

Robin technology

White paper

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In order to ease the deployment of multi-application smart cards, Iteon has designed and patented Robin, a technology that allows a card application to run without the need for specific terminal application software. In Robin, the terminal application resides on the card. A mechanism allows commands to be sent from the card to the terminal.

Robin technology allows application developers to create powerful smart card applications that will work on any terminal, whatever its type, its manufacturer, its location. All the players in the industry will greatly benefit of the Robin opportunity.

The complexity of smart card applications deployment

Despite the motivation of the players, the effective use of multi-application smart cards is still below expectations. The reason for that is the complexity of the deployment of such programs.

Smart card application = software on terminals

This equation is quite simple yet very important.

In order to have a smart card run with a terminal, there must be a piece of software in that terminal to handle the card processing : it will be in charge of running a sequence of commands (the application), interface the card, the keyboard, the display, the printer, the network, etc.

Before Robin, a terminal would not work with a smart card unless it had specific application software to interface it.

Let us take the example of a loyalty application on an EMV multi-application card : when the card is inserted, the terminal application software may do the following : select the loyalty application in the card, read the cardholder's name, get the number of loyalty points, add new points using some kind of security mechanism, display the new points balance and finally print a receipt with a friendly message.

This software is stored in the terminal, where it has been loaded by the application provider. If there is no software in the terminal, nothing will happen.

Let us take another example : an airline co-branded payment card. When the customer makes a purchase a message is printed on the sale receipt such as "You have just earned 100 miles. Your balance is 28'500 miles. Earn 1'500 more miles and get a free flight to Hawaii.". Once again, in order to do so, a dedicated application must be present on all terminals where the cards will be used, therefore on all EMV terminals throughout the world. It is easy to figure out that this is just impossible.

Downloading software onto terminals

Up to now, terminal manufacturers have been taking a series of measures to limit this problem : they have worked in order to make application download on terminals easier, and to standardise software. In groups such as Global Platform or STIP an excellent standardisation work is being carried on.

This work will surely ease the deployment of new applications but will not ultimately solve our problem: the software deployment will be more simple but will still have to be done.

With Robin, the solution is simple: getting rid of terminal software deployment.

Robin technology

The objectives

What we want to achieve is to make it possible for a card to be accepted on all terminals without the need for specific terminal application software.

Cards should be accepted on all terminals: this includes point of sale terminals, ATMs, personal computers, kiosks, vending machines, personal readers, etc.

This should be carried out without the need for specific terminal application software: this means that an application on a card issued in

Robin aims at getting rid of application deployment on terminals.

one country, will work immediately on all terminals worldwide, even if they are not aware of this application.

This will make it possible to run the airline loyalty application described earlier: for each purchase, a ticket is printed. When the terminal does not have a printer (e.g. vending), the message will be displayed.

How this is achieved

In order to do so, Robin stores the terminal application in the card.

When the card is inserted in the terminal, it tells to the terminal what to do: display messages, print a document, communicate with a network, prompt the cardholder for inputs, etc.

We use a mechanism known as "card initiated messages", that is described in the ISO 7816-9 standard. All that is needed on the terminal is an extension to the smart card drivers (implementing the ISO 7816 standard, present on all smart card terminals) to interpret Robin messages.

When special events happen (the terminal will print a document, the terminal will go online, etc.) the card may be notified of that event in order for it to be able to act.

What is needed

Robin works on existing cards. The protocol described in the Robin specification just has to be implemented.

Even if native platforms can be used, it seems easier to develop Robin application on open systems such as Multos or Java Card / Open Platform.

The memory (EEPROM) required depends on the complexity of the Robin application: simple ones can be loaded on cards with less than 8 kilobytes, complex ones may use as much as 32 kilobytes.

On terminals, the smart card drivers should be updated. This is a quite simple development and should have no impact on existing designs.

Who will benefit from Robin technology

Because it increases service to customers and allows actors to differentiate, Robin will benefit to all the players in the industry.

Cardholders

Robin will allow many new applications to be offered to cardholders therefore increasing their usage satisfaction. For example, they will be

Because the terminal application is stored in the card, the application will run anywhere.

Robin works on standard, existing smart cards.

able to be better informed of their account balance, to do some operations at the point of sale, to have useful information when abroad, to store personal information on the card, to easily use their card on their personal computer without the need to install any piece of software, etc.

Because these applications are designed by issuers, who know their customers, they will be targeted for each profile: frequent traveller, internet user, etc.

Issuers

Robin empowers the issuers.

It allows them to provide value-added services to their customers and to increase the quality of their relationship. By providing real-time information and offers to cardholders, issuers will be able to increase their revenue per cardholder and get a better return on investment from their smart card migration.

Even if there is no limit to the applications that can be developed using Robin, here are some examples: the issuer may print special offers on a sale receipt wherever its customer uses its card, print information on the local branch when the cardholder is abroad, inform the customer of its account situation, of its loyalty points status, inform the customer if something goes wrong (e.g. a payment is denied), etc.

We estimate that, in a first phase, issuer will add in the chip their existing customer relationship tools (information, loyalty, etc.) therefore increasing their reactivity and in a second step they will create totally new programs.

Robin is also a wonderful tool for co-branded cards.

Card manufacturers

While today the number of EMV cards actually issued is still below expectations and card manufacturers cannot differentiate one from another, with Robin we expect the migration to become more profitable for issuers and therefore we expect volumes to increase.

Because Robin cards offer more services than low-end EMV cards, this will allow vendors to differentiate in proposing smarter cards, with fancy applications.

The development of Robin applications will be a new, profitable business in which card manufacturers will certainly be interested.

With Robin, issuers will be able to deploy easily and fast value-added applications.

Robin will allow cards manufacturers to recover good margins in providing higher end products.

Application providers

All applications providers (loyalty, home-banking, data storage, etc.) already offer very interesting programs but these are, as we already explained, always limited in their deployment. By removing this limitation, Robin will allow application providers to boost their sales.

Payment associations

Payment associations actively promote multi-application along with the migration to EMV. They created some packaged applications such as Visa Access, MasterCard SecureCode CAP, MasterCard MODS, etc. All these applications will heavily benefit from Robin technology as this will remove the need to have a specific reader.

Robin will boost multi-application and will therefore considerably increase the business case of EMV migration, even for countries where fraud is already low.

Processors

Processors also will take leverage on Robin to differentiate: Robin will make it possible for them to offer value-added services to their customer banks, and to process more transactions (related to multi-application).

We expect processors to create new service packages, either standard or specific to a bank to allow them to increase their revenue per cardholder along with cardholder satisfaction.

Merchants

Merchants will be able to offer more services to their customers and therefore to increase their satisfaction.

They will also be able to issue loyalty, or store cards to their customers that will be immediately accepted in their existing terminal. This is especially interesting for small retailers. All the many cases where a customer today has two terminals (one for payment, one for store/loyalty card) will be removed using Robin technology. This will result in direct cost savings.

Terminal manufacturers

Like card manufacturers, Robin will allow terminal manufacturers to better differentiate and to benefit from the higher volumes generated by the acceleration of EMV migration.

In a second step, just like we have seen for mobile handsets, terminal manufacturers will be able to market higher-end products with better

displays (graphical, colour, high-definition), more memory and processing power, better user interface and therefore will increase their profitability.

The applications of Robin technology

Robin is a technology allowing developers to create value added applications. We give hereunder some examples, but one can expect that the applications offered ultimately, based on issuer actual needs, and on developers creativity, will go even further.

Robin will first help issuers enhance their relationship with their cardholders. Every time the card is used, issuers will be able to interact with their customers (based on location, merchant activity, recent events, etc.). Messages can be displayed (or printed) to explain why a payment is denied, to inform about the account balance, the last transactions, the location of the closest issuer branch when abroad, to promote the issuer new products and special offers, etc.

Robin will also allow issuers to offer new services such as secure - yet easy to use - home banking and internet services.

Robin is also a great tool for loyalty programs allowing the program operator to offer rewards when the card is used. This is a great motivation tool ("You have just earned 100 miles. Your balance is 28'500 miles. Earn 1'500 more miles and get a free flight to Hawaii."), especially for co-branded and affinity cards.

Robin also eases the update of card data. For example, in order to update the data on its health cards (benefits, address, etc.) the user just has to insert its card in any card reader (point of sale, kiosk, personal computer). The card itself will initiate the connexion to the issuer and run the rights update procedure.

Finally, with Robin, as there is no need to deploy software on terminals, anyone can be an issuer. The smallest bank, retailer or other issuer can launch its new application that will work everywhere. No more need for critical mass.

Technical overview

The protocol

Before using Robin, the card and the terminal should mutually ensure that the other party also supports Robin, in order not to interfere with other processing and to preserve backward compatibility. A protocol negotiation procedure is described in the Robin specifications.

There is no limit to Robin applications.

Free you imagination !

Robin is great to enhance customer relationship, to offer loyalty programs and new services.

Robin is fully backward compliant and will not interfere with previous cards and terminals.

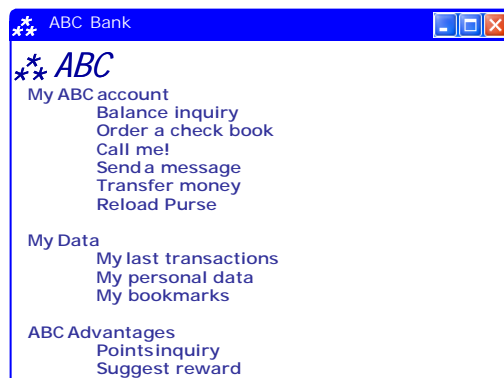
The following processing is totally defined in the ISO 7816 standard: When the card wants to send a message to the terminal, it shall use the status word '82xy', where 'xy' is the length of the message it wants to send. The terminal then retrieves the message with a GET DATA command, with P1P2 fields equal to '0000'. Optionally, the terminal can send a response to the card with a PUT DATA command, with P1P2 fields equal to '0000'.

When the terminal wants to inform the card of the occurrence of an event, it uses an ENVELOPE command.

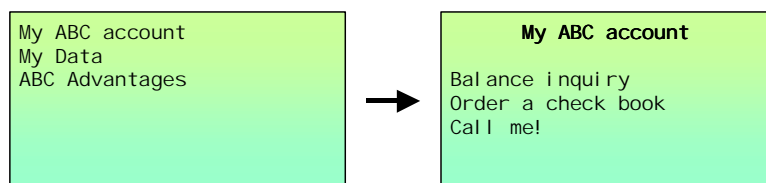
Adaptive processing

An important feature in Robin technology is its adaptive processing, meaning that the card will adapt to the terminal in which it is inserted. The same application, on the same card will be able to print some data if a printer is available, to display it otherwise, to send emails if internet protocol is available or not to propose this option if it is not, etc.

Let us take an example, a bank (ABC Bank) issues an EMV card with a Robin application. When inserted in a personal computer, the following menu will be displayed:



On a point of sale terminal, the same menu will be adapted, some options such as "Send a message" will not appear as this terminal does not have an internet access.



Robin dynamically adapts the application to the terminal it is working with.

Finally, on a personal handheld reader, another adapted menu will be displayed with only the features pertinent for such a device.



The commands : user interface

Eight commands are available to manage the user interface allowing:

- to display some data on the terminal screen. These data can be formatted or unformatted text, with or without graphical images.
- to print some data on a document (e.g. sale receipt). These data can be formatted or unformatted text, with or without graphical images.
- to ask the cardholder to enter some information of various formats (text, numerical values, yes/no, etc.),
- to ask the cardholder to choose one element in a list,
- to define some style sheets for displaying or printing text,
- to add a menu to the terminal man-machine interface. If the cardholder activates this menu, the card will be notified,
- etc.

The first version of the Robin specifications offer 29 card originated commands to enable the development of powerful applications.

The commands : processing blocks

Nine commands are available for general processing, allowing:

- to request the terminal to start a browser (e.g. Internet browser). Two other commands are available to add new favorites and to remove previously added ones,
- to retrieve some information such as geographical location, time and date, type of terminal and business activity, etc,
- to have the terminal run a complete digital signature generation procedure, that may encapsulate card commands. This command has been designed to allow for state of the art signature generation according to existing regulations,
- etc.

The commands : card reader management

Six commands are available to manage card readers. These commands may be sent to another reader (containing a SAM, another card) or to the reader where the Robin card is currently present. For example, the card can ask to be ejected from the reader.

The commands : communication with distant resources

Six commands are available to communicate with the outside world. They allow to send and receive rough data and to send some messages (e.g. email using SMTP protocol).

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About Iteon

Iteon is an independent smart card consultancy. Since its creation, in 2000, it has been helping organisations to develop new products, offer new services and be successful in their migration projects.

Our fields of experience cover smart cards for the financial sector, telecom and identity. We advise our customers on business and technical strategy, represent them in standardisation bodies, define migration plans, write technical specifications, make product plans, give trainings and develop card software.

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