EMC White Paper

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Payment System Electronification

The Role of Automated Networked Storage

Abstract:

This white paper outlines the role new storage technologies are playing in the efforts to fully electronify the global payments system. Specifically, this paper discusses the remaining barriers to payments electronification and how automated networked storage is helping create the necessary technological foundation to overcome these barriers.

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Payments Electronification: An 80-year work in progress

In 1918 the Federal Reserve conducted the first electronic payment when it created the Fedwire payment system. This facility linked the twelve Federal Reserve banks across the U.S. over leased telegraph lines to electronically settle central bank balances. Surprisingly, more than 80 years later, full electronification of the payments system has not yet been achieved. Fortunately, recent developments in storage technology are contributing to a renewed push to achieve the long-predicted elimination of paper from the payments system.

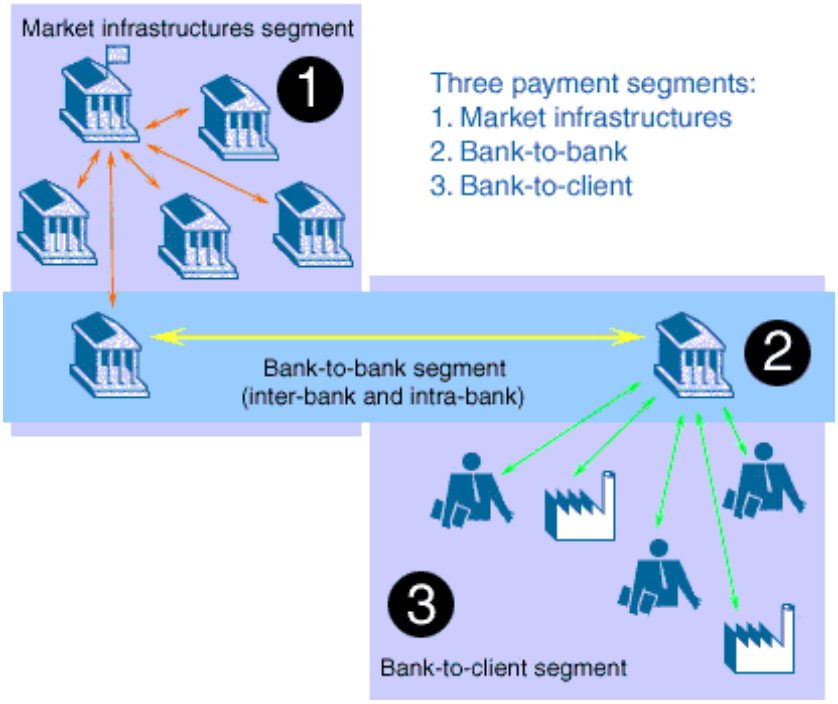

Figure 1: Primary segments of the payments market

To understand the obstacles to full electronification it is important to understand the structure of the payments market. Figure 1 illustrates the three primary segments of the payments market. The market infrastructure segment consists of payment transactions between the clearing systems of central banks and their members as well as other central clearing infrastructures. The bank-to-bank segment consists of payment transactions between financial institutions and their correspondents, counter parties, and branches. In these two segments, electronic payment systems have long played the dominant role in the United States and abroad for payment transactions.

The same cannot be said for the remaining segment. Payments between financial institutions and their clients today are mostly paper-based transactions – especially so in the U.S. Although the share of paper checks in this segment has fallen eight percentage points since 1984[1], according to a recent working paper from The Wharton School, it is still a disproportionate 70 percent of all non-cash payment transactions in the U.S.

New emphasis after September 2001

Businesses' and consumers' refusal to give up checks has clearly hindered previous efforts to electronify the payments market. However, over the past year new electronification initiatives have been gaining momentum. Following the severe liquidity and payment flow challenges precipitated by the terrorist attacks in New York in September 2001, emphasis has been placed on making the payments processes more resilient which is, in turn, requiring full electronification.

[1] Allen, Franklin, James McAndrews, and Philip Strahan, 2001. "E-Finance: An Introduction," *Working Series Paper 01-36,* The Wharton School, University of Pennsylvania, Financial Institutions Center

It is important to remember that payments systems are not only a transaction-processing network, but a complex liquidity system as well. Incoming payments provide the liquidity necessary to execute outgoing payments. So the focus of the latest initiatives is to create payments systems that, at their weakest links, are able to withstand disruptions of any kind, including those resulting from terrorist acts. Paper-based payment processes are unacceptable because they depend on physical transport and/or storage of the paper documents and are virtually impossible to adequately protect from disruption.

Regulations forcing the move to electronification

While the market forces driving electronification (such as client demand for integrated realtime payment information) have steadily increased since the emergence of online banking services, regulatory agencies are not relying on market forces alone to effect full electronification. Governing bodies, such as the Bank for International Settlements (BIS) and the European Central Bank (ECB), have stepped up mandates for secure realtime settlement systems. In the United States, new regulations, such as the Patriot Act, the Uniform Electronic Transaction Act, and the pending Check 21 Act are forcing the move to electronification.

Some of these new regulations, while not directly legislating electronification, require the underlying transaction systems to be electronified in order to fulfill the requirements. The Patriot Act, for example, extends the requirements for enterprise-wide anti-money laundering (AML) systems to include anti-terrorism financing activities. These capabilities require access to realtime payments information that depends on electronified systems.

Key Electronification Barriers:

- Lack of integration between invoice presentment and payment processes
- Perceived loss of float – inability to justify required investments
- Security and fraud concerns

Clearing house study identifies barriers

After years of huge technology-driven advances in so many areas of the financial services industry it seems puzzling that electronification has been slow to catch on in the bank-to-client payment segment, especially in light of the promise of significant operational cost advantages.

A recent study[2] conducted by the New York Clearing House underscored the reasons it hasn't caught on yet. Many organizations, despite acknowledging the advantages of electronification and fully accepting its inevitability, are still reluctant to embrace it.

While the U.S. is unique in its dependence on paper checks, the study identified key barriers to electronification that are likely common across geographies. The study showed that a primary operational barrier to realtime settlement is the absence of corresponding remittance information within most payment transactions. This was identified by 78 percent of the study participants as a significant impediment to efficient electronic payments.

The previously mentioned working series paper[1] from The Wharton School, which explored the effects of e-finance on the payments system, offered a simple explanation. Since most invoices are sent out from companies to their customers in paper form, it is natural that payments in response to these bills are most often checks – a complementary form to the paper invoice. Once companies send more electronic invoices with the appropriate electronic remittance information included, the consensus is that electronic payments will increase.

But despite the availability of numerous secure, Internet-based services that facilitate e-payments, the lack of integration between the invoice presentment and payment processes makes the reconciliation of e-payments just as time-consuming as paper payments. As a result, the velocity of e-payments appears no faster than checks for many organizations. So it is no surprise that fewer organizations than expected are finding a compelling business case for e-payments.

As new regulations begin to take effect these organizations must find ways to overcome the incompatibilities.

[2] New York Clearing House "The Remaining Barriers to E-Payments", May 2002, *White Paper.*

Lack of centralized information an issue

The payments processes of a financial institution's clients are typically driven by the enterprise applications that control accounts receivables, accounts payables, and cash management. The disconnect between the invoice presentment and payment process is in large part a result of the limited integration between these applications.

One of the primary factors limiting their integration has been the way storage resources are utilized. Storage has traditionally been connected directly to the processor on which an application is running. Sharing data between multiple applications – each with their own direct-attached storage – is problematic because the data formats used in one application are often different from another. The result is numerous islands of isolated, inconsistent, and sometimes conflicting data spread across an organization.

A leading provider of technology solutions to the payments industry points out in a recent white paper[3] on check truncation and payment transaction initiatives that a fundamental shift in the structure of application systems is required to enable enterprise-wide payment information aggregation. As image-based and other types of electronic payment transactions proliferate, current [network and storage] architectures create significant risks and incremental operational costs. The development of a "payment hub" as a single source and destination of payment information enables an institution to implement [electronification] initiatives as financial benefits allow.

The idea of a payment hub – a centralized repository of payment information that is available to all payments-related applications across an enterprise – is essential to future electronified payment systems.

New storage technologies facilitating centralized information

The fundamental shift in the structure of application systems mentioned in the referenced white paper has been enabled by recent storage technology developments. Storage vendors such as EMC have been moving to address the challenges of numerous isolated pools of storage within an enterprise. The objectives of this new storage technology have been primarily three-fold:

- To reduce the operational costs associated with installing and maintaining the heterogeneous and geographically dispersed storage resources of the typical organization;
- To ensure the continuous availability of the vital information assets stored in these resources in the face of a disruption of any kind, and;
- To facilitate new strategic uses of an organization's information assets.

Figure 2 illustrates storage deployment before and after new automated networked storage technologies.

Now, sophisticated storage automation software controls the efficient utilization of the storage resources while ensuring the continuous availability of the stored information. By using automated networked storage, organizations are able to consolidate their disparate storage resources into a logically centralized data repository. The result is an enterprise-wide information infrastructure that all applications can share. Through automation, the efficiency, flexibility, and resiliency of the information are maximized.

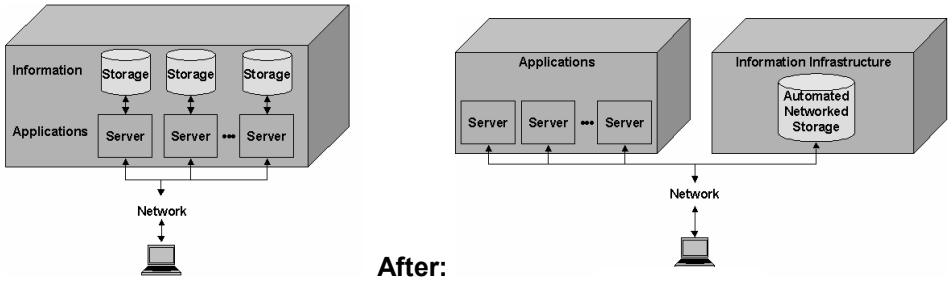

Figure 2: Storage Deployment: Before and After Automated Networked Storage

[3] Unysis "Check Processing: The Challenges Ahead", May 2002, *White Paper*.

Implications for payments electronification

With a foundation of automated networked storage and the resulting enterprise-wide information repository in place, the implications for electronification efforts at both financial institutions and their clients are substantial.

For the clients of financial institutions, payments-related applications such as accounts receivables, accounts payables, and cash management can more easily share information. This facilitates the integration of remittance information within the full payment transaction from invoice presentment to payment and reconciliation. Consequently, these organizations have far more incentive to participate in the e-payment process than ever before.

For financial institutions, the creation of a centralized payment archive opens new information-based revenue opportunities. By aggregating payment information, these institutions can more easily deliver the information services that their clients will increasingly demand regarding payment transactions.

In addition, regulatory compliance regarding the resiliency of their critical payment systems is more easily fulfilled. With a payment system built on automated networked storage, multiple backup copies of payment transaction data are automatically maintained in real time. This redundant payment information ensures the continuous availability of both the payment system and the payment information itself.

This mirrored payment information is also available for uses that deliver significant additional benefits relevant to electronification. One example of these uses is realtime fraud detection. Sophisticated statistical software analyzes the mirrored payment data to automatically detect unauthorized transactions and block them before a payment is committed without negatively impacting the payment systems themselves.

After being the catalyst for much of the growth in electronic payments, the Internet has increased concerns for fraud as more payment information is exposed to public networks. Sixty-seven percent of respondents participating in a recent Association for Finance Professionals survey regarding electronic payment initiatives cited security and fraud detection as their top concern. The realtime fraud detection capabilities enabled by automated networked storage will not only help organizations overcome these security concerns, but also more easily comply with new fraud-detection-related regulations such as The Patriot Act.

New payments systems based on automated networked storage emerging

Leading organizations in the financial services industry are already implementing electronified payments solutions based on these storage technologies:

- Unisys' Payment Information Archive relies on storage technologies from EMC to help financial institutions implement a single repository of payment information. Using EMC's Centera™ fixed content storage system, check image and associated payment data is easily and quickly accessible enabling the execution of new check truncation initiatives. This solution will facilitate the migration to electronic clearing processes by bridging the electronic and paper-based payment transaction systems and information archive.
- Depository Trust & Clearing Corporation (DTCC), the world's largest clearinghouse and depository, has "electronified" the settlement of billions of stock contracts. Utilizing automated networked storage solutions from EMC, DTCC was able to consolidate over 400 distributed servers and direct-attached storage devices. The resulting networked storage infrastructure allows DTCC to reliably execute over $100 trillion in trades annually.
- Both Visa and MasterCard have implemented high-performance credit card payments systems based on automated networked storage from EMC. These systems ensure the rapid execution of authorized card transactions for their cardholders and the continuous availability of payment information to member banks. As electronic credit and debit card transactions continue to replace a growing number of check payments, card payment systems play an increasingly vital role in the move to full electronification.

Automated networked storage is the foundation of electronified payment systems

As realtime electronic payments and associated information flows begin to predominate in payment transactions, significant information infrastructure changes must take place at organizations around the world. Central banks, financial institutions, and their clients must make technology infrastructure changes based on automated networked storage solutions in order to enable the availability of the systems and information required for realtime payment processing and settlement.

These infrastructure changes will also facilitate compliance with demanding new regulations regarding the resiliency of critical payments systems and realtime fraud detection capabilities. Ultimately, payments systems based on automated networked storage will help deliver the long-promised benefits of electronification to all participants of the payments market and speed the acceptance of e-payments throughout the world.