From Industry RFI to Industry Blueprint for Next Generation ATMs

By **Mike Lee**, **Peter Kulik** and **Rich Barron**

1. Brief History & Background

In 2017, the ATM industry celebrates its 50th year, reaching over 3 million ATMs as its global installed base, an average rate of production during this period of about 60,000 ATMs each year (or 165 per day). Behind this sustained growth in production lies the positive truth about the growing popularity of the ATM as a pioneering self-service technology: ATMs have allowed cardholders to transcend the limits of space — with convenient access to hundreds of thousands of machines, both at the branch and off-premises — and time — with terminals available 24/7, 365 days a year. This gain in convenience is a phenomenon of modern banking.

It is therefore not surprising that Global Market Insights, Inc. forecasts that ATM market size will exceed USD $26 billion by 2023, with (i) mass consumer banking through self-service and, (ii) efforts to reach the 2 billion unbanked adults in financial inclusion programs driving increased demand for, and growth of, ATMs.[1]

But exactly how will ATMs continue to thrive in the Mobile Internet Age? This is a time in which the mobile device, especially the smartphone, becomes the main consumer device connected to an Internet in which data, information and even money is digital. And are ATMs ready for the coming Internet of Things?

Two years ago, ATMIA began preparing its members for the end of support for Windows 7 operating systems in 2020. During this period, detailed roadmaps have been worked out for a migration to Windows 10. In addition, there is a WinCE 2023 roadmap. At the same time, ATMIA studied alternative operating systems such as Android through its exploratory work in the Next Generation ATM Architecture Committee.

Last year, this committee formed a sub-committee of banks and independent deployers, spearheaded by co-authors Peter Kulik and Rich Barron, to formulate a vision for the future of ATMs *from an operator's perspective*. A surprising degree of consensus was soon reached by this international group of ATM deployers.

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[1] ATM Market size to exceed $26bn by 2023, February 3, 2017, Author: Global Market Insights, Inc
https://www.gminsights.com/pressrelease/ATM-market-size

This sub-committee successfully articulated an Industry RFI for Next Generation ATMs. In this regard, ATMIA would like to offer sincere thanks to Bank of America, Citibank, Cardtronics, Capital One, Bank of Montreal, Elan Financial Services, FNB of South Africa, Iberia Bank, PNC Bank, Prosperity Bank and US Bank.

On 31st January, 2017, ATMIA sent a letter to the world's leading ATM manufacturers, suppliers and service-providers, attaching the Industry RFI, requesting formal feedback by the end of March. The RFI incorporated all the key requirements and expectations of global operators, while being perfectly aligned with the converging consumer technologies reshaping our industry, including mobile banking apps, the Cloud, cardless ATM access, NFC, biometric authentication, to name but a few.

ATMIA wishes to thank the following companies from the vendor and supplier sector of the industry for their invaluable feedback: Diebold-Nixdorf, NCR, KAL, GRG Banking, Nautilus Hyosung, ACI Worldwide, Euronet, ThetaRay and Paragon Application Systems.

ATMIA also thanks international banking consultant, David Cavell, and ATM security expert, Douglas Russell, for reviewing the final draft of the ATM blueprint to ensure that sufficient cognizance is taken both of the requirements for access to future ATMs by impaired users and E2E security for Next Generation ATMs.

2. From Industry RFI to Industry Blueprint

ATMIA is committed to global ATM innovation. The vision of the future captured in this ground-breaking RFI is a call to action for the ATM to reinvent itself in an era in which global internet giants, international retailers and social media threaten the disintermediation of banks by providing their own on-demand financial services.

Another driver of change to consider is the need for banking and self-service to reach the remaining 2 billion unbanked adults in the world, a mission which will necessitate greater flexibility in ATM systems than is presently available.

The ATM cannot stay the same – or it may run the risk of going out of business. If the ATM does not innovate in this period of 2017-2020, it will fail to future-proof itself.

Consequently, Peter Kulik, Rich Barron and Mike Lee compiled vendor feedback to analyse the main consensus points, points of disagreement and unresolved issues as a first step towards turning the RFI into a global blueprint for the future, based on broad agreement between the industry's major deployers, vendors, suppliers and service-providers. What degree of convergence was reached in the analysis of vendor feedback?

2.1. Vendor Model of the Future

A study of all the feedback provided by the international manufacturing and supplier sector in response to the Industry RFI reveals that the ATM industry's vendor community is, broadly speaking, ready to embrace a new Next Generation ATM ecosystem. But what would its components be? What would its architecture be? Broadly speaking, there would be three levels of ATM architecture interfacing with Consumer Owned Devices (CODs) (see Figure 1 Blueprint for Open Next Generation ATM Ecosystem below).

1st Level

CLOUD ARCHITECTURE/ENVIRONMENT

- ✓ Internet-based agnostic model with most operations migrated to web services
- ✓ Allows for on-demand services delivered through API
- ✓ Enables future server-based machine learning (AI)/intelligence engines (e.g. for cash forecasting using smart cassettes or monitoring paper receipts use and replacements), Big Data analysis and digital currency transactions
- ✓ Option to use Private Clouds

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2nd Level

API FRAMEWORK[2] (Application Programming Interface) – Connectivity Model

Using standard, vendor-neutral web HTTP technologies/HTML5, standard data format (JSON) and a Javascript API to access transaction services (could be based on ISO 20022) to enable multi-channel, cross-channel, multi-app banking

- ✓ Multi-vendor standardisation of App model
- ✓ Menu of Apps for customer services (like App store)
- ✓ Deployer can add own Apps to create mix of standard apps and custom apps
- ✓ ATM Applications developed with Responsive Design techniques for a consistent user experience across the broadest variety of ATM devices
- ✓ API includes an agnostic Appliance Management Server App for monitoring and managing the ATM (operations, cash levels, patches, etc.), with the ATM itself becoming the appliance; collects all transaction data for Big Data analysis; understands apps running on endpoint
- ✓ API integrates services through ecosystem to harmonise the customer journey

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OPTIONAL ADDITIONAL LAYER = A Payments Hub plus option for alternative switching (e.g. sending payment information to CRM or payment hub)

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3rd Level

ATM End Point ("box")

- ✓ Browser-based web-services - HTML5/JS/CSS3 – for consistent customer interfacing
- ✓ Runs embedded base software stack for all ATM modules driving terminal, updates to be downloaded from server
- ✓ Enables traditional interface OR Headless ATM option

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CODs [Customer Owned Devices]

Smartphone/tablet/mobile phone

NOTE: In this model, Apps can be run on the ATM, on the COD or in the Cloud

©ATMIA *Figure 1: Blueprint for Open Next Generation ATM Ecosystem* ©ATMIA

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[2] The APIs could be managed in the Cloud or closer to the ATM, depending upon security requirements.

2.2. Deployer Model of the Future: Areas of Agreement

ATM Deployers concur with the vendor consensus network architecture as described in the previous section, and believe that the API Framework and Network Ecosystem proposed will enable a new wave of innovation at ATMs with far-reaching benefits for consumers and the ATM industry.

ATM deployers require a new architecture to focus all its energies on building great customer experiences, while at the same time integrating ATM operations with the broader financial services systems. Competition would be at the level of customer experience, which is where deployers can achieve differentiation.

A new relationship between FIs and ATM vendors would see vendors providing and maintaining the best underlying, commoditized, compliant hardware, platform and network infrastructure.

3. Areas of Divergence & Issues Still to be Resolved

XFS & Future Interoperability

There are some APIs already in existence, in different stages of development, so finding industry consensus will be a diplomatic exercise for the industry.

Either way, the biggest obstacle to the Next Generation ATM envisaged in the Industry RFI is that there is a legacy of proprietary systems and network protocols which aren't interoperable. A lack of interoperability is incompatible with the open architectures of the Internet Age.

The role of XFS[3] in any future standard will only become clear once the standards- making process progresses. Some see XFS as unsuitable for an ATM app and API model, whereas some propose it could be extended to support a new model of ATM operations. This would be an issue for the ATM vendor to resolve as deployers focus on a higher level standard for an API ATM App model for ATMs.

The next generation API ecosystem should be the same for both Outsourced and Insourced ATM deployers.[4]

Ecosystem Security

The third key issue to discuss is designing security into the new ecosystem, looking at an E2E chain of trust, including the verification of CODs to be used in the interface with ATMs. Other aspects of E2E security would be behaviour anomaly identification systems, which would apply to the behaviour of consumers interacting with the ATM and the behaviour of the individual modules / components within the system. In addition, it should apply to operational risk across the infrastructure.

This would permit alerting on any suspicious manipulation of the ATM (it could also help with maintenance by detecting developing faults). In the API APP ATM Model (the triple A model), there will need to be full testing of ATM apps as well as interoperability tests between standard apps and custom apps. Finally, there will be a need to enable the use of the same credential across all channels for authentication. Attention will need to be given to both physical and system authentication security.

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[3] CEN/XFS or XFS (extensions for financial services) provides a client-server architecture for financial applications on the Microsoft Windows platform, especially peripheral devices such as EFTPOS terminals and ATMs which are unique to the financial industry. It is an international standard promoted by the European Committee for Standardization (known by the acronym CEN, hence CEN/XFS). The standard is based on the WOSA Extensions for Financial Services or WOSA/XFS developed by Microsoft.
With the move to a more standardized software base, financial institutions have been increasingly interested in the ability to pick and choose the application programs that drive their equipment. XFS provides a common API for accessing and manipulating various financial services devices regardless of the manufacturer.
Chronology:
1991 - Microsoft forms "Banking Solutions Vendor Council"
1995 - WOSA/XFS 1.11 released
1997 - WOSA/XFS 2.0 released - additional support for 24 hours-a-day unattended operation
1998 - adopted by European Committee for Standardization as an international standard.
2000 - XFS 3.0 released by CEN
2008 - XFS 3.10 released by CEN
2011 - XFS 3.20 released by CEN
2015 - XFS 3.30 released by CEN
often different hardware vendors have different interpretations of the XFS standard. The result of these differences in interpretation means that applications typically use a middleware to even out the differences between various platforms implementation of XFS.
https://en.wikipedia.org/wiki/CEN/XFS
[4] An analogy to consider here is how companies often start by making their applications cloud-friendly and then push to a private cloud, security requirements permitting of course. They then have the option to move to the public.

4. Additional Key Dimensions of Future ATMs

4.1. The Accessible ATM

A recent review of a number of different markets suggests that around one person in every five of the global population has some form of disability. This proportion is likely to grow as life expectancy increases.

ATMIA urges deployers to develop a formal strategy for maximising ATM accessibility in future ATMs, with accountability for coordination assigned to a senior executive. The onus is on ATM operators to procure and deploy machines to the highest standards of access (whatever the level of legislative demands in their markets). A comprehensive appreciation of the factors that frustrate users with impairments will inform standards for the siting of ATMs, the environment in which they operate, and the features and facilities that they should offer.

5. Next Phase

It appears the ATM industry is heading into a double or dual future in the same way that an overpass, or flyover, is built over existing roads and interchanges to direct a new stream of traffic. The current ATM reality is dual in that there are machines still on XP and others in transition to Windows 7.

The Next Generation ATM defined in Figure 1 will be like a new highway to the future which is overlaid on top of existing infrastructure. It will be directed towards the industry's Desired Future.

In the flyover model, ATMs can head in the same direction but newer ATMs will use the flyover highway and some older ATMs will continue using the established operating systems and standards. There will be two different levels of infrastructure operating simultaneously, the Next Gen infrastructure based on new standards and the transitional infrastructure based on established standards. Older ATMs could run on W7 or W10 while new ATMs could be Android/Chrome/Linux based.

In this dual future, the next generation will incorporate both traditional ATM services and interfaces and the new dynamic app-based services.

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Figure 2: An Overpass or Flyover Model

> In this transitional period, it will gradually become the norm to initiate, authorise and complete ATM transactions via mobile devices.

While the next generation architecture is constructed, we'll need to enhance and support existing infrastructure as well. They will coexist for a period.

It is proposed that ATMIA facilitates an industry consortium to devise a roadmap for the flyover to the future of the industry, based on the blueprint in Figure 1, while acknowledging the reality of a dual future as in Figure 2.

The ATM industry will require a new standard for an open API ecosystem, while still complying with EMV and PCI, to become truly aligned to web and mobile technologies and their impressive interoperability. Banking the unbanked and keeping the current customers will best be achieved by enabling multi-channel and cross-channel banking, ideally employing the same APIs for ATMs and CODs.

A roadmap for Governance of the new Ecosystem Standards will need to be mapped out, since the enforcement of the standard will be key to its credibility and effectiveness. The CEN process as well as processes followed by Google and Apple in achieving app interoperability for smartphones and their apps would be instructive to study in preparation.

6. Conclusions

Following a two-year period to prepare for future industry migrations to new operating systems, an Industry RFI for Next Generation ATMs was developed by a sub-committee of ATMIA's Next Generation ATM Architecture Committee and then reviewed by the world's top ATM manufacturers, suppliers and service-providers. Analysis of this global feedback has led, in turn, to the formulation of a draft blueprint of an API App ATM model (the "triple A"), illustrated in Figure 1 with its three levels, namely Cloud Architecture -> API Framework -> ATM terminal, interfacing with CODs.

This blueprint has coincided with the dual anniversary in 2017 of the ATM's 50th year and ATMIA's 20th anniversary.

It is recognized that while the next generation architecture is being constructed, and for years afterwards, there will be a dual future for ATMs, comprising a new flyover infrastructure for API App ATMs overlaid on top of existing infrastructure running on established operating systems according to current standards.

It is proposed that ATMIA form a consortium to oversee the development of a new standard for the API App ATM ecosystem to run concurrently with established standards, as well as to produce a roadmap for the journey to the industry's Desired Future.

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