

Creating an End-To-End Digital Payment System

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OVERVIEW

For several years, the financial services industry has envisioned the creation of a digital payment system in which the costs and the risk of financial transactions could be dramatically reduced. The vision has been that of a system in which the processing speeds for all involved would be determined by the needs of major financial stakeholders. Smart card technology was widely touted as the means to fulfill the vision.

However, with the exception of western Europe, smart card technology has failed to come close to meeting these expectations. Paper check usage continues to grow and while debit card usage is growing, many users continue to carry their check register in order to maintain a level of comfort in the control of their personal finances.

We believe that to affect the way payment transactions are implemented a new business model must be developed. This model must focus not only on the merchant and the financial institutions but also on the needs of the consumer in order to create real value for everyone. Without consumer buy-in, any new effort will likely suffer the same fate as the smart card.

CONSUMER PROBLEM

As the pace of everyday living continues to accelerate, consumers are finding themselves with less time to focus on the mundane activities in their lives. For many, this means money management practices have literally gone by the boards. Consumers find themselves trying to manage several, often incompatible, payment systems. In this environment, payment details (receipts) are thrown away more often than not. At the same time, merchants require payment receipts to accept a return. Consumers are not the only losers in this scenario; merchants also have a problem. As a group, merchants are experiencing \$500 million in annual chargebacks because they are unable to locate the paper record receipt which, in a dispute, must be produced as proof of purchase.

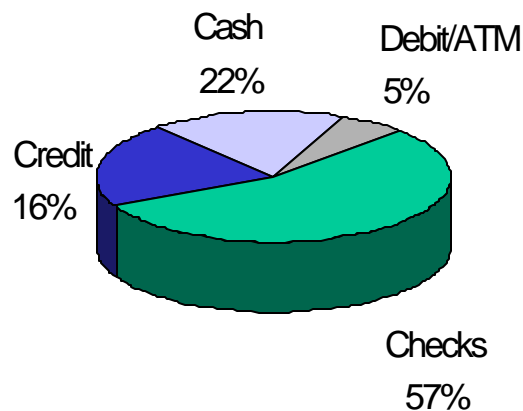
Everyone in the financial services industry has managed to overlook the needs of the consumer. At the same time, the penalties continue to rise for poor budgeting and control. It is not a surprise that smart cards are failing in the U.S. Consumers simply do not perceive any added value in the financial management process. Specifically consumers were, and are, concerned about:

- ◆ the aggravation of learning a new payment system,
- ◆ the perceived additional risk of tampering with their financial data,
- ◆ the risk of exposure of their private information and,
- ◆ the absence of new benefits that might otherwise improve knowledge or control of their financial situation.

CREATING A DIGITAL PAYMENT SYSTEM

Creating a digital payment system will only be successful if it addresses the consumer's needs and provides clear benefits. As history constantly demonstrates, consumers will continue to use tried and proven methods until an easier solution to their financial management requirements presents itself. In addition to meeting the consumer's needs, the new system must also take care not to add additional burden to the financial infrastructure. That is, it must work within the existing structure of transaction capture, clearance, and settlement causing few, if any changes.

The tried and proven method of financial transactions is still the paper check.



Source: Maness, Terry S. & Zietlow, John T., *Short Term Financial Management*, Dryden Press, 1997, p. 227

Seventy-three percent of the transactions are processed via paper. The bankable household writes an average of 415 checks per year. According to First Data, 50% of these checks are tendered at the point of purchase. This means that approximately 70% of transactions taking place at the point of purchase are paper check transactions. Therefore, point of sale purchasing is the place to create end-to-end digitization of transactions.

Because consumers persist in using checks as their best mechanism for financial control and budgeting, a significant consumer advantage must be included in a new check processing system or a new payment system. This is a key requirement.

Various studies have indicated that paper check handling costs run between \$2.00 and \$3.00 per check. Approximately 50% is merchant check cost and another 15% is verification, authorization, fraud, and bank statements. Substantial reductions in these various processing costs for both merchants and financial institutions are also key requirements of a new payment system.

END-TO-END DIGITAL PAYMENT ARCHITECTURE

Creating a digital system requires that the interface between the consumer and payment system be made digital. Interactive payment system terminals provide only limited consumer value. A much broader approach will be to move more of the payment terminal functionality into the consumer's hands.

The proliferation of information appliances with Infrared communications capability already installed represents a unique opportunity for clever payment applications. It is possible to truly begin the elimination of paper at the appliance, provided the consumer enjoys added value.

There are more than 100 million infrared-enabled appliances in the marketplace today. This includes virtually all of the approximately 10 million handheld information appliances which are IrDA enabled (i.e.; palm pilot and other appliances with Microsoft CE O/S). Further, industry forecasters project the continued migration of consumers from PCs to mobile devices. This means that:

- 1) a substantial installed base of consumers already own, use, value and understand these IrDA enabled tools and,
- 2) this stock of early adopters is growing as each day passes.

More importantly, these devices can actually make the consumer's life better. The benefit is derived from digitizing the transaction end-to-end and including all elements of the payment. To do this, one must consider what happens when a consumer implements a transaction. The consumer provides the merchant with a check, a credit/debit card, or cash. When the transaction is completed, the consumer is usually handed a register receipt and a carbon of the transaction. In the case of paper checks, the consumer sometimes records the transaction in a register or uses carbon checks. Digitizing all elements of this process while the transaction is taking place and effortlessly incorporating the information in a money management system creates important value for the consumer.

Today, there are check readers that can accomplish the check digitization process at the point of sale. However, they are in very limited usage due to the

high cost of infrastructure support required of the merchant. Less than 10% of all merchants can afford to have these devices in their operations. Lower cost systems are expected to be introduced to the market in the near future. These systems will be affordable to the remaining five million retailers and will allow for much greater access by the consumer. These new devices must be infrared enabled in order to accommodate the handheld information appliances using new financial transaction software which currently only accommodates person-to-person payments.

The majority of credit card readers, which are installed almost universally, can very likely be retrofitted with a low-cost Infrared interface device (dongle) that can quickly enable electronic device transactions at the point of sale.

Looking to the near future, Motorola, Nokia and Ericsson are including IrDA ports in new cellular phone models. The ability to conduct secure financial transactions from a cellular phone at the point of sale is just around the corner.

WHY IrDA?

Infrared is the interface of choice when creating communications with the consumer's electronic appliance due to its low cost, security, and short-range directional connection. By using IrDA, a proven standard can be brought to bear that considers all issues and is already universally installed in information appliances. Payment terminals must include IrDA, and the IrDA protocols must be extended to cover the financial world's interfaces and security needs.

IrDA was formed in 1993 to define a replacement for the serial cable using infrared transceivers. Since that time, the group has been joined by virtually all major computer and computer peripheral manufacturers resulting in the

deployment of 100 million IrDA-enabled devices. IrDA has been incorporated in the operating systems of Windows 2000, 98 & 95, Linux, WinCE, and the Palm O/S. All the WinCE and Palm-based handheld devices have IrDA ports. IrDA will persist in being the primary connectivity model in these devices because it is the smallest, fastest, lowest cost method of connecting two handheld devices. The IrDA port is the ideal choice for data ports in public areas since there are no exposed slots or wires to wear out or vandalize. NTT has already deployed 5,000 IrDA ports in the public phones in Japan and plans to deploy 400,000 new ports over the next five years.

IrDA standards have been adopted by many international bodies. ISO, JTC1, TCC, IEEE, and IEC have all referenced the IrDA protocols in their publications. Rapid development, high visibility, wide participation within the industry, and strong cooperation with international standards bodies make IrDA a good choice for developing a standard.

FIRST STEP

Major cooperative effort is required to achieve an end-to-end digital transaction system at the point of sale and elsewhere. Many different entities need to become involved before, in Dee Hock's (former CEO of VISA) words, "Money becomes guaranteed data in the form of arranged electrons and photons which move around the world at the speed of light."

However, the emergence of consumer information appliances with incredible power makes it possible to envision taking the first step in this process. By creating a connection between the point of sale and the consumer with one of these devices, it will be possible to start the process with the consumer—an

element that creates tremendous value for the consumer. Obtaining detailed electronic receipts™ at the point of sale clearly creates consumer value. Applications running on information appliances can capture electronic records, instantly update active balances for the consumers' accounts, and capture the data for financial management software. The net result is significant added value for the consumer.

VIRTUAL TRANSACTION

Virtual transaction implies the ability to digitize any type of payment transaction at the point of sale. This step requires secure communications between the information appliance, cellular phone, etc., and the point of sale terminal. The consumer initiates the process. The payment terminal is provided with essentially the same information it can receive from a paper check's MICR encoding, a credit card's magnetic strip, or a stored value card's chip and more. Various security measures may be employed: PROM processor number, lock-step codes, signatures, etc. Of these, the PROM processor number appears to be essential since it addresses card present issues (It proves that this is your payment-making instrument).

Upon transmittal of the payment information, the information flows through the same automated transaction processing systems that financial institutions and transaction processors have developed over the last several years. Upon receiving approval, the full content of the receipt is uploaded into the consumer's electronic appliance. The merchant also saves the receipt electronically.

The net result is dramatic improvement in all stakeholders' positions. The following shows the benefits for consumers, merchants, and financial institutions.

Consumer

- ◆ Instant, digital record collection
- ◆ Effortless integration with money management software or Internet aggregation
- ◆ Faster checkout lines
- ◆ Better service

Merchant

- ◆ Lower transaction costs (card present issues solved with microprocessor burned ID)
- ◆ Reduced fraud costs
- ◆ Digital records reduce charge backs

Financial Institution

- ◆ Lowered transaction processing infrastructure costs

INFRARED FINANCIAL MESSAGING (IrFM) DEVELOPMENT ROADMAP

A successful and enduring implementation of Infrared Financial Messaging (IrFM) protocols and technologies will rely heavily on both the depth and the breadth of stakeholder support.

The stakeholders in this context are consumers (individuals and possibly businesses), financial institutions of all kinds, hardware (appliance) manufacturers, software manufacturers, legislative and regulatory entities at local, national and global levels, and financial clearing and settlement infrastructures.

One cannot expect instant and universal adoption. The introduction of IrFM will follow an evolutionary cycle beginning with introduction of the concept in stages designed to educate and engage the various constituencies. Increasingly sophisticated business system requirements definitions, as well as progressively more robust proof-of-concept demonstration systems, will characterize these stages. As a first step along the developmental path, a core group of “promoters” have convened to establish a program White Paper (this document), a preliminary proof-of-concept prototype, and a charter membership plan involving a number of key alliances.

ALLIANCES

A fundamental precept of the development plan is the inclusion of as wide a range of stakeholder representatives as is possible. In the early stages, the list of participants should include:

- ◆ speakers for the consumer community,
- ◆ representatives of the financial services community,
- ◆ hardware (appliance and POS terminal) manufacturers,
- ◆ software developers and,
- ◆ the communications industry.

As of this writing, the various interests are represented by a to-be-assembled focus group for consumers, representatives from CrossCheck, Inc., Personal Solutions Corporation, and a bank for the financial services segment, companies like 3com, HP and Sharp for the appliance segment, Verifone, Hypercom, Micros, and NCR for the POS segment, and Motorola, Nokia, Ericsson and the Infrared Data Association (IrDA) for the communication segment. We expect this early group to lay the initial groundwork for establishing market needs, technical designs, business functions, and a prototype.

IMPRIMATURS

At least three criteria will have to be met before our objectives can be achieved. The first of these is that the consumer community finds these methodologies and technologies at least as straightforward and simple to use as existing peer-to-peer and network-based payment options. That is, as simple as cash, checks, and credit cards, but with no extraordinary acquisition and maintenance costs. In the ideal solution, a new form of payment mechanism will be more attractive than any of its predecessors. Our proposal, in fact, adds a distinctive feature which is not commonly available in bearer-like transactions: a digital receipt created instantaneously with the transaction event. This benefit is available in any transaction whether it is consumer-to-business or business-to-business. As a first step in illustrating these capabilities, the project proposes to establish a demonstration prototype that is simple, based on existing technologies, and easy to use.

Secondly, the financial services community will need to see the value of this solution in terms of contribution to the bottom line or, in providing greater production efficiency. Contribution to profitability will be the most powerful

inducement for application of IrFM technologies among banks and payment processors. Reductions in the cost of processing check-like payments will run a close second in the race to improve customer servicing. Whatever the incentive, a project objective will be to secure the industry's backing and commitment using the prototype to underscore the benefits and feasibility

Thirdly, all concerned will need to be assured of, and have abiding faith in, the security and stability of the proposed mechanisms. This will be accomplished by the application of proven security policies and procedures including, but not limited to:

- ◆ established cryptographic techniques,
- ◆ mutually assured identification of transaction parties,
- ◆ assured integrity of transaction data and,
- ◆ guaranteed privacy.

To achieve these objectives, it is vital to form alliances among industry trade and oversight organizations to work in a project environment with the aim of producing standardized and open protocols to support the Digital Payments System. The recommended associations follow.

TRADE AND OVERSIGHT ORGANIZATIONS

Infrared Data Association (IrDA) and Financial Services Technology Consortium (FSTC) are two significant and well-established trade organizations with a tradition of successful research and development efforts in their respective industries. A partnership by these two groups will provide technical excellence,

project management, and financial services industry business expertise so crucial to successful development.

Infrared Data Association (IrDA)

IrDA was established to set and support hardware and software standards which create infrared communications links. The Association's charter is to create an interoperable, low-cost, low-power, half-duplex, serial data interconnection standard that supports a walk-up, point-to-point user model that is adaptable to a wide range of applications and devices. IrDA standards support a broad range of computing, communications, and consumer devices.

International in scope, IrDA is a non-profit corporation headquartered in Walnut Creek, California, and led by a board of directors which represents a voting membership of more than 160 corporate members worldwide. As a leading high technology standards association, IrDA is committed to developing and promoting infrared standards for the hardware, software, systems, components, peripherals, communications, and consumer markets.

Financial Services Technology Consortium (FSTC)

The Financial Services Technology Consortium is a not-for-profit organization engaging in collaborative, non-competitive, research and development with the specific purpose of optimizing the global financial transactions infrastructure. The consortium solicits the participation of all parties to the provision of financial services with the aim of creating standardized, open and interoperable technology platforms to further customer service objectives of financial institutions.

Members of the consortium include banks, financial services providers, research laboratories, universities, technology companies, and government agencies.

FSTC sponsors project-oriented collaborative research and development on interbank technical projects affecting the entire financial services industry. Particular emphasis is placed on payment systems and services, and leveraging new technologies that help banks cement customer relationships, boost operational efficiency, and expand their market reach.

The consortium offers a number of important benefits to its membership and the financial services industry.

Member Benefits

- ◆ Offers early information about emerging technology
- ◆ Creates an effective voice in shaping and directing government initiatives
- ◆ Prorates of the costs of common solution development
- ◆ Speeds up the development and introduction of standards
- ◆ Exposes participants to multiple viewpoints, external ideas
- ◆ Fosters a climate of long-term focus

Industry Benefits

- ◆ Enables leverage of technical expertise of national labs and universities
- ◆ Fosters cooperation in research and development of common solutions
- ◆ Encourages interoperability/standards
- ◆ Enables more effective competition for government funds and resources

IrDA and FSTC will jointly approach BITS (see below) with a proposal to create a digital payment system based on infrared communications technology, standardized messaging within the IR medium, and palmtop grade appliances.

Banking Industry Technology Secretariat (BITS)

As an arm of the Financial Services Roundtable (formerly the Banker's Roundtable), BITS fosters the growth and development of electronic banking and commerce in an open environment. The organization intends to encourage greater choices in financial services software, access devices, networks, and processing capabilities for the benefit of financial institutions and their customers. BITS promotes safety and soundness in payments systems and in electronic banking products to provide safe, efficient, and low-cost services. BITS views itself as the guiding hand and a clearinghouse for emerging banking technologies.

With the blessing of BITS and the joint work of IrDA and FSTC most, if not all, of the major obstacles to widespread deployment can be overcome.

OPERATIONS & PROGRAM OBJECTIVES

Project Organization

Following a format suggested by FSTC operations, the project will be directly managed by a Project Manager whose activities will be supervised by a steering committee composed of members from both IrDA and the FSTC. Membership in the project will be by open invitation to association members and others subject to the approval of both associations.

Founding Document

This paper, expanded into a proposal format, will become the founding document and will contain executive summaries of the project objectives, agreements concerning the participation of each project member, language governing the creation and management of intellectual property, and discussion on other matters relating to orderly execution of development work.

Project Funding

While treated in the Founding Document in greater detail, funding for the joint project is expected to be in the form of prorated contributions to the total cost of the project. Total cost means the valuation of monies, contribution of labor and materials, and components of intellectual effort.

Project Deliverables

Project deliverables will be outlined in greater detail in the Founding Document. At a minimum, the development work will produce a financial messaging specification document specific to infrared communications media and a working prototype Digital Payment System with features sufficient to demonstrate viability and broad usability.

MARKETING

Both in the early stages of establishing the membership list, and later during the progress of the project, significant effort will be devoted to evangelizing the Digital Payment System project. The team will prepare press

releases, distribute articles and essays to trade publications, and seek to create or participate in educational forums to further broaden understanding of the system and its benefits to each of the stakeholders. Lastly, the team will encourage pilot tests and prototype installations that demonstrate increased functionality and wider applicability.

CONCLUSION

It is possible to create benefit for consumers, merchants and financial institutions alike by developing a new payment system. It is possible to create one payment platform with multiple options. It is possible to provide real value to the consumer without requiring major behavior modification. All of these concepts have worldwide implications. Our objective is to identify and assure the benefits for all parties involved in the financial transaction. Principal among these are the consumer, the merchant, and the financial services community.