Open standards drive change in ATM technology

New developments in standards and architecture encourage innovation and increased competitiveness in the ATM marketplace

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ATM networks have changed very little since the ATM technology was first introduced. Similarly, the business models of vendors in the ATM market, and the relationships between hardware and software, vendors and banks, have remained fairly static.

But recent changes in technology, and the introduction of open standards into the ATM device and network architecture, have the potential to realise a new dawn in ATM channel functionality and efficiency.

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The evolution of enabling standards and technology

Open architecture ATMs have created a fundamental shift in the market for ATM software, with customers no longer tied to ATM hardware vendors for the software that drives their cash machines.

Traditionally, banks have been extremely dependent on their ATM hardware vendors for the software that runs their machines. Although until recently the majority of ATMs have made use of IBM's OS/2 operating system, each hardware manufacturer had its own proprietary software environment and proprietary message protocols for communicating with the host or terminal driving system. Examples of these proprietary software environments include NCR's NDC+ and Diebold's 912.

The ATM manufacturers had previously enjoyed a dominant position with banks locked into purchasing costly upgrades as new functionality has been required, especially with new industry mandates such as Europay, MasterCard and Visa (EMV) and Triple-DES. This has led to a certain amount of frustration by the banks and a desire to see more competition in the marketplace.

The move to open architecture ATMs has been discussed for a number of years, mainly in the context of the potential of new web-enabled ATMs running Microsoft Windows. Recent years have seen a shift to ATM models that run a version of Windows as the operating system. There is also increasing use of TCP/IP networks for ATM connectivity, instead of the older X.25 or SNA networks. Additionally with the advent of advanced software distribution strategies, the applications on ATMs have been moving towards the fat client model. Additional bandwidth of TCP/IP networks has meant that larger files such as graphics and advertising sequences can now be downloaded automatically without requiring service calls to the ATM. But the most revolutionary development in the world of ATM infrastructure has been the development of XFS, an open software layer that abstracts the ATM hardware from the application software that drives it. This has been accompanied by the evolution of an industry standard message protocol known as IFX for communicating between ATM and host.

Together these developments have created a fundamental shift in the market for ATM software, with customers no longer tied to ATM hardware vendors for the software that drives their cash machines. Banks welcome the increased level of competition between vendors in the marketplace.

Multi-hardware support

XFS, the open software layer, evolved from a Banking Solutions Vendor Council initiated by Microsoft in 1991. The result was referred to as Windows Open System Architecture/Extensions for Financial Services (WOSA/XFS). The aim was to provide multi-hardware support, without having to change application programming specific to hardware features. Since 1998 the standard has been adopted and developed by the European Committee for Standardisation (CEN), and is now referred to as XFS.

Work is also underway to make XFS compatible with other popular non-Microsoft architectures, and the availability of J/XFS (Java) supports greater choice in the market for vendors and banks. IBM's OS/2 currently runs the majority of existing and new ATMs. Between 2004 and 2006 the company is ending support for the various aspects of the operating system, including hardware and device drivers. There has been some talk of using Linux for ATMs because of low cost, security and lower processing power requirements. But, at least for the moment, Microsoft Windows is the most common choice for those moving away from OS/2.

XFS supports not only ATMs, but also other peripheral devices that are unique to financial institutions, such as cash counters and statement printers.

In the ATM context, the standard means it is much quicker and easier for a bank to enhance functionality and maintain the ATM. With XFS, there is one core application, which makes the ATM network a lot easier to manage and a lot more cost efficient, especially if a multi-vendor hardware strategy is in place.

But the major impact of XFS, particularly when combined with the increased adoption of the IFX messaging standard for ATM-host communication, is the formation of an open market for ATM software. The leading ATM manufacturers have for the first time become exposed to competition from each other and from independent specialist software companies. Many of the major ATM manufacturers have already entered this market with Windows-based software development kits (SDK) that accelerate the production of new bespoke ATM applications. These include NCR APTRA Edge, Diebold Agilis and Wincor-Nixdorf ProTopas. Most importantly, it is possible for software developed with one vendor's SDK to run on the ATM hardware provided by a different vendor.

A number of independent software specialists, such as Absolute Systems (South Africa), Dynasty (Spain), KAL (UK), and Phoenix Interactive (Canada) have also created similar solutions, to compete with the established hardware vendors. Larger banks will inevitably want to develop bespoke differentiated solutions using these tools, where smaller organisations are likely to adopt a more packaged approach to take advantage of the cost savings offered by these standards. The end result is that the major hardware suppliers will only maintain a dominant position in the supply of software to run ATMs machines if they create high quality, cost-effective solutions.

The formation of an open market for ATM software means that, for the first time, leading ATM manufacturers are exposed to competition from each other and from independent specialist software companies.

Open standards drive change in ATM technology

One of the major benefits of the open architecture ATM market is that banks can now get a better deal from their ATM providers. Because they are no longer tied to a particular vendor, banks can pursue a best-of-breed strategy for their ATM infrastructure requirements. With the hardware becoming more commoditised, it may now be easier for banks to maintain multi-vendor networks. There is even the possibility for consolidating service contracts across a multi-vendor network with just one service provider. Such developments will enable banks to be more efficient in the way they develop and maintain ATM networks.

Traditional 'fixed' manufacturers software environments, such as NCR's NDC and Diebold's 912, use a 'states and screens' model, where a bank downloads configuration data to the ATM to customise its application and a proprietary message protocol is used to communicate with the host. This approach was elegant in its day, when bandwidth was limited and the application was relatively static, although it is looking dated in today's technology environment. The adoption of XFS and the IFX message standard will enable new ATM applications to be developed using more modern tools. This open ATM architecture gives banks the flexibility to take advantage of opportunities for delivering new services and functionality, and to cope better with regulatory change in the industry.

New peripherals, new services

For example, with XFS in place it becomes much easier for banks and ATM manufacturers to support additional hardware peripherals at the ATM. These can include coin dispensers, cash-counting deposit takers and cheque imaging devices. In the UK, Nationwide Building Society's FAST Till in-branch machines are a good example of this. In addition to basic ATM functionality they provide four new services:

- an automated bunch note cash deposit service that links directly to the card holder's account so cash is instantly credited;
- an intelligent cheque deposit service that provides a scanned image of the cheque on the customer receipt;
- cheque issuance for bankers draft dispensing;
- passbook printing.

IFX standardisation, combined with multiple TCP/IP network links between ATMs, hosts and other bank systems, also makes it easier for a bank to re-use Internet banking functionality at the ATM. This can help the bank offer increased self-service functions, improve cross-selling opportunities and aid customer relationship building.

For example, a host system such as ACI's BASE24 can handle the authorisation of a consumer through a card and PIN, and then coordinate the delivery of internet banking screens and functionality to the ATM. This could include capabilities such as bill payment and transaction history. Alternatively, banks could keep the normal transaction processing that happens between the ATM and host completely separate from the advanced functionality.

With the IFX protocol and use of TCP/IP networks improving the integration of bank branch, ATM and the internet channel, banks can also more easily work with partners to deliver other services through the channel. Mobile phone top-ups are one example of this type of third-party partnership proposition.

At the moment, the capabilities enabled by an open architecture for ATMs exceed most banks' appetite for pursuing them. But in some countries, such as Spain, cash withdrawals are now a minority of the total ATM transactions processed. This indicates that given the right services for a particular market, consumers are comfortable with using ATMs for more than just basic cash needs.

Given the wide range of opportunities that banks have for enhancing product delivery and service over their ATM channels, experimentation is likely to be a major trend in the next few years. Fortunately, experimentation is more straight forward in an open architecture ATM environment, and advanced functionality can be implemented in small groups of ATMs. With a choice of software providers, and the ability to rapidly develop and customise their own solutions, banks will find the investment required to enhance ATM functionality is much diminished. Because of this, it is likely that more and more banks will experiment with various services, perhaps targeted for specific locations or customer segments. If the results of an experiment are not positive, it has not necessarily cost the bank a lot of money to explore the idea.

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Making compliance easier

Open architecture ATMs will make it easier for banks to make changes in the ATM network to accommodate the most recent regulations from the major card associations. It will also give the banks more flexibility in dealing with any future changes.

In EMEA, chief among current regulatory issues is the Europay/MasterCard/Visa (EMV) smart card initiative, which requires that all ATMs comply with new card standards by January 2005. The increased intelligence and complexity of the new EMV smart cards have been designed to reduce the rising levels of plastic card fraud. Non-compliance with these standards after January 2005 will mean the acquirer (in this case, the ATM owner) is liable in the case of fraud committed with an EMV standard card.

EMV standards also allow for multiple applications to be stored on one card. This will have a huge impact on the whole payment transaction cycle. ATM hardware and software, as well as host switch networks, will need to be upgraded to accept EMV smart cards and deal with the myriad of possible transactions. The XFS open software layer makes it much easier for banks to develop the software required to take advantage of these new opportunities, as well as maintain compliance by being able to handle basic chip-card transactions.

For banks of any size, having an open ATM architecture is likely to provide ongoing cost and effeciency benefits, and a simpler path to regulatory compliance.

As well as EMV, banks also need to initiate projects to be compliant with the Triple-DES security standard, which is being introduced to ATMs globally to address security concerns about the existing single DES standard. The major card networks are enforcing compliance with Triple-DES by 2006. Many banks have already upgraded the software elements of their networks in order to comply, but still need to address the hardware upgrade of the actual ATM.

While upgrading ATM hardware to meet Triple-DES compliance, many banks are also making additional security improvements, particularly encrypted PIN pad (EPP) devices and remote key management strategies.

For banks of any size, having an open ATM architecture is likely to provide ongoing cost and efficiency benefits, and a simpler path to regulatory compliance. For banks that like to be on the leading edge of service and delivery innovation, open ATM architectures provide almost endless possibilities.

As the ATM software market evolves as a separate entity no longer tied to hardware, smaller banks without the deep pockets of tier-one institutions will benefit from more flexible and functional packaged solutions.

One of the key problems associated with developing new ATM applications is the testing of this software in the target ATM hardware. The move to an open architecture will enable the use of industry standard software development tools. The completed software will still require testing against the special peripherals, such as PIN pads, chip card readers and cheque scanners. This software also requires comprehensive network testing when it is combined with new EMV chip cards and a bank's host systems.

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The best automated testing solutions on the market today provide desktop simulation tools that enable ATM software to be exercised and tested in a comprehensive manner. These provide a full graphical simulation of all the ATM's peripherals and enable all fault conditions that can occur in these devices to be forced in a systematic and repeatable manner.

The simulation also extends to the card environment where both real and virtual chip cards can be employed. But the most important feature banks should look for in a testing environment is its ability to connect to a central host in the same manner as a real ATM. This enables true end-to-end testing of new ATM applications without the need to use a physical ATM. Banks can then achieve the essential visibility needed to test transactions from the card, through the ATM and subsequent communications with host. With chip cards, where close interrogation of the card is required throughout the testing process, connection with the host is particularly valuable.

New ways of testing

Testing solutions have traditionally provided a software simulation of the ATM vendor's fixed code to test a bank's specific configuration data in conjunction with its host system. With the increased adoption of the XFS open software layer, testing can now be extended to support the actual ATM software rather than a simulation. This offers significant advantages over the previous approach as manufacturer-specific simulations are no longer required.

Just as the introduction of XFS has opened up the market for software that runs on top of this layer, it has freed up the test tool providers from their dependency on the ATM manufacturers. These tools can now reach a wider market and the new freedom will inevitably lead to the development of more sophisticated tools, which will benefit end users.

One example of how these tools could develop is the concept of 'AI testing'. It is already possible today, with the right tools, to enable automated replay of batches of tests without the intervention of the tester. The logical next step is to enable the tester to load their latest ATM software, and for the test software to automatically 'learn' all the routes through this system. These routes can then be exercised in conjunction with all of the error conditions that can arise on the ATM's peripherals and the card. By introducing such artificial intelligence (AI) into the test environment, the test cycle can be shortened and banks can move their new developments to production much faster.

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With the new freedom enabled by the open architecture comes a greater need for automated testing solutions. As banks explore different functionality for delivery through the ATM channel it is essential that all elements of the network, from card through to the host, are comprehensively tested.

The move to an open architecture for ATMs has fundamentally changed the market for ATM technology. ATM hardware and software are no longer intrinsically linked. Increased competition and the end of vendor 'lock in' mean banks will get a better deal on their software, whether they buy a completely packaged solution or do some development themselves.

The new architecture, of which the XFS software layer, IFX messaging protocol and TCP/IP networks play an integral part, mean that banks can develop new capabilities faster and more cost effectively. The architecture also makes it easier to make changes to the ATM infrastructure to deal with both current and future regulatory requirements.

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As well as opening up the future of ATM software development, the open ATM architecture also has implications for the testing software itself. By removing the need for simulation of proprietary software, more sophisticated testing tools can be developed. Among these is the possible introduction of AI systems that can analyse all possible transaction flows and error types. But regardless of the direction that new ATM capabilities and automated testing take, the two will need to be considered simultaneously if banks are to succeed in the new environment.

About Level Four

Since 1995, Level Four has been working with leading financial institutions to unlock the profit potential of their ATM delivery channels. Level Four's key offering is the ATM Channel Development Suite, a comprehensive suite of integrated modules that enables rapid development of new ATM applications and end-to-end testing of ATM networks.

Level Four technology is not fixed to a specific protocol, standard or ATM manufacturer. The company is vendor independent, ensuring delivery of the best solution to meet each bank's requirements. Level Four responds quickly to changes and new developments in the ATM and payments arena, and provides tools to help banks implement new functionality quickly and ensure compliance with industry standards such as EMV and Triple-DES.

Level Four Software
33 St. James's Square
London, UK
SW1Y 4JS

Telephone:
+44 (0)20 7661 9322

Facsimile:
+44 (0)20 7661 9400

Email:
enquiries@levelfour.com

Internet:
www.levelfour.com

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