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Prepaid Cards – The Next Generation

Leveraging EMV technology for minimum-risk offline payments

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A New Angle on Prepaid

Prepaid products have been around for a long time. There is a vast range of examples, from postal orders, book tokens and gift vouchers through to phone and travel cards. But now there is a new angle on the prepaid model; one that benefits from the chip-based EMV technology that provides secure credit and debit payments globally.

Background

Prepaid cards have a long and profitable history in the payments industry, from the simple gift cards that replaced gift vouchers to the sophisticated reloadable products that act like electronic wallets. There are two basic types – online products where the funds are stored on a central server and offline products (commonly known as ‘e-purses’) where ‘real’ funds are held securely in a chip on the card.

Online prepaid products may be issued under private label schemes or may carry one of the major card scheme brands, but the basic functions are the same: a sales transaction at a merchant terminal is sent to the card issuer’s host system for authorisation. If there are sufficient funds in the prepaid account, the transaction is approved. These products achieve the goal of a card with minimum risk, making them suitable for higher risk cardholders and for anonymous issuing, but they can only function in a 100% online environment. Online prepaid cards may be chipped to protect against counterfeit fraud and to ensure acceptance in regular POS terminals in the same way as normal EMV credit and debit cards.

E-purse cards have provided a solution to prepaid, secure, low risk, offline payments. These can be further divided: those aimed at general (but usually low ticket value) retail use and those issued primarily for use in transit environments, which are usually contactless and often issued anonymously. Many retail e-purse schemes have launched and many have failed; some remain in general use and some remain only as niche players. The roll-call of prepaid schemes or technologies will be nostalgic to some: Mondex, Horizon, VisaCash, Proton, Clip, Cash (sic), Chipper and the rest. Those still on general issue (but with variable degrees of success) include Chipknip, Geldkarte and Moneo. Transit-based cards, such as Octopus and Oyster, have seen their acceptance spread to convenience stores, parking and vending, again for low ticket transactions.

These e-purse schemes share a number of common features:

- proprietary technology
- a dedicated acceptance infrastructure or proprietary software in existing terminals
- often a SAM (secure authentication module) needed in the terminal
- not interoperable in credit and debit card acceptance environments.

They rely for their success, firstly, on cardholders having a good reason to carry the card in preference to, or alongside, other cards that may offer similar features and, secondly, on having enough acceptance points to make everyday use practical.

Many of the e-purse schemes that have failed have done so because they were unable to meet one or both of these critical success factors; and that inability can often be traced back to the constraints of the underlying technology. An e-purse card can be seen by consumers as having less utility than a conventional credit or debit card if it is accepted less widely. This can be due to the lack of interoperability with the bankcard infrastructure or to the cost of installing and maintaining a network of dedicated terminals, compounded by the low margins achieved by e-purse schemes. Conversely, those e-purse schemes that are still operating are often co-resident on a card that is also a regular bank card, which at least provides the incentive to make space in the wallet, or else they provide such convenience (e.g. Octopus) or access to discounted fares (Oyster) that to carry them is a “no-brainer”.

New Approach

Now the landscape is changing; in most developed economies banks have been through or are in the course of EMV migration (the USA being the notable exception). In Europe the SEPA initiative is driving EMV card issuance and acceptance, with a deadline for full compliance by the end of 2010. For branded online prepaid cards that

means that they too must migrate to EMV and this has already happened in many cases. But just moving an existing magnetic stripe prepaid product to chip misses an opportunity. For credit and debit cards, EMV's risk management features allow issuers to control exposure to fraud, overspending and credit risk even when cards are used offline; for prepaid products, adapted EMV technology enables secure offline spending against a prepaid available balance – controlled by the card. More on this below.

Where the credit or debit function of an existing co-branded e-purse product is migrated to EMV, then maintaining two incompatible chip applications on a card – EMV payment and proprietary e-purse – is an unnecessary overhead, and the problem of restricted acceptance remains. Yet the same adapted EMV technology will support secure offline prepaid payments alongside a credit or debit application and can be used in all existing EMV POS terminals and ATMs without modification or additional security features – one of the major benefits.

Two factors affect the position of prepaid transit cards. Firstly, the technology on which many are based is no longer seen as sufficiently secure; MiFare Classic, the most common technology in use for these cards, has been 'cracked', potentially allowing fake credit to be created and thereby threatening to undermine the credibility of the schemes. Issuers are thought to have only a couple of years to migrate to a more secure technology. Secondly, transit authorities generally do not want to be card issuers. It is an expensive overhead for them and not part of their core business. How much better for all concerned if the functions of today's prepaid transit cards could be provided by a card that the majority of passengers would be carrying anyway – their regular bank card?

The new generation of offline, EMV-based prepaid cards are probably the answer to all the problems that do, or soon will, beset today's prepaid schemes in both transit and general retail, for the following reasons:

1. They are based on proven EMV technology and security, which is universally endorsed by card schemes, central banks and monetary authorities around the world and is dynamically managed to keep ahead of potential threats.
2. Cards are accepted at any EMV-compliant terminal that is appropriately branded without modification or additional security features.
3. All EMV methods of cardholder verification, including Chip & PIN, are supported, and cards and terminals can be configured to bypass cardholder verification for low value transactions.
4. Card parameters define usage, allowing any permutation of online/offline and contact/contactless.
5. To cardholders and merchants, prepaid transactions are identical to regular credit or debit, contact or contactless.
6. Transactions are delivered over existing networks.
7. The prepaid application can co-exist with credit or debit on a co-branded or dual-purpose card or be issued as a stand-alone prepaid card.

How They Work

EMV technology provides a means for the card issuer to send commands to the card after it has been issued – so-called 'post issuance updates'. For credit and debit cards, these updates, which are delivered in 'scripts' attached to regular authorisation messages, are used to change card data or the state of the card. Common script types include PIN Change, Block Card and updates to the offline risk management parameters. With prepaid chip cards, scripts are also used to manage the value of the offline available balance. This balance is determined in the chip by the difference between an upper limit set by the issuer and an accumulator of offline spending. By adjusting the upper limit relative to the card's offline spending accumulator, the issuer sets the value of the offline balance.

To manage a cardbase of prepaid chip cards, the issuer needs to install a shadow account management system, or 'prepaid host'. The way in which the shadow account – which tracks funds and spending and controls the offline balance – is managed will depend on the product proposition, since not all the funds added to the shadow account need be made available for offline spending immediately. Configuration of the prepaid host can control the amount of funds 'downloaded' to the card, while remaining funds can reside in the host and be used for authorising transactions that exceed the offline balance and come online for authorisation and for non-chip (e.g. card-not-present; CNP) and international transactions, if these are supported for the product.

This ability to manage host and offline funds separately is what gives EMV-based prepaid cards their flexibility and makes them suitable for a variety of cardholder products, for example youth and student cards, benefits and wages cards, transit and general purpose cards. The prepaid host needs to be configurable in a way that allows a range of product types to be managed, possibly managing multiple products concurrently for a large issuer or bureau. While the prepaid host manages the funds that are available for prepaid spending, by managing the shadow account as a sub-account of a regular checking or savings account, the prepaid card can alternatively be operated as a pre-authorized product. This differs from the pure prepaid model by allowing the cardholder to nominate or 'ring fence' for prepaid spending a proportion of their overall funds and to make the remainder available for normal banking transactions.

Accounted or Anonymous?

The prepaid host must be able to accept funds loaded from any source that the issuer supports. For example; by bank transfer from a checking or savings account, from an employer's payroll system, from cash handed over at a branch counter or designated merchant or, at a suitable device, via another prepaid card transaction, thereby enabling P2P payment. These options for loading allow both fully accounted and anonymous products to be supported. In the former case, full KYC and AML checks can be applied, and for both accounted and anonymous products, the prepaid host should have the facility to control both the amount that can be loaded to the account and the amount downloaded to the card, in single transactions and over time.

Being EMV-based, prepaid chip cards benefit from the other features of EMV, and notable among these is the ability to support card and cardholder authentication outside a normal sales context. These features are now being exploited by card schemes and banks primarily as a countermeasure to CNP fraud, but have the potential to be used for strong two factor token-based authentication (possession of the genuine card and knowledge of the correct PIN) in other scenarios, such as verifying identity for benefits provision and physical or logical access controls which could be used in a corporate or campus setting.

Conclusion

Gift cards will continue to be a popular form of prepaid token within the closed loop retailer-customer domain and could also benefit from EMV technology, but the EMV-based prepaid card for general use in the retail environment or for specialised use in transit and for other applications seems set to provide the next generation of chip products. And there's a roadmap further into the future based on smart prepaid, as the EMV-based applications that enable these products can be migrated to mobile phones, resulting in great synergy and further opportunities for driving smart payments. With a mobile implementation of EMV-based prepaid, all interaction with the prepaid host can take place over the air to deliver a seamless funding and downloading experience.

Card schemes are busy promoting EMV-based prepaid cards, and prepaid host software is now available in the marketplace, so the time is ripe for card issuers to develop and deliver innovative products based on the new generation of prepaid chip cards.

About the Author

Nigel Beatty is an experienced business consultant with an extensive knowledge of the electronic payments industry. He has worked as a consultant and project manager at senior levels within leading financial institutions around the world and has particular expertise in the area of EMV, prepaid and mobile payments products.



Nigel works with clients to develop strategies, define business cases and deliver solutions throughout the payments industry.

About Aconite Technology Ltd.

Aconite delivers software solutions and provides consulting expertise for managing business applications on chips in smart cards, tokens or mobiles to issuers around the world. We provide a rapid and cost-effective route to implementing new customer propositions, entering new markets and complying with international standards.

Incorporating a unique blend of proven software and professional services, Aconite solutions can be tailored to meet individual business requirements without the need to replace legacy systems and with minimal impact on staff and processes.

Based in the UK, Aconite operates across the globe, with a local presence in many markets.



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