

## New Models for Providing Payment Services over the Internet

a report by

**Chuck Wade**

Senior Researcher, CommerceNet



Chuck Wade is a Senior Researcher for CommerceNet, focusing on Internet payments and information security. Prior to joining CommerceNet, he was a Principal Consultant in the Information Security Group of BBN Technologies. As one of the original participants in the Financial Services Technology Consortium (FSTC) eCheck Project, Mr Wade has been involved with over-the-Internet electronic payment systems since the mid-1990s and has also contributed directly to the architecture, design, deployment and testing of various large, mission-critical networks, including the trading floor network for the New York and American Stock Exchanges. In a career spanning a quarter-century, Mr Wade spent the 1990s with BBN (now a part of Verizon) as a Consultant and Systems Architect. During most of the 1980s, he worked at Motorola, directing the Advanced Technology Group for the Codex division. He has also worked in the minicomputer industry and university research. He holds both BSc and MSc degrees in Electrical Engineering from Brown University.

### Introduction

The Internet has presented a variety of challenges to both traditional businesses and traditional ways of conducting business. However, the most direct challenges have been to industries that provide the infrastructure that is increasingly being displaced by the Internet or by applications operating over the Internet. As the Internet is first and foremost a new communications medium, the telecoms industry was the first to see traditional business models crumble and the value of existing infrastructure plummet.

This article looks at some of the ways that Internet payments may emerge by extrapolating some of the lessons learned from the impact of the Internet on traditional telecoms companies. There are striking parallels between the telecoms and financial industries. Both were historically regulated businesses, but have been gradually deregulated in recent years, and both were geographically constrained, but now must compete on a global basis. Industry consolidation has resulted in mergers and acquisitions becoming a way of life for both industries, with no end in sight. Both industries have also become weighed down with massive infrastructure that has evolved over decades from outmoded technical standards. The advent of the Internet and other technology advances has led to the emergence of new competitors in both industries that threaten the established players by operating without traditional encumbrances.

### Peer-to-peer Model

As commerce moves increasingly to the Internet, there is a corresponding demand for payments to be conducted in a compatible manner. On the one hand, this often implies use of XML and related technical standards typically associated with e-commerce transactions. However, an equally important issue is how payment transactions will take place via the Internet. The approach taken may depend in large part on the perspectives of the various players.

Payment users tend to gravitate towards a model where the payment transaction is conducted directly between the payer and the payee. The payment could be an

'instruction', much like a cheque, or it could be an actual transfer of value. To facilitate the upstream and downstream e-commerce processes that occur before and after the payment transaction, additional information needs to be sent with the payment to advise the payee of the payment's context and how the amount payable was determined (e.g., invoice number, shipping references or payment terms). Note that this model works for person-to-person, consumer-to-business and business-to-business (B2B) payments.

### Traditional Payment Model Extended to the Internet

While the user perspective is both obvious and compelling, it is not how financial institutions tend to approach offering Internet payment services (IPs), since the role of existing infrastructure looms large in the minds of bankers. Most financial institutions already offer electronic payment services based on legacy infrastructure (e.g., clearing and settlement systems), using the model that is simplistically illustrated in *Figure 1*. However, within any one country, there are multiple legacy payment systems in use, each with its own unique operational and interface characteristics (e.g., wire-transfer, automated clearing house (ACH), asynchronous transfer mode/electronic funds transfer, credit, cheque). In a global context, the number of distinct payment systems quickly becomes unwieldy. Legacy payment systems also tend to serve different classes of users, such as consumers versus businesses. In addition, market stratification often comes into play, resulting in large enterprises having access to payment services that are unavailable to small and medium-sized enterprises (SMEs).

Typically, financial institutions approach Internet payment service offerings by replacing the proprietary networks used in customer interfaces with Internet communications, as illustrated in *Figure 2*. The problem with this bank-centric model is that it results in the characteristics of the underlying bank payment infrastructure being reflected in the payment interface. Financial institutions have provided a variety of electronic interfaces for their customers to initiate payments or receive payment information, but these interfaces are often proprietary or adhere to an

array of ad hoc standards that vary greatly around the world. This has made it difficult for users of the payment systems to employ common accounting software, or even to use the same procedures if they utilise multiple payment systems or employ services from more than one financial institution. It can even be argued that, as financial institutions have begun to utilise the Internet for customer access to payment services and other related services, that interface diversity has actually increased.

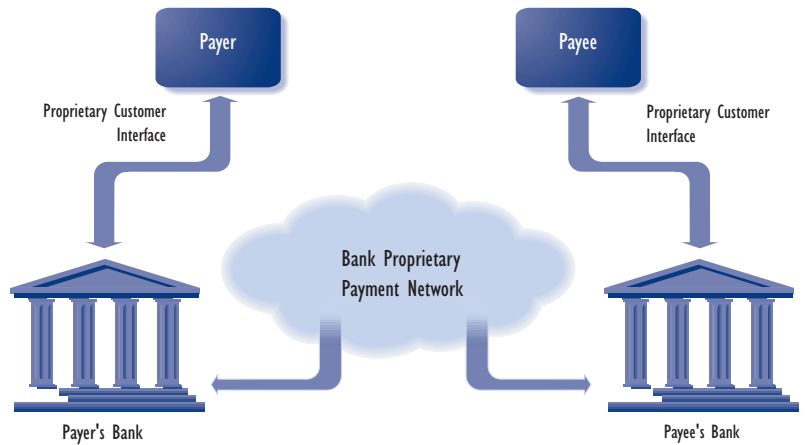
**Experience of the Telecoms Industry in Confronting the Internet**

The financial industry’s approach to Internet payments is reminiscent of conflicting viewpoints that existed in the telecoms industry a decade ago. On one hand, great progress had been made in telephone network technology and standards, such that telephone calls could be placed to nearly any telephone in the world. On the other hand, telephones themselves remained essentially the same technology as in decades past. This dichotomy resulted from the widely held telecoms perspective that telephones interfaced into telephone networks. However, a telephone user considered their telephone to be a device for communicating with other telephones, i.e. an end-to-end communications model. The telecoms industry was driven to move all intelligence into their networks, and consequently the end-user devices were kept as simple as possible, a situation that persists today.

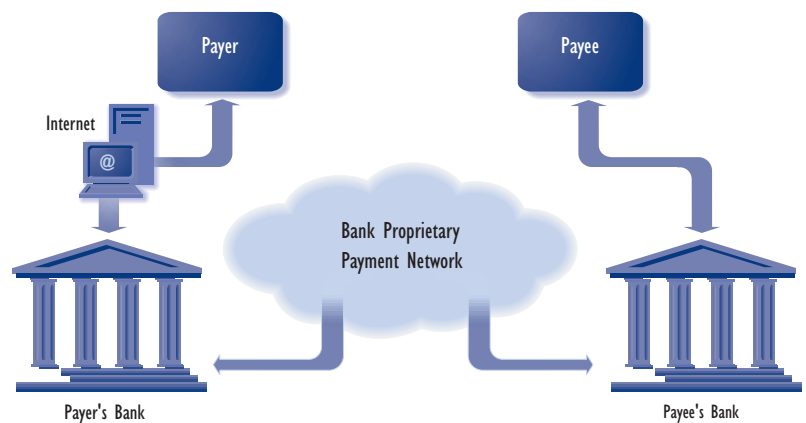
The Internet was anathema to the telecoms industry, in part because it positioned intelligence in the end-user nodes and not the network. Indeed, by the early 1990s, there had already been nearly two decades of conflict between the technology advocates for these diametrically opposed networking models. However, the Internet model empowered users by moving intelligence into the users’ devices, thus gaining increasing popularity as the cost of intelligence declined according to Moore’s Law.<sup>1</sup> At the same time, Internet working protocols decoupled user devices from the underlying network technologies, allowing devices to interface into just about any communications medium capable of carrying a stream of bits.

As the Internet grew rapidly in popularity during the first half of the 1990s, the telecoms industry responded with a series of initiatives aimed at thwarting Internet growth, including pleas to regulators to impose regulatory restraint on the Internet. These efforts proved ineffective and only served to keep the traditional telecoms companies from reaping any of the benefits of the new Internet opportunities. Instead of telecoms providing Internet

**Figure 1: Traditional Electronic Payment Services Based on Current Financial Industry Infrastructure**



**Figure 2: Adding an Internet Interface to Traditional Electronic Payment Services.**



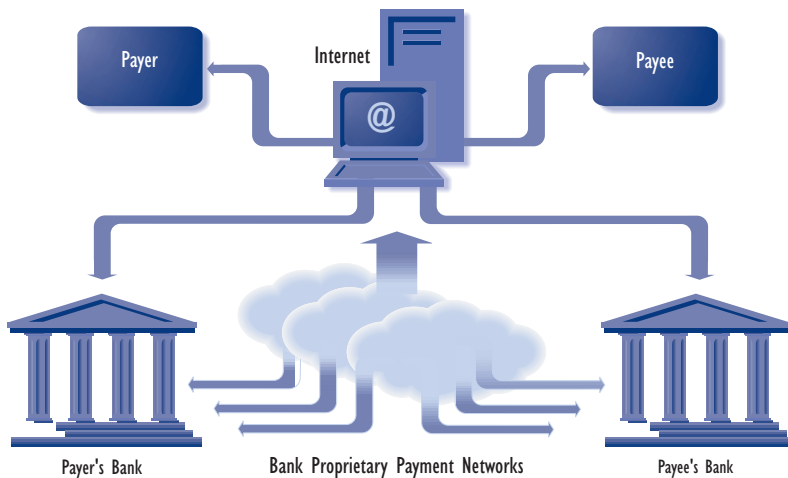
*Using this model, either the payer (as shown) or the payee, or both, may access bank-provided electronic payment services via the Internet.*

services, independent Internet service providers (ISPs) stepped in to fill the demand. By the mid-1990s, the ISPs had deployed as much bandwidth in their networks as the existing voice networks. Only then did the traditional telecoms companies begin to consider how to join the Internet revolution.

**Opportunities Associated with Peer-to-peer Internet Payments**

The point of this analogy is that there is merit in pursuing this payments model. Not only does this model better suit the users, but it is more compatible with the trend towards peer-to-peer e-commerce practices, where information – and the intelligence to process it – moves out to the users’ transactional nodes. However, this model is simplistic in that it does not specify how peer-to-peer payment transactions can be cleared and settled. It is also naïve in that it overlooks questions of trust between the parties and control of risk. Therefore, even with this model, the financial industry’s role remains vital – especially with regard to establishing trust, controlling risk and providing clearing and settlement services.

1. Information handling capacity in computers doubled every two years in the 1950s, 1960s and 1970s. It doubled every 18 months in the 1980s, and is now doubling each year.

**Figure 3: A Peer-to-peer Payment Model**

*This model involves the financial industry in trust establishment, risk management and clearing and settlement. Over time, services associated with legacy payment networks can migrate to the Internet as new financial e-commerce services.*

The advantage to the financial industry in pursuing the peer-to-peer payment model is that new payment transaction protocols can be established that are independent of traditional payments infrastructure. While this can be threatening to the 'fiefdoms' that have grown up around the various stovepipes associated with legacy systems, it is ultimately empowering to the financial industry in that new services can be offered, and new infrastructure built at much lower costs than for legacy systems. Many telecoms now perceive their legacy infrastructure to be more of a liability than an asset, as the cost to maintain traditional telecoms plants begins to exceed the cost of deploying new plants, based on the Internet model.

A more realistic view of peer-to-peer payment services is shown in *Figure 3*, where financial institutions play multiple support roles in facilitating payment transactions between their customers. At the outset, financial institutions can help to establish trust between the parties and, at the completion of the peer-to-peer payment transaction, clearing and settlement services can be used to debit the payer's account and credit the payee's account. In this model, financial institutions become partners in the e-commerce transactions conducted by their customers over the Internet, and can provide a variety of ancillary support services, such as cash management, extension of credit, risk management and financial accounting. Legacy payment systems can initially be used to move funds between accounts, but, over time, some or all of these services may move to secure networks operating over an Internet platform resulting in realtime, global clearing and settlement services.

#### **Emergence of Third-party IPS Providers**

The model shown in *Figure 3* will take time to evolve, yet demand for better Internet payment

services is growing, especially in global B2B e-commerce. One approach already being pursued in the US is where IPS providers are emerging to facilitate over-the-Internet payments. In this model, the IPS takes standard (XML-formatted) payment instructions from either the payer or the payee, and converts these instructions into transactions feeding the legacy bank payment systems through gateway services. The IPS providers can add value by offering optional services to convert advice-of-payment (remittance) information from the payer's preferred format into the payee's preferred format. At the same time, the payers and payees are insulated from the problems of managing interfaces into one or more bank payment systems.

Since the IPS providers can deploy gateways into multiple legacy payment systems, they can trade off risk and cost to optimise payment execution. They can even consolidate payment transactions and use different payment systems on each end of the payment transaction. For example, a payee receiving many payments could have these consolidated into a single wire transfer, while the payers might have their accounts debited through an ACH service. This flexibility to support multiple legacy payment systems positions the IPS providers to extend their services to cross-border payment transactions conducted over the global Internet.

Initially, the IPS providers will likely emerge as third parties operating outside of the traditional financial industry, and will look more like e-commerce venture start-ups. This will allow them to develop new services quickly – unencumbered by the burden of legacy infrastructure. However, some will also be partnered with traditional financial institutions, and IPS products may be sold under the brands of established financial firms. Over time, IPS providers may emerge as new utilities serving the financial industry, or be absorbed into large financial institutions.

At the same time, some financial institutions will continue to develop new payment services along the lines of those illustrated in *Figure 2*. There will certainly be market competition between these approaches. Market segmentation is also likely to continue, as some new IPS providers target consumer retail and person-to-person payments, while other services address the needs of businesses. SMEs will represent an important target market segment, since they are not well served by traditional electronic payment services, despite the fact that this segment generates the largest volume of transactions in the B2B marketplace. ■

*A longer version of this article can be found in the Reference Library of the CD-ROM accompanying this business briefing.*