The next step in creating Electronic Ticketing Interoperability for Europe

Memorandum of understanding

This document presents a memorandum of understanding signed by ITSO, VDV KA, Calypso Networks, AFIMB and UITP in February 2012.

Other national electronic ticketing schemes are invited to join and support the next step in creating interoperability for Europe.
MoU -IFM Alliance
2012-02-15

Presentation of the signers

**ITSO**
ITSO is a UK government-backed non-profit organisation which sets a common technical standard that means transport operators throughout Britain can link up so passengers only have to use one secure payment 'smart' card no matter what bus, train or route they are using and also that same card can be developed for multiple uses.

**VDV-KA-KG**
VDV-KA is the open and secure German standard for electronic fare management systems (EFM) which enables the passenger to move freely and easily between the public transport companies without having to deal with the different tariff zones and ticket machines (interoperability). It provides an open platform which not only allows transport operators to integrate their back office systems as well as those of multimodal and multifunctional partners. The VDV-KA-KG regulates the cooperation of the various stake holders in EFM systems at an organisational level. (((eTicket Germany is the brand name of the VDV-KA.

**Calypso Networks**
Calypso Networks Association (CNA) gathers operators, authorities & suppliers implementing Calypso. Calypso technology is an open specification issued from an EU project, to assure a high security level for contactless transactions and to provide technical interoperability between networks assuring multi-services providers environment. The main tasks of CNA are to define and direct the reference specifications, a certification policy and to contribute to the international standardisation process.

**AFIMB**
The French agency for multimodal information and ticketing (AFIMB) is attached to the Ministry of Sustainable Development and Transport. The agency's responsibilities include to promote interoperability in the areas of multimodal information and ticketing and support standardisation in these areas.

**UITP**
UITP is the international network for public transport authorities and operators, policy decision-makers, scientific institutes and the public transport supply and service industry. It is a platform for worldwide cooperation, business development and the sharing of know-how between its 3,400 members from 92 countries. UITP is the global advocate of public transport and sustainable mobility, and the promoter of innovations in the sector.

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The next step in creating Electronic Ticketing Interoperability for Europe

Memorandum of understanding

This Memorandum of Understanding (MoU) has been developed by representatives of the organisations for technical specifications of VDV KA, ITSO and Calypso together with representatives of UITP and AFIMB. This MoU presents a platform for a cooperation in the context of today’s infrastructures and systems. It will be presented also for other stakeholders asking for support and thus establish a European Alliance for developing European interoperability.

By signing this MoU

- we support a further development of a European electronic ticketing interoperability
- we agree on a platform for cooperation as outlined in this MoU
- we support an IFM Alliance organised on a European level
- we ask for a close cooperation with the European institutions and financial support for a EU-project as proposed in this MoU
- we invite European stakeholders on national level for support and involvement in further development

February 2012

VDV-KA-KG

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Introduction

Since more than a year, the way forward to a European interoperable electronic ticketing has been on the agenda but so far no tangible results are seen. The EU Interoperable Fare Management (IFM) project (www.ifm-project.eu), funded by DG INFSO under FP7, ended in June 2010 with great and proven success. The conclusions from the IFM-project are still valid but the fast development of new techniques using contactless EMV-cards and NFC solutions open up for further development as well as new mobile payment solutions.

The electronic ticketing issue is also on the EU agenda included in the white paper on transport policies, the ITS directive and a priority for DG MOVE Urban ITS expert group. The public transport sector is willing to actively take part in a further development to meet the goals presented in the various recent EU-proposals. But there is a need to use the knowledge and the investments done by the public transport sector and develop it further.

A continuation (i.e. actual pilot implementation) of the IFM concept (downloading of local applications on compatible media) is still high on the wish-list of the former IFM partners (UITP, ITSO, VDV, Calypso-group\(^1\) and the French ministry of Transport) and is supported by a significant number of other countries looking towards smartcard interoperability (eg NL, CZ, HU, SE etc). The development of the multi-application approach combined with EMV and NFC mobile payments is also strongly supported and does not include only the IFM partners but also a range of other important public transport stakeholders. The next step for the public transport sector would be to introduce a true and attractive interoperability throughout Europe.

State of the art of contactless technology

Contactless technology is now mature and open, allowing public transport operators to use a single common specification for usage devices (ticket machines, gates and validators) that can support and load tickets and are able to work securely.

Beside smartcards issued by a scheme itself, other smartcards can be used in a scheme if their specification meets certain criteria and the issuer is “trusted”. Trust schemes are already in place in the mobile phone world (GSMA), Bank and Credit Cards (EMV and EPC), and for Passports/National ID cards. Although each Trust Scheme publishes its own minimum specification and compliance regime, all are believed to be compliant with the Public Transport proposals of EU-IFM.\(^2\)

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\(^1\) In the IFM project the Calypso-group was represented by SNCF and RATP and the French Ministry of Transport by URBA2000. Discussions preparing this MoU include the Calypso Networks Association and AFIMB, the ticketing agency from the French Ministry of Transport.

\(^2\) The EU IFM-Project identified the Smartcard Specifications, linked to International standards, which can securely be used by Transport Operators. These Specifications cover all aspects for smartcard use.

ISO TC204-WG8 has gathered them into a technical report ISO 24014-3 that will be ready for approval April 2012.

<table>
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<tr>
<th>Specification</th>
<th>Standard</th>
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<tr>
<td>Radio Frequencies</td>
<td>ISO 14443</td>
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<tr>
<td>Data Commands</td>
<td>Global Platform</td>
</tr>
<tr>
<td>Operating Systems</td>
<td>Java, Android</td>
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<tr>
<td>Filing Structures in smartcard</td>
<td>ISO 7816</td>
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<tr>
<td>Security Algorithms</td>
<td>Global Platform (i.e 3DES, AES, RSA)</td>
</tr>
<tr>
<td>Card Security</td>
<td>Common Criteria</td>
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</tbody>
</table>
The following families of smartcards can be envisaged:
- Smartcards issued by their own Scheme
- Smartcards issued by other Transport Operators
- Smartcards issued by other Trusted partners
- Contactless Bank and Credit Cards
- NFC-enabled mobile phones

From the early development of smartcards, contactless devices have now developed into a sophisticated range of devices built around a common open specification and able to securely handle multiple applications on a single card. Thus a transport smartcard can potentially talk to a bank ETM machine; and a Mobile Phone can be used to hold a transport ticket and open a metro gate.

A single smartcard can therefore hold a number of separate, independent and discrete transport ticketing applications alongside the means for contactless payment. Each is completely independent of each other and securely locked to the owner of the Transport Ticket of Bankcard.

**State of the art in Fare Management**

Fare management systems are developing following two principle approaches — *card centric* with information stored on a media (smart card or NFC mobile phone) and *back office centric* with information stored in the back office and a read only of a contactless ID.

These meet different demands and market needs and should be seen as complementary solutions within a common framework. Both meet the basic requirements for an electronic ticketing *secure* systems and short transaction times that are required by transport operators at access points (most often < 0.3sec).

The card centric includes information written on a media and intelligence of validators in devices on platforms/vehicles. The back office centric includes information stored in back office as well as intelligence and "read only" devices with control and security checks.

The development of contactless cards is more recent, and it is now possible for Fare management systems to build scenarios for their use, as the unique secure nature of the contactless card allows trusting the identity of the smartcard. ³.

There are two different scenarios for their use:

Â Payment is directly taken at the start of a journey
Â The card details are taken at the start (and potentially at the end as well) and payment is deducted from the cardholders account through the back-office later on.

It is possible in this second scenario to recognise multiple uses of the card throughout the day and make a single composite deduction for travel taken.

Other secure smartcard identities could be used in a similar way (assuming they are pre-identified and linked to a pre-paid deposit, a method of payment or an authority to travel). This could cover smartcards issued for national Identity, Drivers Licenses, or Social Security etc. under limitation of Privacy protection.

³ ISO-TR 18406 supports the conditions for the introduction of contactless payment as fare management media and could be developed to a CEN or ISO standard
The Use cases and Media can be summarised as follows:

<table>
<thead>
<tr>
<th>Use cases</th>
<th>Card centric</th>
<th>Back office centric</th>
<th>Payment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Off line gates/validators and inspection</td>
<td>On line gates/validators and inspection</td>
<td></td>
</tr>
<tr>
<td>1 Pre-defined products</td>
<td>Product on media</td>
<td>ID on media</td>
<td>Payment before usage</td>
</tr>
<tr>
<td>Tickets</td>
<td></td>
<td>Product in back office</td>
<td></td>
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<tr>
<td>Concession</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>2 Pay as You Go with prepaid stored value</td>
<td>Stored value on media</td>
<td>ID on media</td>
<td>Add-value before usage</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Stored value in back office</td>
<td></td>
</tr>
<tr>
<td>3 Pay as You Go with customer account giving permission to travel</td>
<td>ID on media</td>
<td>ID on media Account in back office</td>
<td>Billing after usage according to accounting contract</td>
</tr>
<tr>
<td>Standard Concessionary</td>
<td></td>
<td>Payment means ID in back-office</td>
<td></td>
</tr>
<tr>
<td>4 Pay as You Go with payment registration at gate</td>
<td>Bank ID on media</td>
<td>Billing in Back Office</td>
<td>Payment when usage Usage may be aggregated by short periods</td>
</tr>
</tbody>
</table>

Transport cards support Use cases 1, 2 and 3.
Contactless bankcards support Use cases 3 and 4.
NFC-enabled Mobile Phone can be loaded with both transport cards and bankcards and can therefore address any of the use cases. Their coexistence in the same device may require selection by the holder. They also allow the customer to purchase a ticket or stored value over the internet or over the air.

**Unified ticketing and seamless travel**

There are two options to organise ticketing for a cross network or multi-modal journey, or one crossing multiple borders:

- To offer the customer just one single ticket for the entire journey
- To offer separate tickets for each segment

With classical paper tickets or any form of materialised tickets, issuing Multiple Tickets clearly inconveniences the customer with a wallet full of separate tickets if not using smart technology.

The first offer with a single ticket is complex and costly to implement as it includes not only technical agreements but also business agreements. It obliges transport operators to circulate ticket prices for all segments. It is necessary to develop a common ticketing scheme, with common processes to fulfill and control tickets at gates or on board. The parties involved need to agree commissions to be paid for the lead retailer. There is settlement and clearing to be carried out. This option has only been feasible on limited urban or regional scales.

Smart ticketing raises that inconvenience as it allows multiple tickets to be mitigated by loading them all onto a single device.
The customer appears to have purchased a single through ticket, but one made up of multiple segments. There are thus no complex clearing and settlement rules to follow. This solution could also include long distance rail tickets if the CEN Technical Specification - *Indirect Fulfilment for Rail* was later completed with the corresponding rules, as the current document foresees the possibility of it.

That scenario is however dependent on the single smartcard being compatible with the technical standards of each participating Transport Scheme. At the same time, each Transport Operator must have the trust in the smartcard and its issuer, i.e. that the individual tickets are secure and cannot be altered or deleted until used.

Interoperable smartcards thus allow a single physical infrastructure to cover a range of customer devices managed by a range of suppliers and supporting a range of ticketing solutions. These ticketing solutions can include prepaid single or multiple tickets, pay-as-you-go, post-pay whether for local metro/transit (bus, tram, ferry, light rail), regional bus or rail, or long-distance coach, and even rail or air. In each case the smartcard allows multiple ticketing solutions to be held securely and independently on the same smartcard.

Smartcards are common to many different platforms of use and provide easy and quick transactions for the customer, the retailer and the service Operator. They embrace all contactless smartcard forms (traditional credit card sized plastic, mobile phone, dongle etc). They provide quick (sub half second) response times and are applicable to all forms of transport. They are covered by open international standards and can meet high levels of security.

This option is the preferred solution for cross border tickets.

**Proposal**

We have to find ways of continuing the IFM momentum. Emerging new technologies raise challenges as to how to create European Interoperability.

The new technologies (like EMV, NFC, etc) are compatible with the IFM methodology and could support a wider European interoperable ticketing concept. Everybody is waiting for the European Commission to provide cross-border direction and support as an integral part of their ITS strategy to provide mobility, social inclusion and modal switching towards a more sustainable future.

With the IFM approach and the road map presented in spring 2010 there is a viable solution for electronic ticket interoperability which above all also meets the important subsidiarity factor for the public transport sector. Moreover, this approach fits well with all other transport sectors and other potential smart card and mobile applications.

So the question is - "What can we do NOW?"

The start of an EU-IFM phase 2 based on the first step of the IFM road map and embracing EMV and NFC that allow the development of new payment solutions is the right way forward. A pan-European approach including the main stakeholders will make it possible to introduce new and attractive solutions for the European citizens. Using standardised solutions could also make it possible to introduce global solutions.

But there is a need for European support at the Commission level and also ways of funding the development and demonstration of these new solutions for interoperability. This is a common interest at the highest European level, in respect of the local and regional responsibility for implementation and of today's infrastructures.
Therefore it is proposed that an EU IFM ALLIANCE is set up with the support of EU Commission (DGMOVE/DG INFSO) that creates a trust scheme for Public Transport Smartcards that mirrors the Trust Schemes in mobile phone industry, banking etc.

The EU IFM ALLIANCE trust scheme will cover:
- Rules, specifications and governance requirements for membership
- Compliance checking, award of certification, and actions to be taken in the event of non-compliance
- A recognisable scheme mark and published list of compliant schemes in the Trust network
- Manage relationships with other trust schemes

Additionally the EU-IFM ALLIANCE will be required to set up an EU Ticketing Web-Portal through which customers can access member scheme web-sites in order to download apps for their respective ticketing schemes. This portal can be linked to other EU initiatives to create EU-wide Journey Planning and allow customers the opportunity to take the next step to buying the necessary ticket or permission to travel for their chosen journey.

Once the EU-IFM ALLIANCE has been created and is operational, it is recommended that a pilot be created to test the portal, the trust scheme and the necessary compliance of smartcards as they interoperate between transport schemes and across mobile phone networks and with bankcards

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