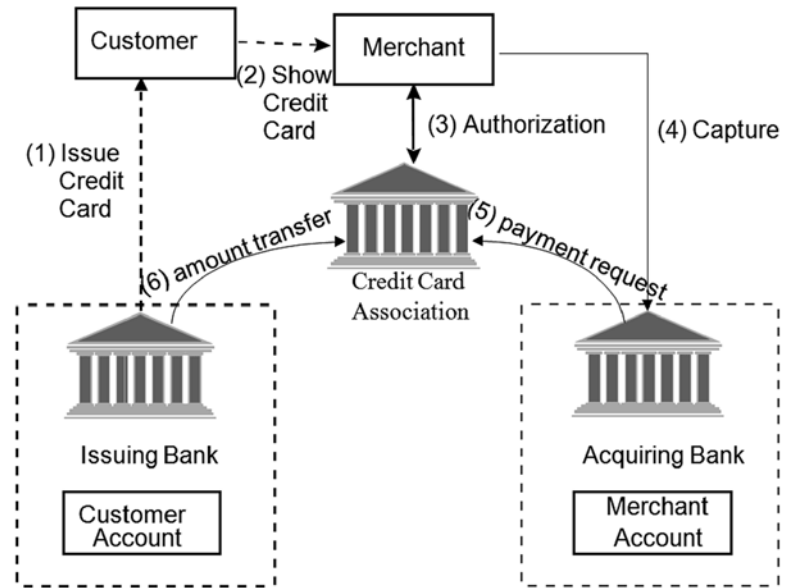
### Credit Card Reading

When paying with a credit card, it is necessary for merchants to read the content of the card and then transfer the content for approval and processing. This must be done in almost real time.

Several methods are available.



**Figure 11.1** Credit card payment procedure (Drawn by J. K. Lee)



- **Stationary card readers.** The most common readers available are physical POS in stores. They are wirelined to the authorization and processing system.
- **Portable card readers.** These are used in places where wirelines do not exist (e.g., on airplanes). They may be connected wirelessly to the processing system, or may be stand-alone systems (sellers then take risks, usually for small payments).
- **Mobile readers.** These systems enable payments from mobile devices. They include credit card readers, which are plugged in to the smartphones. The Square Reader ([squareup.com](https://squareup.com)), which has a “swiper” that plugs into the smartphone’s headphone jack and reads the information from the magnetic strip of the customer’s card, is such a device (see Section 11.6).
- **Image readers.** These new systems use smartphone scanning and imaging capabilities to read the cards, thus eliminating the need for a card reader (e.g., see Clancy 2012).

### Fraudulent Card Transactions

Although the processes used for authorizing and settling card payments offline and online are very similar, there is one substantial difference between the two. In e-commerce, the merchants usually are liable for fraudulent transactions. In addition to the cost of lost merchandise and shipping charges, merchants who accept fraudulent or unauthorized cards for payments may have to pay penalties to the credit card companies. However, these are not the only costs. There also are the costs associated with combating fraudulent transactions. These include the costs of tools and systems to review orders, the costs of manually reviewing orders, and the revenue that is lost from erroneously rejecting valid orders. According to CyberSource’s twelfth annual survey of fraudulent online card transactions, online fraud results in a significant and growing expenditure for merchants (CyberSource 2011). However, since 2011, merchants have improved their fraud management systems (some are using ‘CyberSource Fraud Management Solutions’). Over the years, the CyberSource surveys (CyberSource is a subsidiary of Visa) also have monitored the steps taken by merchants to combat fraud. The results show that relative to earlier years, merchants have

**Table 11.1** Credit card purchases: online versus offline

Online purchase	Offline purchase
1. The <i>customer</i> decides to purchase a CD on the Web, adding it to the electronic shopping cart and going to the checkout page to enter his or her credit card information	1. The <i>customer</i> selects a CD to purchase, takes it to the checkout counter, and hands a credit card to the cashier
2. The <i>merchant's</i> site receives the customer's information and sends the transaction information to its <i>payment processing service (PPS)</i>	2. The <i>cashier</i> swipes the card and transfers the transaction information to a <i>point-of-sale (POS)</i> terminal (usually via a computer keyboard)
3. The PPS routes the information to the <i>processor</i> (a large data center for processing transactions and settling funds to the merchant)	3. The POS terminal routes the information to the card <i>processor</i> via wireline or other connection
4. The processor sends the information to the <i>bank</i> that issued that credit card	4. The processor transmits the credit card data and sales amount, requesting payment
5. The issuing bank either authorizes authorizing the payment or not	5. The issuing bank authorizes (or declines) the transaction
6. The processor routes the transaction result to the PPS	6. The processor sends the transaction code (if authorized) to the POS
7. The PPS passes the results to the merchant	7. The POS shows the outcome to the merchant
8. The merchant accepts or rejects the transaction	8. The merchant tells the customer the outcome of the transaction (i.e., you are approved or not)

**Sources:** Based on PayPal (2004) and Whitman (1996)

increased the number of fraud detection tools that they regularly use. The key tools used in combating fraud are:

- **Certificate and Digital Signature.** *Certificates* are used for public key encryption; a *digital signature* is used for authentication that is the electronic equivalent of a personal signature, as described in Chapter 10. Some countries, such as Korea, require that all electronic financial transactions have both a digital certificate and a digital signature to enhance security.
- **Address verification.** A vast majority of merchants use the **Address Verification System (AVS)**, which detects fraud by comparing the address provided by the buyer at checkout with the address on file. Unfortunately, this method may result in a number of false positives, meaning that the merchant may reject a valid order. Cardholders may have a new

address or simply make mistakes in inputting numeric street addresses or zip codes. AVS is available only in the United States and Canada.

- **Manual review.** Around 70% of all merchants use the manual review method, which relies on staff to manually review suspicious orders. For small merchants with a small volume of orders, this is a reasonable method. For larger merchants, this method does not scale well, is expensive, and influences customer satisfaction. Over the past few years, large merchants have begun to recognize the limitations of this method and have substantially reduced manually reviewed orders.
- **Fraud screens and automated decision models.** Larger merchants (those generating over \$25 million in revenue) often use fraud screens and automated decision models. These tools are based on automated rules that determine whether a transaction should be accepted, rejected, or suspended. A key element of

this method is the merchant's ability to change the rules easily in order to combat changing fraud methods used by criminals (see discussions in Chapters 10 and 15).

- **Card verification number (CVN).** More than 70% of all merchants use the **card verification number (CVN)** method, which detects fraud by matching the 3-digit verification number printed on the signature strip on the back of the credit card (or the 4-digit number on the front of the card, such as American Express cards) to the number stored by the cardholder's issuing bank. However, if a fraudster possesses a stolen card, the number is in plain view and verification becomes difficult. Attempts are made to check the habits of the card user (e.g., to check unusually large purchases or purchases made overseas). In such cases, a cardholder may get a telephone call from the card issuer or the credit card company, asking for verification of identity. In such a case, the verification may be done by intelligent software agents automatically.
- **Card association payer authentication services.** In the last couple of years, card companies have developed a new set of payer identification services (e.g., Verified by Visa and MasterCard SecureCode).
- **Negative lists.** Approximately half of all merchants use *negative lists*. According to "Understanding Credit Card Frauds" ([popcenter.org/problems/credit\\_card\\_fraud/PDFs/Bhatla.pdf](http://popcenter.org/problems/credit_card_fraud/PDFs/Bhatla.pdf)), a negative list is a database of card numbers that could potentially be used by fraudsters. It is also a database of card numbers used to avoid further fraud from repeat offenders. The merchants can match each customer's card against this database to find customers and cards with known problems.

The overall impact of these tools is that merchants are still rejecting a significant number of orders due to a suspicion of fraud. The problem with these rejection rates is that a number of the rejected orders are valid, resulting in lost revenue.

## SECTION 11.2 REVIEW QUESTIONS

1. Describe the three types of payment cards.
2. What options does a merchant have in setting up an e-payment system?
3. Describe P2P payments.
4. List the major participants in processing cards online.
5. Describe credit card readers.
6. What costs does an online merchant incur if it accepts a fraudulent card transaction?
7. What steps are often taken by online merchants to combat fraudulent orders?

## 11.3 SMART CARDS

A **smart card** is a plastic payment card that contains data in an embedded microchip. The embedded chip can be a microprocessor combined with a memory chip or just a memory chip with nonprogrammable logic. Information on a microprocessor card can be added, deleted, or otherwise manipulated; a memory-chip card is usually a "read-only" card, similar to a magnetic stripe card. The card's programs and data must be downloaded from, and activated by, some other device (such as an ATM). The smart card can perform the multiple functions of a credit card, debit card, stored-value card (e.g., to pay for transportation and telephone calls), and various loyalty cards. It can also be used as a security and ID card.

In 2010, the global market for smart cards grew to record levels. Approximately 6 billion smart cards were shipped in 2010, as compared to 4 billion in 2008. In 2015, the number is expected to reach approximately 10 billion units. The biggest driver underlying the smart card growth is its application in the financial services market where smart cards are used mostly as credit and debit cards. The largest demand for smart cards continues to come from transportation cards in the Asia-Pacific region and Europe.

## Types of Smart Cards

There are two distinct types of smart cards. The first type is a **contact card**, which is activated when it is inserted into a smart card reader. The second type of card is a **contactless (proximity) card**, meaning that the card only has to be within a certain proximity of a smart card reader to process a transaction. On the front or back of the contact smart cards there is a small gold (or silver) plate about one-half inch in diameter that contains a chip. When the card is inserted into the card reader, the plate makes electronic contact and data are transferred to and from the chip. A contactless card has an embedded antenna that facilitates data transfer to another antenna (e.g., attached to another device). Contactless cards are especially useful where data must be processed (e.g., paying toll road fees, bus or train fares) or when contact may be difficult. Most proximity cards work at short range (just a few inches). For some applications, such as payments at highway tollbooths, longer range proximity cards are available.

With both types of cards, *smart card readers* are crucial to the operation of the system. Technically speaking, a smart card reader is actually a read/write device. The primary purpose of the **smart card reader** is to act as a mediator between the card and the host system that stores application data and processes transactions. Just as there are two basic types of cards, there are two types of smart card readers – *contact* and *proximity* – that match the particular type of card. Smart card readers can be transparent, requiring a host device to operate, or stand alone, functioning independently. Smart card readers are a key element in determining the overall cost of a smart card application. Although the cost of a single reader is usually low, the cost can be quite high when they are used with a large population of users (e.g., passengers traveling on a metropolitan mass transit system).

*Hybrid cards* and *combi cards* combine the properties of contact and proximity cards into one card. A hybrid smart card has two separate chips embedded in a card: contact and contactless. In contrast, a combi card (dual-interface) smart

card has a single chip that supports both types of interfaces. The benefit of either card is that it eliminates the need of carrying both contact and contactless cards to use with different applications. In addition, you need only one card reader.

## Stored-Value Cards

The **stored-value card** is a card where a monetary value is prepaid and can be loaded on the card once or several times. From a physical and technical standpoint, a stored-value card is indistinguishable from a regular credit or debit card. In the past, the money value was stored on the magnetic strip, but recently, most stored-value cards use the technology of smart cards. With stored-value cards, the chip stores the prepaid value. Consumers can use stored-value cards to make purchases, offline or online, in the same way that they use credit and debit cards – relying on the same networks, encrypted communications, and electronic banking protocols. What is different about a stored-value card is there is no need for authorization, but there is a limit set by how much money is stored on the card. The most popular applications of stored-value cards are the transportation cards that are very popular in the large cities in Asia. It is a necessity for the citizens in Seoul, Hong Kong, and Singapore to hold smart cards that pay for subways, buses, taxis, and other applications. The transportation cards do not require any fees, but the bank that initiates prepaid cards may require fixed monthly fees or a registration fee. Stored-value cards are also popular to pay for telephone calls and texting.

Stored-value cards come in two varieties: *closed loop* (single purpose) and *open loop* (multiple purposes). Closed-loop cards are issued by a specific merchant or merchant group (e.g., a shopping mall) and can be used to make purchases only from the card issuer. Mall cards, refund cards, some toll-pay cards, prepaid telephone cards, and Internet use cards are all examples of closed-loop cards. Among closed-loop cards, gift cards have traditionally represented the largest growth area, especially in the United States. However, over the

past few years, gift card purchases have been declining. In 2011, gift card spending rebounded to reach a five-year high, comprising close to 18% of total holiday expenditures.

An open-loop card is a multipurpose card that can be used for transactions at several retailers or service providers. Open-loop cards also can be used for other purposes, such as a prepaid debit card or for withdrawing cash from an ATM. Financial institutions with card-association branding, such as Visa or MasterCard®, issue some open-loop cards. They can be used anywhere that the branded cards are accepted. *Full open-loop cards* (e.g., the MasterCard Mondex® card) allow the transfer of money between cards without the bank's intervention.

Stored-value cards may be acquired in a variety of ways. Employers or government agencies may issue them as payroll cards or benefit cards in lieu of checks or direct deposits. Merchants or merchant groups sell and load gift cards. Various financial institutions and nonfinancial outlets sell prepaid cards by telephone, online, or in person. Cash, bank wire transfers, money orders, cashier's checks, other credit cards, or direct payroll or government deposits fund prepaid cards.

Stored-value cards have been, and continue to be, marketed heavily to people who do not use credit cards. Approximately 100 million adults in the United States do not have credit cards or bank accounts (2013) – low-income people or those who have declared bankruptcy, young adults, people with bad or no credit history, and others. Among those with credit cards, 40% are close to their credit limits. The expectation is that these groups will be major users of prepaid cards in the future.

## Applications of Smart Cards

In many parts of the world, smart cards with magnetic stripes are used as credit cards for retail purchases and paying for transportation. They also are used to support nonretail and nonfinancial applications. A general discussion of all

types of smart card applications can be found at [globalplatform.org](http://globalplatform.org).

### Retail Purchases

Credit card companies and financial institutions are transitioning their traditional credit and debit cards to multi-application smart cards. In many parts of the world, smart cards have reached mass-market adoption rates. This is especially true in Europe, where the goal was to have all bank cards be smart cards with strong authentication and digital signature capabilities by 2010.

In 2000, the European Commission established an initiative known as the Single Europe Payment Area (SEPA), encompassing 33 European countries. To bring this initiative to fruition, all the EU banks agreed to use the same basic bank card standard, enabling the use of credit and debit cards throughout the EU. The standard (EMV) is named after the four card associations that developed it (AmEx, MasterCard, JCB, and Visa). It is based on smart cards with a microprocessor chip. The chip is capable of storing not only financial information, but other applications as well, such as strong authentication and digital signatures. Originally, the 33 countries agreed to convert all their magnetic strip cards to EMV smart cards by December 2010. However, by the first quarter of 2011, only 40.1% of the total payment cards in circulation, 71% of the point of sale (POS) terminals globally, and 93% of ATMs had been converted (Capgemini 2010; Gemalto 2013).

One benefit of smart cards versus standard cards is that they are more secure. Because they are often used to store more valuable or sensitive information (e.g., cash or medical records), smart cards often are secured against theft, fraud, or misuse. In contrast, if someone steals a regular payment card, he (she) can see the card's number, the owner's signature, and the security code. In many cases only the card number and the security code are required to make a purchase. However, criminals can use the cards up to the authorized value, which is a loss to the bank and Visa or MasterCard.



On the other hand, if someone steals a smart card, the thief is usually out of luck (with the major exception of contactless, or “wave and go,” cards used for retail purchases). Before the smart card can be used, the holder may be required to enter a PIN. The other benefit of smart cards versus standard payment cards is that they can be widened to include other payment services. In the retail arena, many of these services are aimed at those establishments where payments are usually made in cash, and speed and convenience are important. These include convenience stores, gas stations, fast food or quick-service restaurants, and cinemas. Contactless payments exemplify this sort of value-added service.

A few years ago, card companies began piloting contactless payment systems in retail operations where speed and convenience are crucial. All these systems utilize the existing POS and magnetic strip payment infrastructure used with traditional credit and debit cards. The only difference is that a special contactless smart card reader is required. To make a purchase, a cardholder simply waves his or her card near the terminal, and the terminal reads the financial information on the card. Despite their convenience and speed, the overall uptake of contactless payment cards in retail stores has been relatively slow, although the number is steadily increasing. For instance, in 2009, MasterCard issued around 66 million PayPass cards (over 100 million in 2013) that are EMV-compatible, supporting both magnetic strip and contactless payments. Again, it is the same “chicken-and-the-egg problem” facing any new payment system.

### **Transit Fares**

In the U.S., several European countries, and large Japanese cities, commuters need to drive to a parking lot near a train station, board a train, and then change to one or more subways or buses to arrive at work. The entire trip may require several payments. Many major transit operators in the United States and Asia have introduced smart card fare-ticketing systems to help these commuters. The transit systems in Washington, D.C., Seoul, Hong Kong, San Francisco Bay area, Singapore and most other major cities all use

smart card payment systems. In addition to handling transit fares, the public transport smart cards and other e-payment systems (e.g., smartphones) are being used for paying parking fees and even for purchasing certain goods. For an example, see the Philadelphia Parking Authority ([philapark.org](http://philapark.org)). Similarly, many of the major toll roads in the United States and elsewhere accept electronic payments rendered by devices called *transponders* that operate much like contactless smart cards but from a much larger distance. Singapore’s ERP (Electronic Road Pricing) system, shown in Figure 11.2, monitors the roads in downtown Singapore to control traffic, especially during rush hour, by using remote transponders in the car.

### **SECTION 11.3 REVIEW QUESTIONS**

1. What is a smart card? Contact card? Contactless card?
2. What is a smart card operating system?
3. What is a closed-loop stored-value card? What is an open-loop card?
4. Identify the major markets for stored-value cards.
5. Describe the use of smart cards in metropolitan transportation systems.

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## **11.4 MICROPAYMENTS**

**Micropayments** or **e-micropayments** are small online payments made online, usually under \$10. From the viewpoint of many vendors, credit cards are too expensive for processing small payments. The same is true for debit cards, where the fixed transaction fees are greater, even though there are no percentage charges. These fees are relatively small (in percentage) only for card purchases over \$10. Regardless of the vendor’s point of view, there is substantial evidence, at least in the offline world, that consumers are willing to use their credit or debit cards for small value purchases. In the online world, the evidence suggests that consumers are interested in making small-value purchases, but not with credit or debit card payments. For example, as noted in the opening case, Apple’s iTunes music store celebrated its 20 billionth download in 2012.



**Figure 11.2** Singapore electronic road pricing system (Source: Photo taken by J. K. Lee March 2013)

A substantial percentage of these were downloads of single songs at \$1.29 apiece. Although most of iTunes' customers paid for these downloads with a credit or debit card, the payments were not on a per-transaction basis. Instead, iTunes customers created accounts and Apple then aggregated multiple purchases before charging a user's credit or debit card. Other areas where consumers have shown a willingness to purchase items under \$5 using a credit card are cell phone ringtones, ring-back tones, and online games. The annual market for ringtones and ring-back tones is in the billions of dollars. The download of both types of tones is charged to the consumer's cell phone bill. Similarly, the annual market for online games is in the billions of dollars. Like songs and tones, downloading a game is usually charged to the consumer's account, which is paid by a credit or debit card.

Currently, there are five basic micropayment models that do not depend solely or directly on credit or debit cards, and that have enjoyed some amount of success. Some of these are better suited for offline payments than online payments, although there is nothing that precludes the application of any of the models to the online world.

The models include the following (based in part on D'Agostino 2006 and the authors' experiences):

- **Aggregation.** Payments from a single consumer are accumulated and processed periodically (e.g., once a month), or as a certain level is reached (e.g., \$100). This model fits vendors with a high volume of repeat business. Both Apple's iTunes and App stores use this model. The transportation card used in Seoul, Korea and many other places is of this nature.
- **Direct payment.** In this case an aggregation is used but the micropayments are processed with an existing monthly bill (e.g., a mobile phone bill). Service providers of this type are PayOne ([pay-one.com](http://pay-one.com)), M-coin ([mcoin.com](http://mcoin.com)), and Boku ([boku.com](http://boku.com); formerly Paymo). Boku is a global company. For mobile micropayments, we note Zong ([zong.com](http://zong.com); a PayPal service), which is used

for social network games and virtual goods (e.g., Facebook, Habbo).

- **Stored value.** Funds are loaded into a debit account from which the money value of purchases is deducted when purchases are made. Offline vendors (e.g., Starbucks) use this model, and music-download services use variants of this model. This system is being used by several online gaming companies and social media sites.
- **Subscriptions.** A single payment (e.g., monthly) provides access to content. Online gaming companies and a number of online newspapers and journals (e.g., *Wall Street Journal*) often use this model.
- **À la carte.** Payments are made for transactions as they occur; volume discounts may be negotiated. This model is used in stock trading, such as at E-Trade.

In the past few years, micropayments have come to represent a growth opportunity for credit card companies, because credit cards are being used increasingly as a substitute for cash. In response, both Visa and MasterCard® have lowered their fees, especially for vendors with high transaction volumes, such as McDonald's. In August 2005, PayPal also entered the micropayment market when it announced an alternative fee structure of 5% plus 5¢ per transaction. This was economical only for micropayments. In the long run, credit card companies and PayPal will dominate this market. There are a number of new micropayment start-ups that are focused solely on social networks (e.g., [zong.com](http://zong.com)).

#### SECTION 11.4 REVIEW QUESTIONS

1. What is a micropayment?
2. List some circumstances where micropayments can be used.

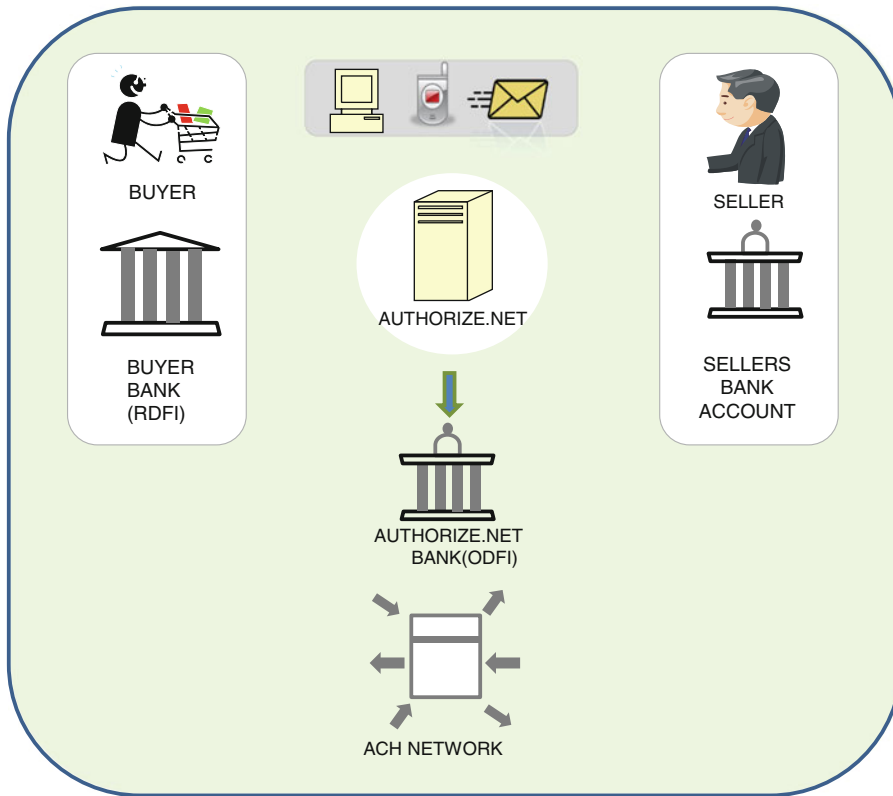
3. In addition to using credit or debit cards, what are some alternative ways that an online merchant can process micropayments?

### 11.5 E-CHECKING

As noted in Section 11.1, in the United States, the paper check is the only payment instrument that is being used less frequently today than several years ago (see Online File W11.1). The reason for this is the availability of paying over the Internet and with e-checks. An **electronic check (e-check)** is the electronic clone of a paper check (containing the same information). E-checks are a legal payment method in many countries. They work in a process similar to that of a paper check, but their processing is more efficient because several steps are automated. With an online e-check purchase, the buyer simply provides the merchant with his or her account number, the nine-digit bank ABA routing number, the bank account type (e.g., checking, savings, etc.), the name of the account holder, and the amount to be paid. The account number and routing number are provided as magnetic ink character recognition (MICR) numbers and characters.

E-checks rely on current business and banking practices and can be used by any business that has a checking account, including small and mid-size businesses that may not be able to afford other forms of electronic payments (e.g., credit and debit cards). E-checks or their equivalents also can be used with in-person purchases. In this case, the merchant takes a paper check from the buyer at the point of purchase, uses the MICR information and the check number to complete the transaction, and then voids and returns the check to the buyer.

Most businesses rely on third-party software to handle e-check payments. Fiserv ([fiserv.com](http://fiserv.com)), Chase Paymentech ([chasepaymentech.com](http://chasepaymentech.com)), and Authorize.Net ([authorize.net](http://authorize.net)) are some of the major vendors of software and systems that enable an online merchant to accept and process e-checks directly from a website. For the most part, these software offerings work in the same way regardless of the vendor. For details, see



**Figure 11.3** Processing e-checks with authorize.net (Drawn by J. K. Lee)

[support.quickbooks.intuit.com/support/articles/how16416](http://support.quickbooks.intuit.com/support/articles/how16416).

The system shown in Figure 11.3 is based on [Authorize.Net](http://Authorize.Net) and is typical of the underlying processes used to support e-checks. It is a seven-step process.

- (Step 1) First, the merchant receives authorization from a customer to charge his or her bank account, including the amount.
- (Step 2) Next, the merchant securely transmits the above information to the [Authorize.Net](http://Authorize.Net) Payment Gateway server.
- (Step 3) If the transaction is authorized, then its information is sent as an ACH transaction to the Originating Depository Financial Institution (ODFI).
- (Step 4) From there, this information is passed to the Automated Clearing House (ACH) Network for settlement. The ACH Network identifies the

government institution that governs the customer's bank account (known as the Receiving Depository Financial Institution (RDFI)).

- (Step 5) The ACH Network instructs the RDFI what to transact. Then, the RDFI transfers money from the customer's account to the ACH Network.
- (Step 6) The money transfer authorization goes to the ACH and to the ODFI, and then to [Authorize.Net](http://Authorize.Net).
- (Step 7) The merchant's account is now credited.

As the figure illustrates, the processing of e-checks in the United States relies quite heavily on the **Automated Clearing House (ACH) Network**. According to the U.S. Government Accountability Office ([gao.gov](http://gao.gov)), the ACH Network is a processor of paper checks by converting them to electronic format via the government's electronic funds transfer (EFT) system (see [fms.treas.gov/ach/index.html](http://fms.treas.gov/ach/index.html)).

E-check processing provides a number of benefits:

- It expedites the checkout time during shopping.
- It reduces the merchant's processing costs.
- Merchants receive funds more quickly.
- It is more secure than a paper system with less probability of fraud.
- It reduces the processing time of bounced checks.
- There are fewer errors.

In 2014, an electronic services provider called MyECheck, Inc. ([myecheck.com](http://myecheck.com)) launched a G2G payment platform for real-time transfers between government accounts (see [pymnts.com/news/2014/myecheck-launches-g2g-payments-platform](http://pymnts.com/news/2014/myecheck-launches-g2g-payments-platform)).

### SECTION 11.5 REVIEW QUESTIONS

1. What is an e-check?
2. Briefly describe how third-party e-check payment systems work.
3. What is the ACH?
4. List the benefits of e-checking.

## 11.6 MOBILE PAYMENTS

The term **mobile payment** refers to payment transactions initiated or confirmed using a person's mobile device, usually a smartphone. Mobile payments are replacing some traditional nonelectronic payment methods, such as the purchasing of products (services), money transfers, bill payments, and proximity purchases (see Fishman, Part I 2014a).

Among wireless carriers, smartphone vendors, and mobile operators, there is a strong belief that mobile payments will emerge as a primary way to pay, potentially eliminating dependence on credit and debit cards, as well as cash. A study by *Juniper Research* (2008) supports this belief. The study estimated that the value of mobile payments will reach approximately \$670 billion by 2015, which is about a 45% increase from the previous

estimate for 2013. While the bulk of the market involves the sale of digital goods (e.g., music, tickets, and games), the growth of mobile payments for physical goods is strong and will reach \$170 billion by 2015. The rapid growth in mobile payments is the result of the increased use of smartphones, the increased usage and availability of apps, the increasing use of mobile payments for railway and other transportation tickets, and the increase in online shopping at webstores such as Amazon Mobile apps.

Overall, the study concluded that:

- Mobile payments are used extensively in East Asia, Africa, China, Western Europe, and North America.
- In 2015, digital goods may account for about 70% of mobile payments.
- Greater collaboration among involved stakeholders is needed to assure even greater success.

Mobile payments come with a variety of features and methods, including mobile proximity, remote, and POS payments. Each of these is described in the sections that follow.

### Mobile Proximity Payments

Mobile proximity payments are used for making purchases in physical stores, vending machines, transportation services, and much more. Proximity payments are frequently done via mobile phones equipped with an integrated chip or a smartcard, a specialized reader that recognizes the chip when the chip comes within a short distance from the reader, and a network for handling the payment. Essentially, a buyer waves the specially equipped mobile phone near a reader to initiate a payment. For this reason, proximity payments are also called *contactless payments*. Rarely is additional authentication (e.g., a PIN) required to complete a contactless transaction. The payments are accumulated and debited to a mobile phone monthly account, or charged to a debit card account. Such payments are made from a **mobile (digital) wallet**, an electronic account, such as Google Wallet, which enables payments as well as processing loyalty programs and performing target promotions all from one mobile device.



### **The Near Field Communication Standards**

Over the years, a number of protocols and technologies have been proposed to support proximity payments (e.g., from mobile devices). Currently, the most promising protocol is *Near Field Communication* (NFC). It is used in a number of non-payment, contactless applications (e.g., access control to buildings or secured rooms, paying toll fees without stopping). Estimates indicate the usage of NFC for proximity payments will increase rapidly in the next few years, going from \$50 billion in 2014 to \$670 billion in 2015 (e.g., estimates found at [thefonecast.com/News/tabid/62/ArticleID/4337/ArtMID/541/Default.aspx](http://thefonecast.com/News/tabid/62/ArticleID/4337/ArtMID/541/Default.aspx)). For details, see [nearfieldcommunication.org](http://nearfieldcommunication.org).

While there seems to be an agreement among many firms and organizations that NFC will play a major role in the future of EC mobile payments, there is still disagreement about the specific handsets, chips, readers, and networks to be used. At the moment, only a few of these NFC participants seem to be in agreement on a standard. Instead, various players have introduced their own proprietary systems which are being field tested in a number of pilot programs. The following describes two of these attempts:

1. *Google Wallet* ([google.com/wallet](http://google.com/wallet)). Google Wallet is an application that lets a mobile device be used for payments. It was launched to the public in September 2011. It stores digital versions of credit and loyalty cards. In 2013, Google Wallet had a fixed set of operational partners (Sprint, Citibank, MasterCard, and FirstData), and was available only on the Sprint Nexus S 4 G handset, supporting two credit cards (Citibank MasterCard and Google Prepaid cards). Currently, it only works with one reader (MasterCard PayPass terminals). However, the fact that it works with PayPass means that it is accepted by many PayPass merchants (e.g. McDonald's, CVS Pharmacy, and Best Buy). Eventually, Google plans to expand the partnership so that other companies can participate. Square Wallet ([squareup.com/wallet](http://squareup.com/wallet)) performs similar functions. For more on Google Wallet, see Fishman, Part I (2014a).
2. *ISIS* ([paywithisis.com](http://paywithisis.com)). According to *Business Wire* (2011), in November 2010, three of the major U.S. wireless service providers, namely, AT&T, T-Mobile USA, and Verizon Wireless joined forces to build a nationwide mobile commerce network, called Isis, using NFC technology. Its major function is to support electronic payments. The Isis system works with major U.S. card issuers, financial institutions, and merchants offering them NFC-based services. Tests were conducted in Salt Lake City and in Austin. The ISIS mobile payment system was released in 2012. For more information, see *Business Wire* (2011).

### **The Bluetooth Low Energy**

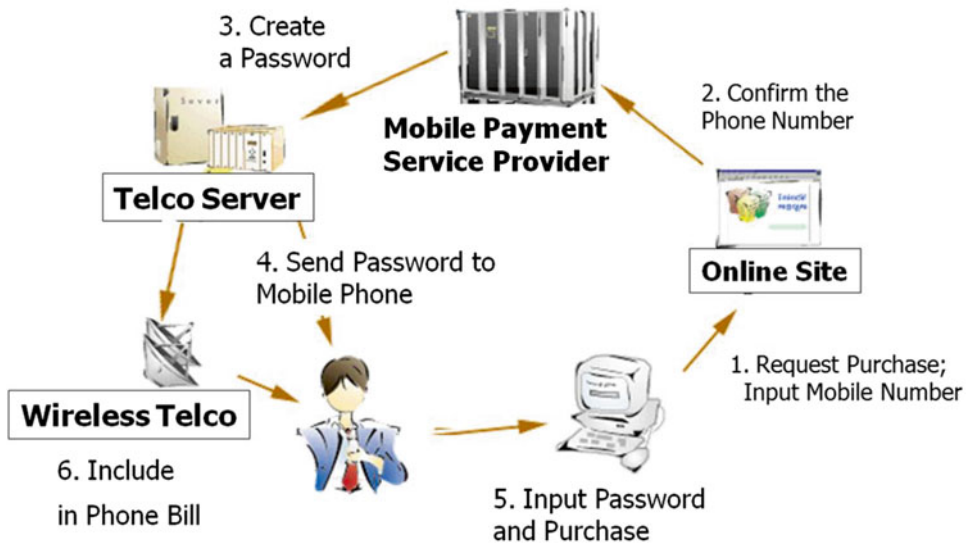
Bluetooth low energy (BLE) wireless technology, marketed as Bluetooth Smart, is an alternative to NFC. A comparison between the two is provided in an infographic by Fishman, Part II (2014b) along 16 dimensions. For more about Bluetooth Smart technology, see [bluetooth.com/pages/bluetooth-smart.aspx](http://bluetooth.com/pages/bluetooth-smart.aspx).

### **Mobile Remote Payments**

A number of initiatives have been launched to support mobile remote payments. In addition to Internet shopping, these initiatives offer services that enable clients and consumers to use their mobile devices to pay their monthly bills, transfer funds to other individuals (P2P payments), and add money to their prepaid mobile accounts without having to purchase prepaid phone cards.

### **Example: M-Pesa in Kenya**

While Google Wallet and similar systems in the U.S. are growing slowly, M-Pesa in Kenya is used by about of 19 million out of a population of 44 million. The system is used to pay micro-loans and to transfer money from urban to rural centers. The receivers can use M-Pesa to buy products and services, thus eliminating cash. In a developing country where only 40% of the population have bank accounts, a mobile service of this nature is extremely useful and revolutionary. The system is now replicated by other developing countries. For details see Fishman, Part I (2014a).



**Figure 11.4** Process of mobile payment service (Drawn by J. K. Lee)

Online File W11.2 provides an example of how remote mobile payments are being used in developing countries like India to service loans to those on the economic margins of the country.

Often, because of the need to support the lowest common denominator cell phones, SMS text messaging has been used to handle these tasks. Prior to starting transactions, the customer needs to establish an account with a mobile payment service provider such as Boku or Gamalto that handles the payment transaction for the merchant. The following six steps demonstrated in Figure 11.4 show how a customer can pay a bill using SMS.

4. The mobile telecommunication company sends the password to the customer.
5. The customer inputs the password to authenticate himself.
6. The telecommunication company includes the fee in the next month's phone bill.

If the online shopping takes place on mobile phones, as illustrated in the Crutchfield case (Case 11.1), companies may count on a third party mobile payment service such as PayPal Mobile Express Checkout ([paypal.com/us/webapps/mpp/mobile-checkout](https://www.paypal.com/us/webapps/mpp/mobile-checkout)).

1. To make the payment, the merchant's website requests the customer's mobile phone number.
2. The merchant sends a text message to the managed service provider (MPSP) that includes the dollar amount, phone number, and the merchant's account number.
3. The MPSP receives the information, and sends a message to the mobile telecommunication company requesting that a one-time password be created.

## CASE 11.1: EC APPLICATION: CRUTCHFIELD GOES MOBILE

### The Problem

Crutchfield Corporation ([crutchfield.com](https://www.crutchfield.com)) is a successful consumer electronics retailer headquartered in Virginia. They began in 1974 as a print "magalog" – a cross between a magazine and a catalog (see [books.infotoday.com/books/casinwitcon/sample.pdf](https://books.infotoday.com/books/casinwitcon/sample.pdf)). What distinguished

their catalog from others was the inclusion of information designed to educate potential buyers.

Crutchfield sells a wide range of electronic products – televisions, digital cameras, stereo equipment, and the like. It is a multichannel retailer providing sales and service through their mail order catalog, call centers, and their website that includes live chat. Crutchfield has won BizRate’s “Circle of Excellence Platinum” award for fourteen consecutive years ([twice.com/articletype/news/crutchfield-earns-top-bizrate-honors-again/108515](http://twice.com/articletype/news/crutchfield-earns-top-bizrate-honors-again/108515)).

Crutchfield recognized the growing importance of mobile technology as new sales and service channels. Goldman Sachs’ March 2014 forecast \$626 billion in sales by 2018 would be accounted for by mobile online shopping globally. This number represents about 98% of the total of mobile shopping in 2013 (reported by [Severt 2014](#)). Crutchfield concluded that they needed a payment solution that was built specifically for mobile transactions and could run on a variety of mobile devices. In addition, the solution needed to support their Canadian call center and the Web, as well as servicing other international buyers outside the U.S. and Canada and could be implemented quickly.

## The Solution

As noted earlier, most e-payments are made with credit and debit cards. This is true for both non-mobile and mobile purchases. However, the number of steps and the total amount of information required to complete a card transaction with a mobile device can be a bit more because of the smaller design and the time delay in mobile responses. For this reason, Crutchfield decided to implement an alternative solution that could support a range of mobile devices. They chose PayPal Mobile Express Checkout.

In October 2010, PayPal introduced their Mobile Express Checkout system ([paypal.com/us/webapps/mpp/mobile-checkout](http://paypal.com/us/webapps/mpp/mobile-checkout)), which is a mobile version of their Express Checkout service. Before the introduction, they had approximately 5 million members using mobile devices to place orders. It was a cumbersome process

requiring a number of steps. They tried to simplify the process with a pay-by-text service, but were unsuccessful. The Express Checkout is a comprehensive, streamlined, and highly secure service that expedites checkouts.

Crutchfield decided to employ Usablenet Inc. ([usablenet.com](http://usablenet.com)), which built Crutchfield’s mobile site, to help integrate Mobile Express Checkout with their existing website. Usablenet has over 400 clients worldwide, and has been named by *Fast Company* magazine as one of the top 10 innovative companies in mobile computing. They have lived up to their billing. They took only two weeks to get the system up and running, just in time for the holiday season.

## The Results

Crutchfield’s ROI from their new mobile system was substantial. First, testing revealed that the Mobile Express system increased conversion by 33.7%. In this case, conversion refers to the number of unique visitors to a site who actually made a purchase. More importantly, testing also revealed that 65% of the PayPal mobile users were new to Crutchfield. Not only did the system result in improved sales, but it also attracted new customers. (The case study is available at [paypalobjects.com/webstatic/mktg/docs/Crutchfield\\_case\\_study.pdf](http://paypalobjects.com/webstatic/mktg/docs/Crutchfield_case_study.pdf).)

**Sources:** Based on Severt (2014), O’Dell (2010), Hachman (2010), Hamblen (2011), and McMillian (2011).

## Questions

1. Why was Crutchfield interested in implementing a mobile payment solution?
2. What solution did Crutchfield select?
3. What were the outcomes of the mobile payment implementation?

## Mobile Payment Participants and Issues

The major participants in mobile payments as shown in Figure 11.4 are: The *shoppers*, the *sellers*, the *network operators* (wireless Telco and

Telco servers), and the *financial institutions* (mobile payment service providers). To successfully implement mobile payments, it is necessary to overcome the following issues:

**For Buyer:** Security (fraud protection), privacy, ease of use, choice of mobile device.

**For Seller:** Security (getting paid on time), low cost of operations, adoption by sufficient number of users, improved speed of transactions.

**For Network Operator:** Availability of open standards, cost of operation, inter-operability, and flexibility and roaming.

**For Financial Institutions:** Fraud protection and reduction, security (authentication, integrity, non-repudiation; see Chapter 10), and reputation.

## Mobile POS Payments

Similar steps are used to enable merchants or service providers the opportunity to conduct POS transactions without the need for special POS terminals. These payments have been labeled *mobile POS* (*mPOS*) transactions. With mPOS transactions, the merchant utilizes a special mobile service to send a payment request to the customer's mobile device. Once the request is received, the customer enters his or her PIN. At this point, the service sends a confirmation to both the merchant and the customer. The transactions are completed by debiting the customer's account and crediting the merchant's account. The cost to the merchant is substantially less than a POS credit card-based transaction. These services are aimed at small businesses and independent operators such as doctors, dentists, delivery companies, taxis, and repair people.

### Innovative POS Mobile Payments Systems

E-payments in physical stores and other places (e.g., taxis) are improving with time. Several methods exist and several companies are competing in this growing field. Here are some examples:

#### Example: Carmen's Best Ice Cream ([carmensbest.com](http://carmensbest.com))

This small business in the Philippines became successful due to a mobile POS that allows it to

move payments to its suppliers faster and at significantly less cost. It also collects money from its business buyers faster and less expensively. The mPOS is managed by Globe Telecom. The system uses a smartphone attached to a credit card reader. For details see Estopace (2014).

#### Example: Square ([squareup.com](http://squareup.com))

Square Inc. developed a mobile *card reader* that enables merchants to accept payments made with credit cards by using a card reader attached to a smartphone or a tablet. The credit card is inserted into the reader for processing by the company. Square charges less than Visa and other card processors, and promises next day deposit into the merchant's account.

The merchants get a free reader and the customer gets the free Square Wallet smartphone application ([squareup.com/wallet](http://squareup.com/wallet)). For example, Square partnered with Whole Foods in 2014 to make shopping easier for customers at the coffee, juice, wine and beer bar in-store venues. The iPad-based checkout system enables cashiers to swipe the customers' credit cards using Square Wallet (which is connected to customers' credit cards system). The system reads the QR-code and deducts the money from the customer's account. For more about the partnership, see [media.wholefoodsmarket.com/news/square-and-whole-foods-market-partner-to-create-faster-easier-payment-and-c](http://media.wholefoodsmarket.com/news/square-and-whole-foods-market-partner-to-create-faster-easier-payment-and-c).

The reader is distributed at [squareup.com](http://squareup.com). Users input the payment amount, swipe the credit card through the reader, sign, and receive a receipt on their mobile phone or tablet. The Square Card Reader is used by major vendors such as AT&T, Walgreens, FedEx Office, and Walmart. Square Readers are provided for free. For more details, see Chen (2013) and the description in the Starbucks case in Chapter 1.

#### Example: PayPal's Card Reader

PayPal offers a similar device called PayPal Here™ ([paypal.com/webapps/mpp/credit-card-reader](http://paypal.com/webapps/mpp/credit-card-reader)) that works with PayPal's processing system. The company charges a 2.7% transaction fee (in the U.S.) compared to Square's 2.75% (and

3% or more charged by traditional credit card companies). PayPal allows merchants to accept payments, including credit card payments, on their website or on eBay. For details, see [paypal-businesscenter.com](http://paypal-businesscenter.com) and [paypal.com/webapps/mpp/merchant](http://paypal.com/webapps/mpp/merchant). Note: Several other companies offer similar services. Examples are Brain Tree Payments ([braintreepayments.com](http://braintreepayments.com); a division of PayPal, Inc.), Bank of America Mobile Pay on Demand ([mobilepay.bankofamerica.com/bams/mobilepay/home.html](http://mobilepay.bankofamerica.com/bams/mobilepay/home.html)), Intuit Payments ([payments.intuit.com/](http://payments.intuit.com/)), Phone Swipe ([phoneswipe.com](http://phoneswipe.com)) and Capital One Spark Pay ([spark-pay.com](http://spark-pay.com)).

### MasterPass™: Automating the Shopping and Payment Processes

When you buy at [Amazon.com](http://Amazon.com) you can use the 1-Click system that stores all your necessary data, including a credit card number and shipping address; therefore, you can complete a transaction easily and quickly. A similar concept has been developed by MasterCard® in their *MasterPass*™ innovation. The basic idea is to streamline the entire shopping process using mobile devices.

MasterPass™ is an extension of the PayPass Wallet service that is provided by MasterCard® as a checkout system to several hundred thousand merchants. The system enables customers easy and fast shopping from any Internet connected mobile devices, using the PayPass NFC terminals at participating merchants, or clicking on a button for an online purchase. MasterPass™ allows you to go one step further. For example, you can scan a product barcode with your smartphone in a store, show your smartphone receipt at the checkout and take the item with you or request shipment to your home. Alternatively, you can shop online in a similar manner as you would on [Amazon.com](http://Amazon.com). MasterPass™ also works with Quick Response (QR) codes and tags.

#### Eliminating Credit Cards

MasterPass is an example of an effort to eliminate the use of physical credit cards for payments.

Participating merchants can accept any major credit or debit card as well as prepaid cards (stored value) for payments. Therefore, there is no need to swipe a credit card—just use your mobile device. There are many possible applications. Imagine you are in a store and like a product but your size is not available. You can click to pay and the store will ship the right size to you, or you can be transferred to the manufacturer's site to complete the purchase. For more details, see Bonnington (2013), Trinh (2013), and MasterCard® (2013).

### Innovative Social Commerce Payments

In Chapter 7, we introduced several social commerce models. Here are few examples of related innovative systems for mobile payment readers.

#### Groupon Breadcrumb (Formerly Groupon Payments)

Breadcrumb by Groupon ([breadcrumb.groupon.com/payments](http://breadcrumb.groupon.com/payments)) is a POS app for businesses. Breadcrumb Payments offers a mobile credit card reader, which is attached to an iPhone or other mobile device. To compete with similar companies, Groupon offers lower processing rates to Groupon's partners. The system is available to other merchants, but at higher processing fees. For details, see Boorstin (2012) and Purewal (2012).

#### Placecast

Placecast ([placecast.net](http://placecast.net)) is a pioneer in location-based marketing. According to their website, Placecast's *Card-Linked ShopAlerts* service ([shopalerts.com](http://shopalerts.com)) is a mobile management monetization solution that sends offers from participating merchants to customers. Offers are delivered via mobile devices by a location-based service. When customers receive an offer in a targeted area, they can redeem it by making their purchase, swiping their linked card at the store, and receiving the discount on their bank statement (see Rao 2012 and [placecast.net/press/releases/PR\\_card\\_linked\\_offers.pdf](http://placecast.net/press/releases/PR_card_linked_offers.pdf) for details). A related product by Placecast is *ShopAlerts Wallet*; see Lunden (2012) and [placecast.net/shopalerts/payments.html](http://placecast.net/shopalerts/payments.html) for details.



### **Apple and Mobile Payment Processing**

In early 2014, there were continuous rumors that Apple was going to enter the mobile payment market. For a discussion on this speculation and Apple's strategic advantages, see LowRiskValue (2014). In late 2014 Apple introduced its Apple Pay system.

### **SECTION 11.6 REVIEW QUESTIONS**

1. Discuss proximity-based wireless payments. What is NFC? Give some examples of where it is used.
2. What are the basic processes used in handling SMS mobile remote payments?
3. How can the Square Card Reader process credit card transactions via smartphones?
4. How does MasterPass™ work? What are its advantages?

- The need for tight security
- The time needed for handling the necessary paper documents
- The supply chain segments may not work together in an efficient manner
- There are too many human errors that result in disputes
- The need for reconciliation of documents
- The lack of transparency of cash flow when goods are in transit

These inefficiencies are evident especially with A/P (accounts payable) and A/R (accounts receivable) processes where payments are still made with paper.

The world of B2B payments continues to be slow to change. A large portion of B2B payments are still made by paper checks and the barriers to electronic payments remain essentially the same. However, there is increasing evidence that companies are beginning to move to B2B e-payments. For example, according to NACHA, in 2013, the number of B2B transactions on the ACH network grew to almost 22 billion, an increase of 4% over 2012 volume. This rate continues at about the same level (see [nacha.org/news/ach-volume-grows-nearly-22-billion-payments-2013](http://nacha.org/news/ach-volume-grows-nearly-22-billion-payments-2013)).

## **11.7 B2B AND INTERNATIONAL ELECTRONIC PAYMENTS**

B2B payments usually are much larger and significantly more complex than payments made by individual consumers. The dollar values often are in the hundreds of thousands, the purchases and payments involve multiple items and shipments, and the exchanges are much more likely to create disputes that require significant work to resolve. Simple e-billing or EBPP (i.e., electronic bill presentment and payment) systems lack the precision and security to handle these B2B situations. This section examines the processes of EBPP.

### **B2B Payment Practices in the Financial Supply Chain**

B2B payments are part of a company's financial supply chain that includes procurement, contract administration, fulfillment, financing, insurance, credit ratings, shipment validation, order matching, payment authorization, remittance matching, and general ledger accounting. Unlike the larger (physical) supply chains, inefficiencies still characterize the financial supply chains of many companies. A number of factors create these inefficiencies, including:

### **Enterprise Invoice Presentment and Payment**

The procedures and processes by which companies present invoices and get paid for these invoices over the Internet is known as **Electronic Invoice Presentment and Payment (EIPP)**. For many firms, presentment and payment used to be costly and time consuming. This means that millions of dollars of B2B were tied up in floats. This reduces the recipients' cash flow and increases the amount they must borrow to cover the float. In the same vein, manual billing and remittance can result in errors, which in turn can result in disputes that delay payments. In electronic systems, the cost is much lower and the transfer is faster. Given that most firms handle

thousands of invoices and payments yearly, any reduction in time, cost, or errors can result in millions of dollars in savings. Improved cash flow, customer service, and data quality, along with reduced processing costs, are the primary reasons companies turn to EIPP.

### **The EIPP Models**

EIPP automates the workflow surrounding presentment and payment. Like EBPP, there are three EIPP models: seller direct, buyer direct, and consolidator.

#### **Seller Direct**

This solution electronically links one seller to many buyers for invoice presentment. Buyers sign up for the seller's EIPP program. The seller posts the invoices and informs the buyers when the invoices are ready to view on its website. The buyers review and analyze the invoices. The buyers may authorize invoice payment or communicate any disputes to the sellers. Once payment is authorized and made, the seller's account is credited.

#### **Buyer Direct**

In this model, there is one buyer for many sellers. Sellers enroll in the buyer's EIPP system. Sellers generate invoices and post them at the buyer's EIPP. Once an invoice is posted, the buyer's staff is notified. The buyer checks and approves (or rejects) the invoices. Once an invoice is approved, the buyer authorizes payment, which the buyer's financial institution processes. Companies such as Walmart are in a strong position to institute buyer-direct EIPPs.

#### **Consolidator**

This is a many-to-many model with an intermediary consolidator. Consolidators generally are third parties who not only provide EIPP services but also offer other financial services (e.g., insurance, escrow). In this model, the sellers and buyers register with the consolidator's EIPP system. The sellers generate and transfer invoice information to the EIPP system. The consolidator notifies buyers when to inspect a bill. Then, the buyers can view the bills. Once a buyer authorizes the invoice payment, the consolidator arranges for payment.

The consolidator model eliminates the hassles associated with implementing and running an EIPP. The model has been adopted in those industries where multiple buyers rely on the same suppliers. The Global eXchange Services (GXS) Trading Grid ([gxs.com](http://gxs.com)), which is now operating under the name of Open Text, is an example of a third-party consolidator linking thousands of suppliers and buyers. GXS's Trading Grid supported online trading for 40,000 customers in over 20 countries in 2013. This network eliminates the need for point-to-point connections between suppliers and buyers, and automates most of the administrative tasks. Finally, the GXS network complements and integrates the suppliers' and buyers' existing purchasing and procurement systems. In addition, Paymode-X ([paymode-x.com](http://paymode-x.com)) provides a settlement network for global payment that enables electronic invoicing and payment, and PAY.ON ([payon.com](http://payon.com)) and Syncada ([usbpayment.com/syncada](http://usbpayment.com/syncada); now a part of U.S. Bank Payments Group) provide global payment networks respectively. Sage Exchange ([sageexchange.com](http://sageexchange.com)) provides a mobile payment portal for small businesses when they have multiple physical locations that accept credit and debit card payments. See Sage Software ([na.sage.com](http://na.sage.com)) for details.

### **EIPP Options**

A variety of online options are available for making payments in an EIPP system. They differ in terms of cost, speed, accessibility, and control. The selection of a particular mechanism depends on the requirements of the buyers and sellers. Some frequently used B2B payment options follow.

#### **ACH Network**

The Automated Clearing House (ACH) Network is the same network that underlies the processing of e-checks (described in Section "The Information Assurance Model and Defense Strategy" in Chapter 10). The difference is that there are three types of B2B payments that vary by the amount of remittance information that accompanies the payments. The remittance information enables a buyer or seller to examine the details of a particular

invoice or payment. The three types of ACH entries for B2B transactions are: (1) Cash Concentration and Disbursement (CCD), which is a simple payment, usually for a single invoice that has no accompanying remittance data and typically is initiated by the buyer, who credits the seller's account; (2) CCD+ (which is CCD with a small amount of remittance data, called Addenda); and (3) Corporate Trade Exchange (CTX), for paying multiple invoices.

The ACH Network does not require any special hardware. The cost of the software needed to initiate ACH transactions depends on the volume of CTX transactions. In addition to hardware and software costs, the buyer's and the seller's financial institutions charge handling fees for ACH transactions.

### Purchasing Cards

While credit cards are the most popular for B2C payments, this is not the case in the B2B marketplace. In the B2B marketplace, the major credit card companies and associations have encouraged businesses and government agencies to rely on *purchasing cards*, instead of checks, for repetitive, low-value transactions. **Purchasing cards (p-cards)** are payment cards issued to a company's employees. They are used to pay for unexpected purchases of goods and services, usually MROs (e.g., stationery, office supplies, and computer supplies) up to a certain limit (usually \$1,000–\$5,000). These purchases often represent the majority of a company's payment transactions, but only a small percentage of the dollars spent. Purchasing cards are similar to regular credit cards and are used for both offline and online purchases. The major difference between a credit card and a purchasing card is that the latter is a non-revolving account, meaning that it needs to be paid in full each month, usually within five days of the end of the billing cycle. For additional information, see [purchasinginsight.com/resources/what-is/what-is-a-purchasing-card](http://purchasinginsight.com/resources/what-is/what-is-a-purchasing-card).

Purchasing cards enable a company or government agency to consolidate the purchases

of multiple cardholders into a single account and, thus, issue a single invoice that can be paid through EDI, EFT, or an e-check (e.g., authorization, placing the orders). This has the benefit of freeing the purchasing department from day-to-day procurement activities and from the need to manage the reconciliation of individual invoices. With a single invoice, accounts can be settled more quickly, enabling a company or agency to take advantage of discounts associated with faster payments and large volumes. A single invoice also enables a company or agency to more easily analyze the spending behavior of its cardholders. Finally, the spending limits make it easier to control unexpected purchases. Some estimates suggest that benefits resulting from the use of purchasing cards can reduce transaction costs by 50 to 90%. To learn more about purchasing cards, see the National Association of Purchasing Card Professionals ([nacp.org](http://nacp.org)).

### Fedwire or Wire Transfer

Among the forms of online B2B payments, Fedwire ([frb.services.org/fedwire/index.html](http://frb.services.org/fedwire/index.html)) is second only to ACH in terms of frequency of use. Fedwire, or wire transfer, is a U.S. government (Federal Reserve Bank Services) funds transfer system. It typically is used with larger dollar payments and/or where time is a critical element. The settlement of real estate transactions, the purchase of securities, and the repayment of loans are all examples of situations where Fedwire is likely to be used. All Fedwire payments are immediate and irrevocable. For more information about Fedwire Funds Services, see [federalreserve.gov/payment-systems/fedfunds\\_about.htm](http://federalreserve.gov/payment-systems/fedfunds_about.htm).

### International Payments

Cross border payments, both B2C and B2B, can be complicated due to country-specific regulations, import/export requirements, and global attempts to control money laundering. Several of the methods cited earlier can be used for global payments. Another common method is letters of credit.

### Letters of Credit for Global Payments

*Letters of credit* often are used in global B2B trading. A **letter of credit (L/C)**, also known as a *documentary credit*, is issued by one bank to another bank (usually in another country) on behalf of a buyer (e.g., importer). It guarantees a seller (e.g., exporter) that sufficient payment for goods or services will be made on time, provided the conditions of the L/C are met by the exporter. L/C arrangements usually involve a series of steps that can be conducted much faster online than offline.

For sellers, the main benefit of an L/C is reduced risk – the bank assures the creditworthiness of the buyer. For those global situations where the buyer is a resident in a country with political or financial instability, the risk can be reduced if the L/C is confirmed by a bank in the seller's country. Reduced risk also is beneficial to buyers.

### Digital River's World Payment

Digital River Inc. ([digitalriver.com](http://digitalriver.com)) partnered with Meridian Global Services ([meridianglobalservices.us](http://meridianglobalservices.us); a company that provides merchants with international value-added tax (VAT) and Travel and Expense compliance and consulting services) to offer a comprehensive payment service. The combined service enables buyers to use locally preferred payment methods. The partnership offers online merchants about 170 types of transactions in more than 180 international and local payment options. Small and medium companies that do not have personnel who specialize in global payments may find this service especially helpful.

### SECTION 11.7 REVIEW QUESTIONS

1. Describe the financial supply chain.
2. Describe the current state of B2B e-payments.
3. What is Electronic Invoice Presentment and Payment (EIPP)?
4. Describe the three models of EIPP.
5. Describe the basic EIPP options.
6. What is a purchasing card?

## 11.8 EMERGING EC PAYMENT SYSTEMS AND ISSUES

In this section we present several emerging systems, starting with Bitcoin.

### Bitcoin: Ups and Downs, but Alive

Earlier, we described Bitcoin briefly and described how it was hacked (Chapter 10). **Bitcoin** is a digital currency managed by a group of individuals and companies who own the computing power and process (called mining) of creating Bitcoins. The individuals and companies who are known as “miners” verify and record transactions in a public ledger, assuring the credibility of the currency.

Bitcoin is very secure, protected by the two key encryption method described in Chapter 10 (public and private keys; the private key is used to authorize transactions).

Here are some facts about Bitcoin. (Derived from Patel 2014, [bitcoin.org/en/vocabulary](http://bitcoin.org/en/vocabulary), and [money.cnn.com/infographic/technology/what-is-bitcoin/?iid=HP\\_Highlight](http://money.cnn.com/infographic/technology/what-is-bitcoin/?iid=HP_Highlight).)

- *Advantages:*
  1. Buyers remain anonymous
  2. Simple international transactions (no regulations)
  3. No transaction fees
  4. Can be used for micropayments
- *Trading:* Done in marketplaces (exchanges) such as in Mt. Gox in Japan. BTC of China is the world's largest exchange. Ownership is transferred to buyers.
- *Valuation:* Prices between 2011 and 2013 were in the range of \$5 to \$1,242. The price has been fueled by demand in China.
- *Illegal activities:* Bitcoin is the currency of choice for drug dealers and other illegal traders (e.g., used in the Internet drug site “Silk Road,” see Chapter 10).
- *Taxation:* The Internal Revenue Service in the U.S. and some other countries treat Bitcoin

like property, not like currency; owners may have to pay property tax (see Green 2014).

- *Bitcoin exchange:* BitInstant used is Silk Road's online site for money laundering. In January 2014, U.S. government agents arrested its CEO.
- *Biocoins are illegal* in certain countries (e.g., Russia).
- *Litecoin*, a cheaper version of Bitcoin, is "silver to Bitcoin's gold" (see [businessinsider.com/introduction-to-litecoin-2013-11](http://businessinsider.com/introduction-to-litecoin-2013-11)).
- *Bitcoins are produced* by users running computers in many places in the world utilizing software that solves mathematical problems.
- *There are only 21 million Bitcoin units* that will ever be created.
- *Bitcoin wallet.* The wallet secures the Bitcoins using strong encryption.
- *Bitcoin is being accepted as a universal currency* by an increasing number of legal business in many countries (e.g., Texas-based gun company TrackingPoint; [tracking-point.com](http://tracking-point.com)). For how you can live on Bitcoin alone when you travel, see Vigna (2013). According to *Business Wire* (April 2, 2014), the average daily business Bitcoin transactions in February 2014 totaled \$68 million (a 10 fold increase since February 2013) compared with the popular PayPal's \$492 million in 2013. See [businesswire.com/news/home/20140402006189/en/Fitch-Bitcoin-Remains-Small-Comparison-Payment-Processors#.U1tpH\\_mICm5](http://businesswire.com/news/home/20140402006189/en/Fitch-Bitcoin-Remains-Small-Comparison-Payment-Processors#.U1tpH_mICm5) for details.
- *Bitcoin bypasses banks and regulations.* Many people use Bitcoins for illegal transactions for this reason.
- *Bitcoin has a monthly magazine.* *Bitcoin Magazine* ([bitcoinmagazine.com](http://bitcoinmagazine.com)).
- *Mt. Gox exchange* has been raided by the U.S. authorities, sued by CoinLab, hacked by cybercriminals, and had to file for temporary bankruptcy protection in March 2011. The company closed in February 2014.
- *Banking regulators* in New York sent subpoenas to 22 companies that have had some involvement with Bitcoin in August 2013 (see [dealbook.nytimes.com/2013/08/13/officials-broaden-inquiries-into-oversight-of-bitcoin-and-other-currencies/?\\_php=true&\\_type=blogs&\\_r=0](http://dealbook.nytimes.com/2013/08/13/officials-broaden-inquiries-into-oversight-of-bitcoin-and-other-currencies/?_php=true&_type=blogs&_r=0)).

## Other Interesting Systems

We present here only a few of the many other emerging systems.

### Coin (The "All in One" Credit Card)

*Coin* ([onlycoin.com](http://onlycoin.com)) is the name of an electronic device that contains the information of all your credit and debit cards on one "coin." The mobile app allows you to add or delete cards you wish to store on the device. You swipe your card through a small device on your smartphone, then choose which card you wish to use. The merchants swipe Coin just as they would a regular card (see Pepitone 2013). For more information on how Coin works, compatible mobile devices, and so forth, see [onlycoin.com/support/faq](http://onlycoin.com/support/faq).

Also watch the video titled "Why Coin Is the Future of Payments" (3:10 minutes) at [money.cnn.com/video/technology/2013/12/05/t-coin-ceo-kanishk-parashar-app-start-up.cnnmoney/index.html](http://money.cnn.com/video/technology/2013/12/05/t-coin-ceo-kanishk-parashar-app-start-up.cnnmoney/index.html).

The device is planned to debut in summer 2014, and reached its pre-order goal in November 2013. However, there are issues with the product. According to Pepitone (2013), the device has three disadvantages. First, it "locks up" if you are away from your smartphone for more than 10 minutes or if your battery has run out. Second, Coin has not received approval from any credit card companies; Coin does not know if the credit card companies will even welcome the idea. Finally, merchants may be confused since Coin does not look like a "regular" credit card (with raised numbers and hologram).

A competitor, NXT-ID, is also releasing a mobile digital wallet, called the Wocket™ (described later).

### TrialPay ([trialpay.com](http://trialpay.com))

TrialPay is an EC payment system using the "Get It Free" payment model. According to Wikipedia, based on Kim (2008), "TrialPay's payment platform presents online shoppers with advertising offers as a way to pay for goods or services. Shoppers sign up for a trial or purchase a product from an advertiser to receive a free product. The system tries to provide benefits to each party: online stores make more sales from their current



traffic, advertisers acquire new customers on a pay-for-performance basis and shoppers get a free product with every purchase.”

### Amazon Payments

Amazon Payments ([payments.amazon.com](http://payments.amazon.com)) is a comprehensive set of online payment tools. These tools are for businesses, individual consumers, and developers. The objective is to make payments easy, fast, and secure.

### For Consumers

Users make a purchase from any online store featuring the “Pay with Amazon” link and pay from their existing [Amazon.com](http://Amazon.com) account. Consumers can also send or receive money, using the payment information stored in their [Amazon.com](http://Amazon.com) account.

### For Businesses

Businesses can accept payments from buyers and provide payment processes and order management capabilities (‘Checkout by Amazon’). ‘Amazon Simple Pay’ allows an easy way to accept payments or donations online. For example, customers can pay participating vendors using the secure information in their Amazon accounts. For more about Amazon Payments for businesses, see [payments.amazon.com/business/asp](http://payments.amazon.com/business/asp).

### M-Payment

Amazon has a mobile payment method with their subsidiary GoPago. According to Amazon, mobile shoppers are buying, not just browsing. Customers can now buy from a merchant using a mobile-optimized checkout flow hosted by Amazon, or by using a touchscreen widget installed by the merchant embedded on their site. This simplifies the payment process for the customers, since they do not have to re-enter their payment information (see [payments.amazon.com/business/mobile/overview](http://payments.amazon.com/business/mobile/overview)).

### Kindle Checkout System

Amazon is planning to offer brick-and-mortar retailers a checkout system using Kindle tablets to process payments. The system, which will be offered to SMBs first, could include a combination of Kindle tablets and card readers. For details, see

[smartplanet.com/blog/bulletin/amazon-develops-kindle-based-checkout-system-for-smbs](http://smartplanet.com/blog/bulletin/amazon-develops-kindle-based-checkout-system-for-smbs).

### Miscellaneous Systems

The following are some other payment systems.

- A *cash-payment kiosk* for marijuana users functions like an ATM, recording each transaction, tracking payments, ensuring that the accounting is accurate and the proper taxes are collected. This solves the problem of marijuana-related cash that many banks refuse to handle.
- *Google Wallet Sent Money* feature lets Gmail users send money to anyone in the U.S. with an e-mail address. The service works with the Google Wallet app. See [google.com/wallet/send-money](http://google.com/wallet/send-money).
- *NXT-ID*. Their digital wallet system, the Wocket™ ([nxt-id.com/products/wocket](http://nxt-id.com/products/wocket); [wocketwallet.com](http://wocketwallet.com)), is scheduled to launch in 2014. Similar to Coin, this product aggregates up to 100 credit cards, coupons, gift cards, loyalty cards, and more. In addition, it works only with a biometric system (e.g., face, voice, fingerprint) that eliminates the need for a password structure (see [nxt-id.com/wocket-hopes-replace-wallet](http://nxt-id.com/wocket-hopes-replace-wallet)).
- *Alipay of Alibaba Group* (see Chapter 4) partnered with the Chinese microblogging site Sina Weibo ([weibo.com](http://weibo.com)) to launch Weibo Payment (“Weibo Zhifu”), an online payment platform where users can connect their Alipay and Weibo accounts and shop and purchase directly using their Weibo app. According to *Global Times* (January 7, 2014), “Weibo users can buy things and pay bills online easier just by inputting passwords.” (See [globaltimes.cn/content/836256.shtml#U17DR\\_IdWS0](http://globaltimes.cn/content/836256.shtml#U17DR_IdWS0)).
- *Apple is moving closer to m-payments*. In early 2014, it was rumored that Apple was laying the groundwork for an expanded mobile payment service (see Del Rey 2014).

## SECTION 11.8 REVIEW QUESTIONS

1. Describe Bitcoin and list its benefits to buyers and sellers.
2. Describe the functions of the Bitcoin exchanges.
3. Why do governments want to make Bitcoin and similar currencies illegal?

4. Find the status of Coin and NXT-ID Wocket™.
5. Review [Amazon.com](https://www.amazon.com)'s payment systems from the points of view of buyers and sellers.

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## MANAGERIAL ISSUES

Some managerial issues related to this chapter are as follows:

1. **What payment methods should your B2C site support?** Most B2C sites use more than one payment gateway to support customers' preferred payment methods. Companies that only accept credit cards exclude a number of potential segments of buyers (e.g., customers under the age of 18, customers who do not have or do not want to use credit cards online). EFT, e-checks, stored-value cards, and PayPal are some possible alternatives to credit cards. The e-check is barely used in some countries because it is not considered an efficient enough method in the electronic era there; thus, selecting a globally acceptable payment method is important for the globalization of EC. For solutions in Asia, see [asiapay.com](https://www.asiapay.com).
2. **What micropayment strategy should your e-marketplace support?** If your EC site sells items priced less than \$10, credit cards are not a viable solution. Many digital content products cost less than \$1. For small-value products, micropayments should be supported. Fees may be taken from a prepaid account that is connected to the buyer's bank account or credit card, or the fee may be charged to the buyer's cell phone bill. The use of stored-value smart cards on the Internet has emerged, but has not widely penetrated the market because buyers need to install the card reader/writer. Companies should support multiple options so that customers can choose their preferred payment method.
3. **Which mobile systems could influence your business?** Over the next few years, mobile payments will emerge as a primary, if not the primary, way that people will pay for digital and physical goods, both online and off. Mobile payments have the potential to replace the direct use of credit and debit cards, as well as cash. At the present time, mobile payment technologies and protocols are in a state of flux, making it difficult to decide which systems to adopt. The key is to determine which forms of mobile payment are required for a particular business – remote or proximate – and, in the short term, rely on those vendors and organizations that are ready to have a strong presence in the online world (for instance, PayPal or the protocols and systems supported by major credit card vendors).
4. **Should we outsource our payment gateway service?** It takes time, skill, money, software, and hardware to build and maintain a comprehensive self-payment system. For this reason, even a large online business usually outsources its e-payment service. Many third-party vendors provide comprehensive payment gateways. Furthermore, if a website is hosted by a third party (e.g., Yahoo! Stores), an e-payment service may be provided by the host.
5. **How secure are e-payments?** Security and fraud continue to be major concerns in different online e-payments. This is especially true with regard to the use of credit cards for online purchases. B2C merchants are employing a wide variety of tools (e.g., address verification and other authentication services) to combat fraudulent orders. These need to be an integral part of the business security program (Chapter 10). For more on payment security, see Morphy (2012).
6. **What B2B payment methods should we use?** Several methods are available. Electronic transfers are very popular. Some customers pay with e-checks while small amounts are paid with credit cards. For MROs, consider using purchasing cards. For global trade, electronic letters of credit are popular. With all these methods, a key factor is determining how well they work with existing accounting and ordering systems and with business partners.

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## SUMMARY

In this chapter, you learned about the following EC issues as they relate to the chapter's learning objectives.

1. **Payment revolution and micropayments.**

Cash and checks are no longer kings. Debit and credit cards now rule – both online and offline. This means that online B2C businesses need to support debit and credit card purchases. In international markets outside of Western Europe, buyers often favor other forms of e-payment (e.g., bank transfers). With the exception of PayPal, virtually all the alternatives to charge cards have failed. None have gained critical mass to overcome the “chicken-and-the-egg” problem.

A major area of development is the payment of small amounts (micropayments) in EC. Several different methods are being developed ranging from PayPal to prepaid cards.

Note: Due to security problems with credit cards (see Chapter 10), many people are using cash. However, as the problems are solved, we anticipate the return to credit cards.

2. **Using payment cards online.** The processing of online card payments is essentially the same as it is for brick-and-mortar stores and involves essentially the same players and the same systems – banks, card associations, payment processing services, and the like. This is one of the reasons why payment cards are predominant in the online world. The major difference is that the rate of fraudulent orders is much higher online. Surveys, such as those conducted annually by CyberSource, indicate that over the past few years, merchants have adopted a wide variety of methods including address verification, manual review, fraud analysis, card verification services, authentication services, and negative pay files to combat fraudulent orders. In the same vein, some consumers have turned to virtual or single-use credit cards to avoid using their actual credit card numbers online.
3. **Smart cards.** Smart cards resemble credit cards but contain microprocessors for manipulating data and have a large memory capacity. Some cards have memory chips for read/write data. Smart cards can be rechargeable. Applications include contactless retail payments, paying for mass transit services, iden-

tifying cardholders for government services, securing physical and network access, storing healthcare data, and verifying eligibility for healthcare and government services. Given the sensitive nature of much of the data on smart cards, public key encryption and other cryptographic techniques are used to secure their contents.

4. **Stored-value cards.** A stored-value card is similar in appearance to a credit or debit card. The monetary value of a stored value card is housed in a magnetic strip on the back of the card. Closed-loop stored-value cards are issued for a single purpose by a specific merchant (e.g., a Starbucks gift card). In contrast, open-loop stored-value cards are more like standard credit or debit cards and can be used for multiple purposes (e.g., a payroll card). Those segments of the population without credit cards or bank accounts – people with bad credit, no credit history, problems with immigration status, or another reason – are driving the substantial growth of stored-value cards. Specialized cards, such as BB&T EasySend ([bbt.com/bbtdotcom/banking/cards/easy-send.page](http://bbt.com/bbtdotcom/banking/cards/easy-send.page)), make it simple to send money internationally. MasterCard® offers a variety of prepaid cards, such as the MuchMusic Prepaid MasterCard®, where the user loads the card with cash and can use it online or anywhere. For a list of the different prepaid cards offered by MasterCard®, see [mastercard.ca/prepaid-card.html](http://mastercard.ca/prepaid-card.html).
5. **Micropayments.** In the online world, most purchases are made with credit and debit cards. When the value of a purchase is under \$10, it is called a micropayment. The problem is that the fees associated with card purchases make these low value transactions cost prohibitive. Today, as an alternative, most merchants rely on one of five methods such as aggregation, stored-value card, and subscription to avoid the individual transaction costs. Aggregation adds the value of a number of purchases before submitting the transaction to the card companies; a stored-value card enables up-front payments to a debit account from which purchases are deducted as they are made; and a subscrip-

tion is a single payment that covers access to content for a defined period of time. More recently, card companies have lowered their transaction fees in order to encourage their use in these situations. Similarly, PayPal has introduced support for micropayments at a reduced transaction costs.

6. **E-checking.** E-checks are the electronic equivalent of paper checks. They are handled in much the same way as paper checks and rely quite heavily on the ACH Network. E-checks offer a number of benefits, including a potential reduction in processing time, reduced administrative costs, a more efficient deposits process, reduced float period, and fewer checks returned for non-sufficient funds. These factors have resulted in the rapid growth of e-check usage. The rapid growth is also being facilitated by the use of e-checks for in-store purchases. Purchase Order Processing (POP) and Back-Office Order Conversion (BOC) are two systems established by NACHA (The Electronic Payments association), that enable retailers to convert paper checks used for in-store purchases to ACH debits (i.e., e-checks) without the need to process the checks using traditional procedures.
7. **Mobile payments.** Wireless and smartphone companies are rapidly enabling their customers to initiate or confirm payments and other financial transactions via their mobile devices. These transactions are one of two types: mobile proximity payments or mobile remote payments. With mobile proximity payments, also known as “contactless” payments, a cell phone or smartphone is outfitted with a special chip that allows users to swipe their phones near a payment device (e.g., POS reader), much like a contactless smart card or credit card. With mobile remote payments, the mobile handset can be used to make person-to-person, person-to-business, and business-to-business payments. The uptake of mobile proximity payments is currently hindered because vendors cannot agree on the chip, reader, or network standards to be used.
8. **B2B electronic payments.** B2B payments are the financial part of a company’s supply chain that encompasses the range of processes from procurement to payment and from ordering to cash flow. Today, the vast majority of B2B payments are still made by check, although many organizations are moving to Electronic Invoice Presentment and Payment (EIPP) that has three models: seller direct (buyers go to the seller’s website), buyer direct (sellers post invoices on the buyer’s website), and consolidator (many buyers and many sellers are linked through the consolidator’s website). One of the largest consolidators is GXS Trading Grid. In addition to these services, there are several EIPP payment options, including the ACH Network, purchasing cards, wire transfers, and letters of credit (L/C). The move to EIPP is being inhibited by the shortage of IT staff, the lack of integration of payment and accounting systems, the lack of standard formats for remittance information, and the inability of trading partners to transfer payments electronically with all the necessary accompanying information and procedures.
9. **Emerging EC payment systems.** A large number of new payment systems are emerging. Most notable is the controversial Bitcoin that is popular in the underground economy as digital currency. Coin is an ‘all-in-one’ credit/debit card competing with NXT-ID. Amazon Payments is a comprehensive set of payment tools aimed at providing payment flexibility to shoppers. Of special interest is Alipay from the Alibaba Group that caters to millions of Chinese shoppers.

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## KEY TERMS

Address Verification System (AVS)  
 Authorization  
 Automated Clearing House  
 (ACH) Network  
 Bitcoin  
 Card verification number (CVN)  
 Contact card

Contactless (proximity) card  
 Digital (virtual) currency  
 Electronic check (e-check)  
 Electronic Invoice Presentment  
 and Payment (EIPP)  
 Letter of credit (L/C)  
 Micropayments (e-micropayments)  
 Mobile payment  
 Mobile wallet  
 Payment cards  
 Payment service provider (PSP)  
 Purchasing cards (P-cards)  
 Settlement  
 Smart card  
 Smart card reader  
 Stored-value card

## DISCUSSION QUESTIONS

1. Boku ([boku.com](http://boku.com)) launched a mobile payment service with the 2009 acquisition of Paymo and MobileCash (two leading providers in the global mobile payment industry) that enables buyers to make online purchases with their mobile phones. How does the Boku payments service work? Who are some of the companies supporting Boku? Do you think the Boku mobile payments system will succeed? What factors will play a major role in its success or failure? Start by reading the press release at [www.boku.com/boku-launches-new-online-payments-service-for-mobile-consumers-acquires-paymo-and-mobilicash-businesses-pr](http://www.boku.com/boku-launches-new-online-payments-service-for-mobile-consumers-acquires-paymo-and-mobilicash-businesses-pr).
2. Criminals may use fake or stolen credit cards to pay merchants. What steps should the merchants take to combat the fraud?
3. A retail clothing manufacturer is considering e-payments for both its suppliers and its buyers. What sort of e-payment method should it use to pay for office supplies? How should it pay suppliers of raw materials? How should its customers – both domestic and international clothing retailers – pay?
4. A metropolitan area wants to provide users of its public transportation system with the ability to pay transit fares, and make retail purchases, using a single contactless smart card. What sorts of problems can it encounter in setting up the system, and what types of problems could the riders encounter by using the cards?
5. Discuss the probability that Ven ([ven.vc](http://ven.vc)) will become an acceptable global digital currency.
6. Discuss the role of e-checking. Does it have a future?
7. Discuss the different methods of global payments.

## TOPICS FOR CLASS DISCUSSION AND DEBATES

1. If you were running an online retail store, would you permit purchases with e-checks? Why or why not?
2. Why is the marketplace for electronic payment systems so volatile? Is there a need for some other form of electronic payment?
3. Debate: Why was PayPal able to succeed where other e-payment alternatives were not? Does the company present a threat to the banking industry?
4. Several years ago Facebook declared that all Facebook applications, including games, would have to use Facebook Credits as their currency. A short time later they rescinded this policy. Why would Facebook issue such a policy? Why did they rescind it? Do you agree with their actions?
5. Besides e-books and online music, what are some of the other places where micropayments could be used?
6. Which would you prefer, paying for goods and services with a physical debit or credit card or paying with your cell phone? What are some of the benefits and limitations of each?
7. Several companies are trying to enter the e-textbook business. Debate: Which company, Apple or [Amazon.com](http://Amazon.com), has the best chance of building and dominating this market in the long run? Explain.
8. Some question the viability of MasterPass™. Find pro and con information and debate the issue.

9. Some say (e.g., former U.S. Congressman Ron Paul) that Bitcoin could destroy the dollar. Investigate and discuss.
10. Research VeriFone Systems ([verifone.com](http://verifone.com)) and discuss its role in the e-payment field.
11. Debate the future of credit cards.
12. Discuss the differences between digital currency and virtual currency.

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## INTERNET EXERCISES

1. In 1999, eBay purchased a payment system called Billpoint, which was a head-to-head competitor of PayPal. Use online sources to research why PayPal succeeded and Billpoint failed. Write a report based on your findings.
2. Select a major retail B2C merchant in the United States and one outside of North America. Detail the similarities and differences in the e-payment systems they offer. What other payment systems could the sites offer? Write a short report.
3. A small number of companies are providing digital (mobile) wallet systems. What is a digital wallet? Make a list of these companies and their products. Compare their various capabilities. Do you think any of these products will be popular in the near future? Why or why not?
4. Read the White Paper titled “Transit and Contactless Financial Payments” at [smartcardalliance.org/resources/pdf/Transit\\_Financial\\_Linkages\\_WP\\_102006.pdf](http://smartcardalliance.org/resources/pdf/Transit_Financial_Linkages_WP_102006.pdf). What are the key requirements for an automated fare-collection system? Based on the report, what type of payment system did the New York City Transit Authority pilot use? What factors helped determine the type of system to be piloted? How did the pilot program work?
5. Go to [nacha.org](http://nacha.org). What is NACHA? What is its role? What is the ACH Network? Who are the key participants in an ACH e-payment?
6. Both Walgreens and Kohl’s utilize Solutran’s SPIN for their BOC systems. Based on information provided at [solutran.com](http://solutran.com) and information found in online articles about the system, what kinds of capabilities and benefits does the system provide? What is unique about the system? If you were running a large retail operation, would you focus on POP or BOC?
7. Read about Starbucks’ mobile payment alternatives at [mashable.com/category/starbucks-card-mobile](http://mashable.com/category/starbucks-card-mobile) and find other sources. Write a summary.
8. Find current information about [authorize.net](http://authorize.net), which is now a CyberSource Solution. Write a report.
9. Enter [placecast.net/shopalerts/brands.html](http://placecast.net/shopalerts/brands.html) and find information about the capabilities of ShopAlerts. What is ShopAlerts Wallet? Write a report.
10. Enter [fiserv.com](http://fiserv.com). Find what this company is doing worldwide in financial services. Also check its Popmoney division. Write a report.

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## TEAM ASSIGNMENTS AND PROJECTS

### 1. Assignment for the Opening Case

Read the opening case and answer the following questions.

Suppose Amazon decided to resurrect its Amazon Pages program.

- (a) What sort of micropayment system should it use in order to run this business profitably?
  - (b) What types of business and legal issues would it encounter?
  - (c) Besides the book and music businesses, describe some other online business where micropayments are, or would be, critical to its success.
2. The competition within the mobile payment reader industry is very intense. Each team selects a company in this field (e.g., Square, PayPal, Groupon) and presents the company’s capabilities and weaknesses.
  3. Write a report comparing smart card applications in two or more European and/or Asian countries. In the report, discuss whether those applications would succeed in North America. Start with ‘Payment Methods in Peru’ at [emarketservices.com/start/Home/Intro/prod/Payment-methods-in-Peru.html?xz=0&cc=1&sd=1&ci=2129](http://emarketservices.com/start/Home/Intro/prod/Payment-methods-in-Peru.html?xz=0&cc=1&sd=1&ci=2129) (November 15, 2012).



4. Have one team represent MasterCard® *Pay Pass*™ ([mastercard.us/paypass.html](http://mastercard.us/paypass.html)) and another represent Visa *payWave* ([usa.visa.com/personal/security/card-technology/visa-paywave.jsp](http://usa.visa.com/personal/security/card-technology/visa-paywave.jsp)). The task of each team is to convince a company that its product is superior to the other.
5. Have each team member interview three to five people who have made a purchase or sold an item via an online auction. Find out how they paid. What security and privacy concerns did they have regarding the payment? Is there an ideal payment method?
6. AT&T, Verizon, T-Mobile, and Discover Financial Services released a mobile commerce platform called *Isis Mobile Wallet* ([paywithisis.com](http://paywithisis.com)) that resulted in a new cell phone–powered payment system. How does this system work? What are some of the competing systems that have been proposed or implemented? Which system has the best chance of success and why? Research and write a report.
7. Go to the NACHA site for the Council for Electronic Billing and Payment ([cebp.nacha.org](http://cebp.nacha.org)). The site provides information (see the “Current Initiatives” section) about various forms of EIPP and EBPP. Compare and contrast two of the forms it details.

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## CLOSING CASE: INNOVATIVE CREDIT CARD MICROPAYMENTS FOR THE KOREAN METROPOLITAN UNIFIED FARE SYSTEM

Boram, a banker in Seoul, Korea commutes by MRT and public buses. She uses a credit card that allows her to pay for both MRT and buses, not only in Seoul, but also in other major Korean cities without having to recharge the card. The accumulated monthly charges are automatically paid by the bank. Boram recalls the days when she had to carry two different transportation cards in addition to credit cards.

In the past, Boram used to pay for the subway by using a Seoul MRT Card, which is a stored-value card. The card is issued by the city-owned Seoul MRT Corporation and could be recharged only at MRT stations. To ride a bus, she had to

use a Seoul Bus Card that is another stored-value card issued by the private Seoul Bus Transport Association (SBTA). The Seoul Bus Card was introduced in 1996 as the first RF-type bus card in the world. Thus, she had to recharge both cards individually because they could not be used interchangeably. Other cities have similar governance structures. Therefore, to take the subway in another city, Boram had to buy one-time subway tickets at the subway station.

Credit cards, as described in this chapter, are not cost-effective enough to be used for the micropayment of transportation because the card company could not justify its service fee. Therefore, as described earlier, Boram needed to carry at least one credit card and two transportation cards in her wallet.

Large cities in Asia such as Seoul, Hong Kong, and Singapore have adopted similar types of stored-value transportation cards. As such, credit cards and stored-value cards coexist as two major card services. The two types of card issuers compete to expand their application territory. The transportation card company wants to extend the card’s application so users can pay for parking fees, various toll fees, and at restaurants and stores. However, the users have to load the cards for prepayment.

At the same time, for credit cards issuers to expand their application to include payments for transportation, they need to simplify the authorization process and reduce the service fee for the participating transporters. The question is: which business model will eventually win? In Seoul, it is the credit card issuer that includes payments for transportation.

In order to pay transportation fares quickly, credit card payments for subways and buses must be processed without the full authorization procedure. This risk is tolerable because the frequency and amount of micropayment abuse is low in Korea. Therefore, the transportation ticket gate merely automatically checks whether the card is valid and not on a “blacklist.” The gate displays not only the fare, but also the charges incurred during the current month as shown in Figure 11.5. The first credit-based MRT card was adopted by Kookmin Bank in 1998. Today, several issuers support this type of card.



**Figure 11.5** The credit-based transportation card displays the fare and accumulated charges for the current month at the ticket gate (Photos by J. K. Lee)

The credit-based transportation card has revolutionized the recharge service process. In the early stage, both MRT cards and bus cards had to be recharged at manned booths. To reduce the expense of the recharge service, unmanned booths were installed at MRT stations. However, with the credit card, recharge booths can be eliminated altogether and users do not have to spend time recharging their cards. Therefore, both the users and the city transportation authority benefit.

Another benefit of the smart transportation card is that it can restructure the city's transportation system by aligning and coordinating the routes of subways and buses. In the past, bus routes were designed in consideration of the departure and destination points of citizens' trips. This approach intended to make it convenient for citizens to take only one bus to reach their destination. However, too many buses created bottlenecks in busy streets, causing traffic jams. To avoid such congestion, the MRT and main bus companies planned to design the transportation system so that bus branch routes are connected to the subway and to the main bus routes. However, if citizens are required to pay an additional fee for branch routes, they may resist the new structure. Therefore, the transportation fare card should be interconnected.

To solve this problem, the transportation card, credit or stored-value, is designed to memorize the departure time from the MRT station so that the

connecting buses do not charge passengers again if the elapsed time is less than 30 minutes. Taking a branch bus is regarded as a transfer for single trip. This means that the owners of transport systems need to agree on about how to allocate the collected fees. Therefore, the city of Seoul adopted the Metropolitan Unified Fare System in 2009.

Due to the national standardization and integration effort, nationwide transportation cards are now unified using smart cards. Credit card companies do not really make enough money through transportation payment services, but this service is essential for them to gain new customers and retain existing ones.

The city also can collect data about commuters so that additional buses can be dispatched depending upon the passenger load by route and time. Note that, at midnight, regular bus services stops. For midnight bus service, the control center analyzes the frequency of mobile phone usage in certain areas to estimate the number of potential commuters and dynamically determine the routes of midnight buses.

Another lesson that can be learned from Korea's experience is the C2C payment system use of credit cards. In C2C auction markets, escrow services that are based on credit cards allow individual buyers to pay eBay Korea directly. The sellers can receive payment through eBay Korea if delivery is confirmed by the buyer. Therefore, there is

no need for an e-mail payment system such as PayPal that charges high service fees. The function of a debit card, combined with a credit card, has also virtually replaced the function of electronic checks, so e-checks are no longer needed. In this manner, payments by credit cards in Korea are electronically integrated for e-commerce, physical stores, and micropayments for transportation.

**Sources:** Case written by Jae K. Lee, Seoul–Korea.

### Questions

1. How can credit cards be processed as quickly as stored-value cards at the ticket gate?
2. What is the major benefit of owning a credit-based transportation card for commuters?
3. What is the major benefit of credit-based transportation cards to the city government?
4. How can the Metropolitan Unified Fare System enable the restructuring of public transportation infrastructure?

### ONLINE FILES

available at [affordable-e-commerce-textbook.com/turban](http://affordable-e-commerce-textbook.com/turban)

W11.1 To POP or BOC Digital Checks

W11.2 Application Case: Closing the Digital Divide with Mobile Microfinance in Bangalore, India

### COMPREHENSIVE EDUCATIONAL WEBSITES

[afponline.org](http://afponline.org): Website of the Association for Financial Professionals.

[agents.umbc.edu](http://agents.umbc.edu): Large collection of information about intelligent agents.

[paymentssource.com](http://paymentssource.com): Comprehensive site for reports, news, events, technologies, and vendors.

[cybersource.com](http://cybersource.com): A Visa company for payment security and management, digital wallets, reports, and news.

[globalplatform.org](http://globalplatform.org): GlobalPlatform provides information and guides on smart cards and their infrastructure and security.

[nacha.org](http://nacha.org): NACHA – The Electronic Payments Association. They manage the development and governance of the ACH Network.

[paymentsnews.com](http://paymentsnews.com): Website maintained by Glenbrook Partners offering daily news about e-payment innovations and other financial services.

[glenbrook.com](http://glenbrook.com): A payments industry strategy consulting and research firm. Monitors the news of the day across the wide-ranging field of electronic payments, including mobile payments.

[smartcardalliance.org](http://smartcardalliance.org): A nonprofit association for smart card-related issues.

## GLOSSARY

**Address Verification System (AVS)** System that detects fraud by comparing the address provided by the buyer at checkout with the address on file.

**Authorization** First phase of processing a credit card transaction that determines whether a buyer's card is valid (e.g., not expired) and whether the customer has sufficient credit or funds in his or her account.

**Automated Clearing House (ACH) Network**

A processor of paper checks by converting them to electronic format via the government's electronic funds transfer (EFT) system. Bitcoin A digital currency managed by a group of individuals and companies who own the computing power and process of creating Biocoins.

**Card verification number (CVN)** Method for detecting fraud by matching the 3-digit verification number printed on the signature strip on the back of the credit card (or the 4-digit number on the front of the card, such as American Express cards) with the number stored by the cardholder's issuing bank.

**Contact card** A smart card that is activated when it is inserted into a smart card reader.

**Contactless (proximity) card** A smart card that only has to be within a certain proximity of a smart card reader to process a transaction.

**Digital (virtual) currency** A medium of payment that is electronically created, stored, and used in e-commerce. It can be used to pay for either physical goods or virtual ones.

**Electronic check (e-check)** An electronic clone of a paper check, containing the same information.

**Electronic Invoice Presentment and Payment (EIPP)** The procedures and processes by which companies present invoices and get paid for these invoices over the Internet.

**Letter of credit (L/C)** Letter issued by one bank to another bank (usually in another country) on behalf of a buyer (e.g., importer). It guarantees a seller (e.g., exporter) that sufficient payment for goods or services will be made on time, provided the conditions of the L/C are met by the exporter.

**Micropayments (e-micropayments)** Small online payments, usually under \$10.

**Mobile (digital) wallet** Proximity payments that are debited to a mobile phone account as a monthly fee or to a debit card account. The technology enables payments as well as processing loyalty programs and performing target promotions all in one mobile device.

**Mobile payment** Payment transactions initiated or confirmed using a person's mobile device, usually a smartphone.

**Payment cards** Electronic cards that contain payment-related data. They include credit cards, charge cards, and debit cards.

**Payment service providers (PSPs)** Third-party companies that provide services to merchants so they can accept all kinds of electronic payments. The PSPs connect all participants in the electronic transactions.

**Purchasing cards (p-cards)** Payment cards issued to a company's employees used to pay for unexpected purchases of goods and services, usually MROs (e.g., stationery, office supplies, and computer supplies) up to a certain limit (usually \$1,000 to \$5,000). settlement Second phase of processing a credit card transaction that transfers money from the buyer's account to the merchant's account.

**Smart card** A plastic payment card that contains data in an embedded microchip.

**Smart card reader** A read/write device that acts as a mediator between the card and the

host system that stores application data and processes transactions.

**Stored-value card** A card where a monetary value is prepaid and can be loaded on the card once, or several times.

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## REFERENCES

- Analysys Mason. "Final Report for PhonepayPlus: The Marketplace for and Regulation of Micropayment Services in the UK." [Ref: 18615–503] December, 2010. [phonepayplus.org.uk/~media/Files/PhonepayPlus/Research/Analysys\\_Mason\\_The\\_marketplace\\_for\\_and\\_regulation\\_of\\_micropayment\\_services\\_in\\_the\\_UK.pdf](http://phonepayplus.org.uk/~media/Files/PhonepayPlus/Research/Analysys_Mason_The_marketplace_for_and_regulation_of_micropayment_services_in_the_UK.pdf) (accessed April 2014).
- Bell, C. "4 Risky Places to Swipe Your Debit Card." *Bankrate*, December 22, 2011. [bankrate.com/finance/checking/risky-places-swipe-debit-card-1.aspx](http://bankrate.com/finance/checking/risky-places-swipe-debit-card-1.aspx) (accessed June 2014).
- Bonnington, C. "MasterCard MasterPass Augments Your Digital Shopping Experience." *Wired*, February 25, 2013.
- Boorstin, J. "Groupon Gambles Big on Mobile Payments." *CNBC*, September 19, 2012. [cnbc.com/id/49078709](http://cnbc.com/id/49078709) (accessed June 2014).
- Business Wire*. "ISIS Advances Mobile Commerce with First Market." April 4, 2011. [businesswire.com/news/home/20110404007248/en/Isis-Advances-Mobile-Commerce-Market#.VIIIjHF-So](http://businesswire.com/news/home/20110404007248/en/Isis-Advances-Mobile-Commerce-Market#.VIIIjHF-So). Accessed Dec 2014
- Capgemini. "World Payments Report 2010." 2010. [ecom.cmu.edu/resources/elibrary/epay/WPR\\_2010.pdf](http://ecom.cmu.edu/resources/elibrary/epay/WPR_2010.pdf) (accessed April 2014).
- Chen, B. X. "Now on Sale at Starbucks: Square's Credit Card Reader." January 3, 2013. [bits.blogs.nytimes.com/2013/01/03/starbucks-square-mobile-credit-card-reader](http://bits.blogs.nytimes.com/2013/01/03/starbucks-square-mobile-credit-card-reader) (accessed April 2014).
- Clancy, H. "Mobile Payment Apps Eliminates Card Reader." November 21, 2012. [zdnet.com/mobile-payment-apps-eliminates-card-reader-7000007747](http://zdnet.com/mobile-payment-apps-eliminates-card-reader-7000007747) (accessed April 2014).
- CyberSource. "12th Annual Online Fraud Reports." 2011. [cybersource.com](http://cybersource.com) (accessed April 2014).
- D'Agostino, D. "Pennies from Heaven." *CIO Insight*, January 2006. [allbusiness.com/company-activities-management/financial-performance/13443526-1.html](http://allbusiness.com/company-activities-management/financial-performance/13443526-1.html) (accessed June 2014).
- Del Rey, J. "PayPal Wants Role in Apple's Mobile Payments Dreams." *Re/code*, January 30, 2014. [recode.net/2014/01/30/paypal-wants-in-on-apples-mobile-payments-dreams/](http://recode.net/2014/01/30/paypal-wants-in-on-apples-mobile-payments-dreams/) (accessed April 2014).
- Estopace, E. "Ice Cream Maker Makes a Difference with Mobile POS." *Enterprise Innovation*, May 21, 2014.
- Evans, D. S., and R Schmalensee. *Paying with Plastic: The Digital Revolution in Buying and Borrowing*, 2nd ed., Cambridge, MA: MIT Press, 2005.

- Fishman, J. "The Future of Mobile Payments: Part I." *Seeking Alpha*, February 18, 2014a. [seekingalpha.com/article/2028491-the-future-of-mobile-payments-part-i](http://seekingalpha.com/article/2028491-the-future-of-mobile-payments-part-i) (accessed June 2014).
- Fishman, J. "The Future of Mobile Payments: Part II." *Seeking Alpha*, February 19, 2014b. [seekingalpha.com/article/2030631-the-future-of-mobile-payments-part-ii](http://seekingalpha.com/article/2030631-the-future-of-mobile-payments-part-ii) (accessed June 2014).
- Gemalto, N. V. "EMV in the United States." 2013. [gemalto.com/emv](http://gemalto.com/emv) (accessed April 2014).
- Green, J. "IRS Deems Bitcoins Taxable Property." *Pymnts.com*, March 26, 2014. [pymnts.com/in-depth/2014/irs-deems-bitcoins-taxable-property/#.Uitg4\\_mICm4](http://pymnts.com/in-depth/2014/irs-deems-bitcoins-taxable-property/#.Uitg4_mICm4) (accessed April 2014).
- Hachman, M. "PayPal Launches Mobile Express Checkout." *PCMag.com*, October 26, 2010. [pcmag.com/article2/0,2817,2371519,00.asp](http://pcmag.com/article2/0,2817,2371519,00.asp) (accessed April 2014).
- Hamblen, M. "Crutchfield Sees Benefits from Speedy Mobile Checkout." *Computerworld*, June 3, 2011.
- Jing, M. "Internet Finance: Golden Goose for Nest Eggs?" *China Daily USA*, November 28, 2013 (Updated). [usa.chinadaily.com.cn/epaper/2013-11/28/content\\_17138252.htm](http://usa.chinadaily.com.cn/epaper/2013-11/28/content_17138252.htm) (accessed April 2014).
- Juniper Research. "Mobile Payment Transaction Values for Digital and Physical Goods to Exceed \$300bn Globally Within 5 Years, According to Juniper Research." July 1, 2008. [juniperresearch.com/view-pressrelease.php?pr=97](http://juniperresearch.com/view-pressrelease.php?pr=97) (accessed April 2014).
- Kim, R. "TrialPay Offers Double the Savings for Valentine's Day." *San Francisco Chronicle*, February 11, 2008.
- LowRiskValue. "Evidence that Apple Intends to Start Mobile Payment Processing." *Seeking Alpha*, February 27, 2014. [seekingalpha.com/article/2053153-evidence-that-apple-intends-to-start-mobile-payment-processing](http://seekingalpha.com/article/2053153-evidence-that-apple-intends-to-start-mobile-payment-processing) (accessed April 2014).
- Lunden, I. "More Mobile Wallets Incoming: Placecast Launches White Label ShopAlerts Wallet." *TechCrunch*, June 27, 2012. [techcrunch.com/2012/06/27/more-mobile-wallets-incoming-placecast-launches-white-label-shopalerts-wallet](http://techcrunch.com/2012/06/27/more-mobile-wallets-incoming-placecast-launches-white-label-shopalerts-wallet) (accessed February 2013 April 2014).
- MasterCard. "MasterCard Introduces MasterPass – The Future of Digital Payments." A Press Release, February 25, 2013. [newsroom.mastercard.com/press-releases/mastercard-introduces-masterpass-the-future-of-digital-payments](http://newsroom.mastercard.com/press-releases/mastercard-introduces-masterpass-the-future-of-digital-payments) (accessed April 2014).
- McMillian, J. "Crutchfield Drives High Mobile Conversion with PayPal." June 26, 2011. Available at [archive-ca.com/page/165097/2012-07-19/https://www.paypal-blog.ca/2011/06/crutchfield-drives-high-mobile-conversion-with-paypal-2](http://archive-ca.com/page/165097/2012-07-19/https://www.paypal-blog.ca/2011/06/crutchfield-drives-high-mobile-conversion-with-paypal-2) (accessed April 2014).
- Morphy, E. "Troubles Multiply for Global Payments." *E-Commerce Times*, April 3, 2012. [ecommercetimes.com/story/74771.html](http://ecommercetimes.com/story/74771.html) (accessed April 2014).
- O'Dell, J. "PayPal Debuts Mobile Express Checkout." *Mashable*, October 26, 2010. [mashable.com/2010/10/26/paypal-mobile-express-checkout](http://mashable.com/2010/10/26/paypal-mobile-express-checkout) (accessed April 2014).
- Patel, C. "Decoding Virtual Currencies and Bitcoin for Beginners, List of Terms and Definitions." *Let's Talk Payments*, March 26, 2014. [letstalkpayments.com/decoding-virtual-currencies-bitcoin-beginners-list-terms-definition](http://letstalkpayments.com/decoding-virtual-currencies-bitcoin-beginners-list-terms-definition) (accessed April 2014).
- PayPal. "Business Guide to Online Payment Processing." 2004. No longer available online.
- Pepitone, J. "Hot Startup Coin Has 3 Big Problems." *CNN Money*, November 17, 2013. [money.cnn.com/2013/11/17/technology/innovation/coin-startup-credit-card](http://money.cnn.com/2013/11/17/technology/innovation/coin-startup-credit-card) (accessed April 2014).
- Purewal, S. J. "Groupon Introduces Mobile Payments System." *PC World*, September 20, 2012.
- Rao, L. "Placecast Debuts Location-Based, Credit Card-Linked ShopAlerts Offers." *TechCrunch*, October 18, 2012. [techcrunch.com/2012/10/18/placecast-debuts-location-based-credit-card-linked-shopalerts-offers](http://techcrunch.com/2012/10/18/placecast-debuts-location-based-credit-card-linked-shopalerts-offers) (accessed April 2014).
- Roth, D. "The Future of Money: It's Flexible, Frictionless and (Almost) Free." *Wired*, February 22, 2010. [wired.com/magazine/2010/02/ff\\_futureofmoney/all/1](http://wired.com/magazine/2010/02/ff_futureofmoney/all/1) (accessed April 2014).
- Severt, N. "Goldman Sachs: M-Commerce Sales Forecast to Hit \$626 Billion by 2018." March 12, 2014. [evigo.com/12038-goldman-sachs-m-commerce-sales-forecast-hit-626-billion-2018](http://evigo.com/12038-goldman-sachs-m-commerce-sales-forecast-hit-626-billion-2018) (accessed June 2014).
- Trinh, T. "MasterCard Rolls Out MasterPass Mobile Payment System." February 25, 2013. [abcnews.go.com/blogs/technology/2013/02/mastercard-rolls-out-masterpass-digital-wallet](http://abcnews.go.com/blogs/technology/2013/02/mastercard-rolls-out-masterpass-digital-wallet) (accessed April 2014).
- Tsotsis, A. "Kindle Books Overtake Paperback Books to Become Amazon's Most Popular Format." January 27, 2011. [techcrunch.com/2011/01/27/kindle-books-overtake-paperback-books-to-become-amazons-most-popular-format](http://techcrunch.com/2011/01/27/kindle-books-overtake-paperback-books-to-become-amazons-most-popular-format) (accessed February 2013 April 2014).
- Valentine, L. "Payment Innovations: Are You In?" *ABA Banking Journal*, July 2012.
- Vigna, P. "Bitcoin Couple Travels the World Using Virtual Cash." *Wall Street Journal*, November 20, 2013.
- Whitman, D. "Credit Card Transactions: Real World and Online." *VirtualSchool.edu*, 1996. [virtualschool.edu/mon/ElectronicProperty/klamond/credit\\_card.htm](http://virtualschool.edu/mon/ElectronicProperty/klamond/credit_card.htm) (accessed April 2014).
- yStats.com. "Global Alternative Payment Methods 2014." *GmbH & Co. KG*, May 23, 2014. [ystats.com/en/reports/preview.php?reportId=1085&backtosearch=true](http://ystats.com/en/reports/preview.php?reportId=1085&backtosearch=true) (accessed June 2014).
- Zawya. "Cairo Amman Bank Introduces PayPal Services to Promote Electronic Commerce in Jordan." April 23, 2014. [zawya.com/story/Cairo\\_Amman\\_Bank\\_introduces\\_PayPal\\_services\\_to\\_promote\\_Electronic\\_Commerce\\_in\\_Jordan-ZAWYA20140423103516](http://zawya.com/story/Cairo_Amman_Bank_introduces_PayPal_services_to_promote_Electronic_Commerce_in_Jordan-ZAWYA20140423103516) (accessed June 2014).