On November 16, 1999, Peter Theil sat with friends at a restaurant. When the bill arrived, Theil used his Palm Pilot to "beam" his share to a friend sitting across the table. Theil and fellow co-founder Max Levchin had built a system that would allow them to send money to one another via a Palm Pilot's infrared links. From this idea sprang one of the first "peer-to-peer" payment systems: PayPal.com, which allows individuals to send money to one another via e-mail.

PayPal emphasizes ease of use for both senders and receivers of cash. Here's a brief synopsis of how it works. First, you create a PayPal account at the PayPal Web site by filling out a one-page application form and providing credit or debit card or bank account information. Only PayPal is privy to this information, not the receiving party. Then, when you use PayPal to pay for a purchase, money is drawn from the credit card or bank account and transmitted to the Automated Clearing House (ACH) Network, a privately operated financial intermediary that tracks and transfers funds between financial institutions. The party who is to receive the payment is notified via e-mail that money is waiting. If the receiving party has a PayPal account, the funds are automatically deposited into the account; if the person does not have a PayPal account, he or she must set one up, and then the money is credited to his or her account. Once the funds are in the PayPal account, the recipient can then transfer them electronically to a checking account, request a paper check, or use PayPal to send the funds to someone else.

Levchin and Theil originally conceived of PayPal as a method for "beaming" money to users of handheld PDAs. When this idea did not pan out, they changed their target to arranging payments between individuals who knew one another. However, they quickly realized that it would also work for a company such as eBay, providing purchasers and sellers with a way to short-cut
the time-consuming and cumbersome process of mailing checks and money orders, waiting for checks to clear before shipping items. Moreover, for small merchants selling items on the Web, it is difficult and expensive to obtain the capability to accept credit cards. Credit companies extend these merchant services only to bona fide businesses, usually requiring a physical place of business as a requirement. Theil and Levchin were right. Today, PayPal is the largest and most popular online payment service, growing from a handful of users when it launched in late 1999 to over 92 million by the end of 2005, of which about 25 million can be characterized as active users. Over 50,000 new users sign up each day, and in 2005, PayPal processed about $27.5 billion in transactions for the year. One reason PayPal has grown so fast is because it experiences the benefits of network economics or the “viral effect”: the more people who accept and use PayPal, the greater the benefit to the consumer.

PayPal fills a niche that credit card companies have avoided. Before PayPal, it was very difficult, if not impossible, for individuals to accept credit card payments. To date, PayPal is one of e-commerce’s major success stories. PayPal earns money in two ways. First, online sellers (who may be individuals or small businesses that do not want the difficulties or high fees associated with obtaining a merchant credit card account) pay a transaction fee for the service (30 cents plus 1.9%–2.9% of the proceeds of the transaction), less than a merchant typically pays for a credit card transaction. The other advantage for merchants on eBay is that they are not required to have a merchant bank account, which is required by credit card issuers. Consumers are not charged for use of the account. Second, PayPal earns revenue by collecting the interest earned on consumer funds not yet transferred out of the PayPal system.

Part of the strength of PayPal lies in its simplicity: it piggybacks on existing credit card and checking payment systems. This is also one of its weaknesses, however. PayPal reportedly suffers relatively high levels of fraud related to the credit card system on which it relies. To protect against fraud, PayPal requires special authorization for payments over $200.

In 2002, PayPal went public and issued shares in an initial public offering. One of the main reasons PayPal grew so rapidly was because of its popularity on eBay. In an effort not to lose this lucrative transaction business to PayPal, eBay spent over $100 million promoting its own similar system called Billpoint—but to no avail. In October 2002, eBay purchased PayPal for $1.5 billion—about $20 a share. At the time, analysts felt the price was too high, but eBay has had the last laugh—today PayPal is valued at $6–$7 billion, and, according to the company, has a 9% share of the U.S. consumer e-commerce payments market, and a 5% share of the global market. In 2005, PayPal generated about $1.1 billion in net revenue for eBay. Although this only accounted for about 25% of eBay’s revenues, the growth rate of PayPal revenues (58%) exceeded that of the rest of eBay (39%) by almost 20%.

Since PayPal has been acquired by eBay, eBay has pushed to expand its usage by both eBay customers and other online merchants. For instance, in Spring 2004, PayPal introduced new application program interfaces (APIs) that allow programmers working for Web merchants to more easily merge PayPal transactions with the merchants’ existing financial systems. Then, in August 2004, it revamped its merchant pricing, replacing its two-tier structure with a new one featuring four tiers based on seller
volume. In Fall 2004, PayPal rolled out its first marketing campaign aimed at signing up non-eBay merchants. In June 2005, it launched Website Payments Pro, a new transaction tool aimed at small and medium-sized Web merchants and in October 2005, extended this effort by acquiring VeriSign's payment gateway business (which allows merchants to authorize, process, and manage online payments), which processed more than $40 billion in total payment volume in 2004. PayPal plans to use the acquisition to accelerate its effort in the merchant services arena and expand its small and medium-sized business customer base, and said that it expects the new business to generate an additional $100 million in revenue for eBay in 2006. It has also signed up a few larger merchants, such as Overstock.com and TigerDirect.

PayPal is pursuing a number of other growth initiatives. In Fall 2004, PayPal signed up both Napster and Apple's iTunes Music Store as merchants in its first foray into the micropayments market. The experience proved so successful that PayPal is now investigating similar deals for other micropayments markets, such as downloadable games, electronic greeting cards, and other online content. In August 2005, PayPal introduced a new micropayments pricing plan designed to increase and encourage the purchase of low-priced digital goods. PayPal is also pursuing an overseas expansion strategy. In 2005, it added localized Web sites in China, Australia, Italy, and Spain to a list that already included Canada, Austria, Belgium, France, Germany, the Netherlands, Switzerland, and the United Kingdom. As of February 2006, businesses or consumers with e-mail could use PayPal to send online payments in 56 countries, and receive payments in 44 countries. Payments can be made or accepted in any one of six different currencies.

Although a number of PayPal's direct competitors, such as Yahoo and HSBC Holding's PayDirect, Citigroup's C2it, and Bank One's E-Mail Money, have gone out of business, competition remains from traditional credit card companies and banks. While some analysts believe PayPal has the potential to ultimately challenge the credit card system (in 2004, PayPal entered into an agreement with GE Consumer Finance to offer buyers lines of credit, leading to speculation that an independent PayPal-branded credit card might be next), it currently is still a small fry in comparison. For instance PayPal's $19 billion in volume in 2004 was dwarfed by Visa's $3 trillion. In terms of number of accounts, while PayPal now exceeds American Express, Discover, and Bank of America, it still significantly trails MasterCard (680 million) and Visa (1.2 billion). And more competition looms on the horizon. In June 2005, Google announced that it plans to offer an electronic payment service. Although Google says that its product is not intended to compete directly with PayPal, some believe that it ultimately may. PayPal also faces other challenges. PayPal's business makes it a natural target for fraud, both by merchants that do not deliver goods or services paid for by its customers, and from outside forces who send fraudulent e-mails to its customers, attempting to steal the customers' password, credit card numbers, or other personal information. PayPal has been forced to institute a number of costly measures to combat fraud in the attempt to enhance its customers' confidence in its services.

Despite the challenges, however, the future for PayPal appears bright. In fact, some analysts believe that PayPal may someday become an even bigger phenomenon than its acquiror, eBay.
THE RIGHT TO SHOP

How would you feel if the only way you could take advantage of a great bargain was to purchase the item online—but you didn’t have access to a computer or the Internet, or even if you did, the merchant could only process payments by credit card, and you didn’t have one. If you think that would be unfair, you’re not alone. Although the right to purchase merchandise online may not yet have risen to the level of an inalienable right, over the past several years, increasing attention has been focused on the equity (or social fairness) issues raised by the fact that some groups don’t have the same access to computers and the Internet as do others. This gap between the “haves” and “have nots” is often called the “digital divide.”

A U.S. Department of Commerce study done in 1998 entitled “Falling Through the Net II: New Data on the Digital Divide,” forecast growing challenges for the digital “have nots” in America, primarily households with incomes below $35,000, those without college educations, people living in rural areas, African Americans, Hispanics, seniors over 65, and the disabled. The report predicted that members of these groups would have an even more difficult time functioning in an economy that was Internet-dependent. Without access to a computer and the Internet, the report suggested, these Americans would have limited access to career improvement, be shut off from communications with family and friends, and lose out on purchasing opportunities.

Thankfully, the picture looks much more promising today, with the digital divide narrowing significantly just in the space of a few years. According to various reports, between 65% to 75% of all Americans can now access the Internet. Hispanics and African-Americans, groups that had previously been considered among the most at risk to suffer from the digital divide, comprise the fastest-growing Internet user populations. According to the Pew Internet & American Life Project, almost 70% of Hispanics and 60% of African Americans now use the Internet (compared to around 70% of those who identify themselves as white). Around 65% of seniors between the ages of 50 to 64 are Internet users, as are almost 30% of those over 65 years of age. Differences between community type have leveled off, with about 60% of Internet users coming from rural communities, compared to about 70% from urban and suburban communities. Even the divide based on household income has significantly declined, with almost 50% of those with household incomes of less than $30,000 a year now having Internet access.

Two of the main factors behind these encouraging statistics are falling computer prices (in 2000, a computer suitable for Internet access cost around $1,800, compared to around $400 today) and low-cost ISPs. If one looks at the digital divide as merely describing a gap between those who have Internet access and those who do not, then that gap is clearly closing. However, in some views, the divide is merely migrating. The newest digital divide focuses on those who have broadband access and those who do not. And another digital divide continues to impact e-commerce: the digital payments divide.

Consider that credit card payments account for around 80% of all online payments in the United States. Consider further that close to 100 million adults in the United States do not have a credit card. According to the U.S. Census Bureau, over 35% of those under the age of 35 do (continued)
not have a general purpose credit card. Even among those in the 35 to 75-year age bracket, anywhere from 20%–25% do not have a general purpose credit card. Although there are a number of alternative online payment systems, many continue to rely on the underlying possession of a credit card. Although it appears that the digital divide is closing, the number of people without credit cards in this country indicates that the digital payments divide is still quite significant.


### THE SET (SECURE ELECTRONIC TRANSACTION) PROTOCOL

Central issues for merchants and credit issuing banks involve authentication and irrefutability of charges. Although the SSL protocol provides secure transactions between merchant and consumer, it does not and cannot provide authentication. In addition, SSL cannot provide irrefutability: consumers can order goods or download information products and then claim the transaction never occurred.

The **SET (Secure Electronic Transaction) protocol** is intended to address the weaknesses of ordinary online credit card transactions by authenticating cardholder and merchant identity and making it impossible to refute charges through the use of digital signatures. SET is an open standard for the e-commerce industry developed and offered by MasterCard and Visa, the two major credit card issuers in the United States, as a way to facilitate and encourage improved security for credit card transactions.

SET uses a **digital certificate**, discussed in Chapter 5, which is an attachment to a message that verifies a sender’s identity, as one way of improving payment security. Credit card companies issue digital certificates to their cardholders just as they issue plastic cards; the digital certificate is stored in a digital wallet (described more fully in the next section) for use during online transactions. Merchants are issued similar certificates by the bank providing merchant account status. By using SET, merchants can be assured that received orders have not been altered somewhere in the process. SET also authenticates both the consumer and the merchant. **Figure 6.5** illustrates how SET transactions work.

The SET transaction process itself is similar to a standard online credit card transaction, except that there is more identity verification involved. As shown in Figure 6.5, after completing an online order form, the consumer selects the “Payment with SET” option at the site and then indicates which credit card he or she wants to use (1). On receiving the order form, the merchant’s computer accesses the consumer’s digital wallet to learn the details of the credit card payment. The merchant’s server verifies the consumer’s identity using the digital certificate in the...
While the online market for "big ticket" items such as travel, furniture, and jewelry grows, the online market for "little ticket" items (digital content such as newspapers, videos, and other digital transactions) grows to $3 billion. The market for microtransactions, or transactions under $5, is estimated to grow to $30 billion by 2010, representing $1.32 trillion in transactions in 2009. These transactions will be processed through micropayment systems such as PayPal, Amazon, and E-Commerce Digital Payment Systems in the B2C Arena. MIPST Technology (MIPST) is a leading provider of micropayment systems and is expected to see significant growth in the coming years.
include the fact that it is much less expensive than processing via cards, serves people who do not have cards, and allows people who have cards to avoid entering card data online. This is the model used by Qpass and Valista. It is expected to continue to lead in the wireless sector.

Internet micropayments models will rise in importance as digital content—from television shows, to movies, radio, music, and newspapers—grows in importance. Without micropayment systems in place, it is not economical to sell small chunks of digital content—which is how consumers like to consume digital content, namely, where, when, and how they want to.

Internet micropayment systems have gone through two generations. The first generation began in 1994 and lasted until the end of the 1990s. These systems focused on a buzz word called “digital cash” and included DigiCash, Millicent, CyberCoin, Beenz and Flooz, among others. This first generation, as noted in the section on digital cash, forced users to use cumbersome interfaces and complicated digital wallets with digital certificates. These efforts were unsuccessful. Early firms also struggled because most online digital content was free and consumers were not yet totally comfortable with paying for content. But that’s changed. The word today is that content is valuable, and you pay for it. Today, people are more comfortable buying online, companies are looking to gain revenue from their content, and the content available on the Web is more valuable, due to the increase in broadband connections.

Interest in micropayments has been rekindled by the success of Apple’s iTunes, which has sold over 500 million music tracks at 99 cents a piece since its launch in 2003. "iTunes has become a shining example of how small electronic purchases can actually become a major revenue-driver for an entire company," according to Gartner (although in this instance, iTunes acts primarily as a revenue driver for the sale of iPods, as opposed to the revenue garnered from the sale of music tracks). iTunes has changed perceptions about whether consumers are willing to pay for online content.

The second generation of micropayment vendors have given up on “digital cash” and offer two very different approaches. Leading micropayment companies now in the marketplace include Peppercoin and BitPass.

Peppercoin uses a “single-merchant” aggregation model. It takes all transactions that all customers make with a single merchant and groups them together, then submits them through payment systems (such as credit card payment systems) yielding a lower-per-transaction cost than the same payments taken singly would have. Peppercoin’s software approves and processes card transactions at the merchant’s site, which avoids the need to process each transaction through the credit card network. This model works best for merchants with a large base of customers. Peppercoin originally proposed a “universal aggregation” model, which aggregated transaction streams from multiple merchants, but it has moved away from that model (some say due to pressure from bank card networks).

Peppercoin has strong ties with financial institutions, including First Data and Chase Merchant Services, and views itself as an enabler of traditional payment methods (credit cards and debit cards), but in a way that is more profitable for the seller. It started out in the Internet space, but has extended into mobile phone and physical environments. Peppercoin was founded in late 2001 by MIT professors Silvio Micali and Ronald Rivest.

BitPass is a major competitor of Peppercoin. BitPass offers only a prepaid online stored value method. Customers, especially teenagers, purchase prepaid cards for as little as $3 using either a credit card or a PayPal account. Then they use these cards with participating merchants. In this sense, BitPass is like a prepaid debit card except that the transactions do not have flow through an expensive credit card authorization network for every purchase.

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A BitPass prepaid account allows customers to purchase items from any BitPass-enabled merchant. There are now over 3,000 BitPass-enabled online merchants in 100 countries. Why would customers use a BitPass account rather than using their credit cards? First, a micropayment card may be the only card accepted by merchants selling items for less than $5-$10. Customers save time: rather than entering all their credit card information, they simply enter a single BitPass account number. Customers also safeguard their privacy and identity: no personal identifying information is sent over the Web to merchants. More important, BitPass lowers the cost of transactions for merchants and allows them the change to pass these savings on to consumers.

BitPass was founded by two Stanford University students in December 2002, with backing from Garage Technology Ventures. It launched a public beta in June 2003 and made its official debut in December 2003. In September 2004, BitPass raised $11.75 million in venture capital and former American Express Chairman James Robinson III joined its board of directors. Robinson said, “The era when everything on the Internet must be considered free is gone. That subsequent continental shift has created an opportunity for BitPass.”

In addition to Peppercoin and BitPass, two giants are looking at micropayments: PayPal and Google. In August 2005, PayPal restructured its fee structure to encourage micropayments. Vendors can now process payments for under $2 for just 5% of the purchase price, plus 5 cents (compared to the industry’s current payment processing rates of approximately 2% plus 20 to 30 cents per transaction). For example, on a $2 dollar transaction, the cost to the vendor would be just 15 cents. Analysts believe that PayPal could be poised to take over the market. Why would Peppercoin and BitPass want to compete with the industry giant, PayPal? PayPal, which accounted for 25% of eBay’s total revenues in 2005, has focused on payments for eBay customers and ignored other Web sites. BitPass and Peppercoin have moved into this vacuum offerings prepaid payment services to millions of customers at sites other than eBay. However, PayPal is rumored to be moving out of the confines of eBay and beginning to offer its services to other Web merchants.

Can Google be far behind in the micropayments gold rush? In June 2005, the Wall Street Journal reported that Google was planning to offer a payment service similar to PayPal. Why would Google be interested, given that 99% of its revenues come from advertising? Actually Google is in a good position to insinuate itself into the purchase scenario: the customer searches for a product on Google, finds the product, and uses Google Wallet to pay for it. Google denies that it plans to compete against PayPal.

Not everyone believes the micropayment industry will surge ahead. Clay Shirky, Internet pundit and critic, believes the second generation micropayment vendors will fail just like their precursors. Micropayments, according to Shirky, exact mental transaction costs (is the purchase really worth it?), regardless of the size of the purchase, and with the explosion in P2P music and video sharing, Internet consumers of digital content really have not agreed that pay for content is a good business model. For instance, while a copy of the New York Times sells on the newsstand for $1.00, is a single article worth $2.95 or even 50 cents? Most Web users still want free content and are not likely to be convinced otherwise, Shirky argues.

INSIGHT ON TECHNOLOGY

WIRELESS PAYMENTS FOLLOW WI-FI AND CELLULAR GROWTH

Will your cell phone replace your credit card or change holder? Some analysts are predicting that within the next five years, it may, particularly for small payments of between $3 and $10. Now that developers have had some experience creating “traditional” e-commerce payments systems, they are focusing on the next frontier: m-commerce, and the technological building blocks needed to make wireless payments systems a reality in the United States and elsewhere.

In doing so, developers in the United States can look to Asia, and particularly Japan. For instance, in July 2004, NTT DoCoMo introduced i-mode FeliCa, a service that enables cellphone to operate as electronic wallets utilizing Sony’s Edy contactless smartcard chip e-money system at over 9,000 participating stores in Japan. By March 2005, NTT DoCoMo had sold over 3.7 million e-money compatible phones. In Korea, all three of the country’s biggest mobile operators, SK Telecom, FTK and LG Telecom, offer cell phones that can be used as credit cards and FeliCa-style prepaid smartcards. In the United States, the development of technologies such as Bluetooth and Wi-Fi are also helping to drive the movement. When two Bluetooth-equipped devices come within 30 feet of one another, they can establish a link, allowing you to point your phone at a vending machine or fast-food cash register and pay instantly. With a Wi-Fi connection, you can take advantage of all existing forms of Internet payment; the fact that you are connected wirelessly should have no impact.

As the history of the development of e-commerce payment shows, development of the technology is just the first step. There are many other necessary conditions before a payment system finds widespread acceptance.

First, the technology must become widely available. As one analyst noted, “Bluetooth is like everything else—it needs ubiquity between devices and cash registers and phone. It needs to be almost universal.” But with the rapid growth in Wi-Fi and 3G telephone wireless Internet, the technical foundation for wireless payments is being established.

Second, to become widely adopted, the technology needs the backing of most of the major stakeholders in payment systems: consumers, vendors, phone equipment manufacturers, wireless service providers, and financial industry participants. Another analyst points out: “Unless the banks and credit cards get behind a system like this and make it an adjunct of the services they are already offering, ... it will be very difficult.” At the Gartner Group, Mike McGuire notes that consumers won’t be interested unless they can easily transfer funds from and to their bank and credit card accounts.

Some are looking to the wireless service providers to act as financial intermediaries, pointing out that cell phone users already have a billing relationship with them, and that those companies already have billing software in place to handle transactions. Others say, however, that cell phone carriers may be reluctant to become bankers—essentially what this model assumes—with all the associated administrative and technical overhead. Moreover, there are few national Wi-Fi networks so far, and in this marketplace, third-party providers of wireless payments such as Qpass or Valista (which provide server-side merchant services) are the logical choice.

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Despite the existence of a number of common protocols such as Wireless Application Protocol (WAP), Wireless Transport Security Layer (WTSL, the wireless equivalent to SSL) and others that are supposed to smooth the way for development, getting all the players to agree on a common, secure platform for wireless e-commerce payment systems is likely to be very difficult. For instance, in Europe, Orange, Vodafone, T-Mobile, and Telefonica Moviles of Spain launched Simpay, a joint venture that would allow customers to make payments with their mobile phones, in May 2004. Despite being supported by multiple operators in multiple countries, the joint venture flopped, and was quietly discontinued in June 2005. Analysts at Forrester Research believe that Simpay was "doomed from the start," in part because the costs incurred by merchants to accept Simpay payments was significantly more than that for credit cards, and in part because the demand for mobile content services (on which Simpay was focused) in Europe was not sufficient to support the service. But despite the Simpay experience, new developers of wireless payment systems are likely to continue to emerge, lured by the prospect of becoming the standard in what is likely to eventually become a huge marketplace. PayPal, for example, has recently indicated that it might like to explore this market, and work with mobile carriers to integrate PayPal into payments via mobile devices, hopefully leveraging its very successful brand into this new, but related arena. But it is moving cautiously, well aware of the difficulties that such an effort entails.


remittances. The billing market represents an extraordinary opportunity for using the Internet as an electronic billing and payment system that potentially could greatly reduce both the cost of paying bills and the time consumers spend paying them. Estimates vary, but online payments are believed to cost between only 20 to 30 cents to process. As consumers increasingly go online, it is reasonable to believe they will want to use the Internet as a means of efficiently paying their bills.

Electronic billing presentment and payment (EBPP) systems are systems that enable the online delivery and payment of monthly bills. EBPP services allow consumers to view bills electronically and pay them through electronic funds transfers from bank or credit card accounts. (EBPP for businesses, often referred to as electronic invoice presentment and payment systems (EIPP), is addressed in Section 6.5.) More and more companies are choosing to issue statements and bills electronically, rather than mailing out paper versions. But even those businesses that do mail paper bills are increasingly offering online bill payment as an option to customers, allowing them to immediately transfer funds from a bank or credit card account to pay a bill somewhere else.