Synergy between Registered Traveler Programs and Visa-Processing for frequent travelers

Chris Shire, Infineon Technologies UK Ltd., London, UK
Mayumi Inada, Infineon Technologies Japan K.K., Tokyo, Japan
Yaw Peng Ng, Infineon Technologies Asia Pacific Pte., Singapore
Detlef Houdeau, Infineon Technologies AG, Munich, Germany

Summary
A Visa-sticker or ink stamp indicates a right of access to a country for a person on a short term visit and is issued at a border control point. Today around 40 states worldwide use e-Gates to speed up the border control process. Many such systems are based on ICAO Standards. Synergies between Visas and e-Gates/RTP are possible, especially when addressing frequent travelers who are also issued a Visa. Using the ICAO 9303 Standard reduces cost, risk and development time for e-Gates/RTP as well as replacing Visa-stickers and/or –stamps. The following article reviews the background and benefits.

1. Registered Traveler Program
Registered Traveler Programs (RTP) have been set up to speed up the border control process. The main target is to replace manual processing – with border police, control booths and inspection systems with MRZ-scanner – to automatic processing based on electronic ID document inspection and document holder verification and/or verification of the travelers data, including biometrics held on a server.

Naturally a pre-travel registration of the participant is needed in an automatic system. These programs can run at so-called “green borders” on land, “blue borders” at sea and at airports, as both online and offline verification is possible. By the end of 2011 more than 40 States worldwide will have an RTP in use. The main focal point of such programs is at international airports, especial airport hubs, like Narita-Tokyo, Abu Dhabi International Airport, Changi-Singapore, Fraport-Frankfurt and Heathrow-London.

1.1. Scope of e-Gates
The objectives of an Automatic Border Control (ABC) system are to:

a) Improve passenger clearance without increasing staff costs (efficiency);
b) Make the process easier for passengers (convenience);
c) Enhance precautions against fraud (security).

1.2. Scope of user group
Frequent travelers are the main target of ABC-programs. A frequent traveler could be a commercial citizen of any country (in some cases), a service provider, such as caterers or baggage handlers, or members of airline crews.

1.3. Scope of ID-documents for RTP and e-Gates
An ABC-system enables automated or semi-automated border control that can be operated with an eMRTD, RTP-Card, National eID-Card or without a token. References are available for all four approaches:

- e-Passport, complying with ICAO 9303, e.g. in Australia, Serbia, UK, Germany etc.;
- e-Registered Traveler Program with token, e.g. in Netherlands, France, Japan, Oman, UAE, Bahrain, the US;
- National eID-card, e.g. in Hong Kong, Spain;
- e- Registered Traveler Program without token, e.g. Germany (ABG), UK (IRIS).
With the selection of ICAO 9303, the biometric data set, the electrical security and technologies for the token are well defined.

The lifetime of specific RTP-tokens are limited typically to 1 year, but the life time for eMRTD and national eID cards are typically 10 times longer. In some cases, the specific RTP-token provides the revenue to enable a commercial business case. Participants of an RTP-program may pay a fee to an accredited 3rd party identity checking enterprise for a RTP-token.

### 1.3.1. e-Gates based on eMRTD

Face recognition based on eMRTD was first trialed in 1999 at Kuala Lumpur International Airport (KLIA) in Malaysia. A document validation check and a passenger identity check, monitored by border police, are the cornerstones of this implementation. The Ministry of Interior selected face recognition as the biometric. There were no standards for the biometric data set (e.g. ISO 24727) or the biometric photo in travel documents (e.g. ICAO 9303) at this time. When the new standards for travel documents were introduced in 2004, some countries started using eGates based on these new standards plus biometrics, such as Thailand (2005), Portugal (2007 – RAPID), Australia (2008 – SmartGate), Germany (2009 – easyPASS) and Serbia (2010).

Serbia had one of the first implementations, which used fingerprint recognition technology alongside standard travel documents. France was expected to take a similar approach in 2011. The traveler’s two fingerprints are flat scanned and stored electronically in the document.

A central register of the booklet holder’s biometric data is not always needed and in some countries not implemented because of privacy requirements. There are now three generations of travel document:

- 1G, Face, protected by ICAO BAC; in use since 2006
- 2G, Fingerprints (2x), protected by BIG EAC; in use since 2009
- 3G, Face, protected by ICAO SAC; roll out expected in 2012

A full set of biometric data in the travel document and the related data access security framework typically takes about 10 to 20 seconds to read. This includes reading and verifying the full electronic data set including biometrics and credentials, terminal authentication and MRTD - authentication. If it is only the facial image and digital credentials that are verified this can be reduced to under 5 seconds.

The facial image data set in travel documents is usually compressed using JPEG or JPEG2000 to around 12 Kbytes. Fingerprint images use a similar high resolution and are about 18 Kbytes per fingerprint.

Because of normal issuance cycles it takes up to 10 years to replace all old-style non-biometric travel documents. This means, for example, that it will be at least 2016 before all of Europe’s travelling citizens have electronic documents containing biometrics. This has implications for the current trade in fraudulent documents, but also highlights the need to start using eGates or at least manual electronic authentication, otherwise illegal travel documents will continue to be used.

### 1.3.2. e-Gates based on RTP-token

One example RTP based on special RTP-tokens was a scheme at Schipol Airport in the Netherlands in 2002, called Privium. Similar projects have been set up in Israel at Ben Gurion International Airport (2004), in the US at JFK International Airport (2005), in Japan at Narita Airport (2006), in the UK, at Heathrow Airport (2006), in France at Charles de Gaulle Airport (2006), in Oman at Muscat International Airport (2007), in Canada at Ottawa International Airport (2008) and in the UAE at Dubai International Airport (2009). Most of these are stand alone commercial schemes installed with the support of the local authorities but are not interoperable.

Passenger data, including biometric data, is held centrally to allow three-factor authentication.

Various local biometric data formats are in use, varying from image to template and ISO standard or non-ISO standard.
Registered travelers normally pay additional fees to participate in such schemes. This ABC technology typically takes around 5 to 10 seconds to process each traveler’s document.

1.3.3. e-Gates based without RTP-token
A key example of a RTP-program without token is the ABG system at Frankfurt Airport (Fraport), in Germany, which was piloted in 2006. This eGate system is based on a central registration database of iris template data sets. The passenger’s iris image needs to be captured pre-flight. Participation in this scheme is free of charge and voluntary for the passenger. It takes no more than 15 seconds to process each passenger.

A similar system has been installed in airports across the UK since 2004. More than 100,000 users have been registered, mostly from the UK, but from elsewhere worldwide as well. It is free to use, and has a typical cycle time of around 20 seconds. But with only a few eGates per terminal, the queue to use the system can be quite long at times, and several IT issues have affected system availability. The databases are kept by the national authorities and the schemes are not interoperable.

1.3.4. e-Gates based on National eID-Cards
A RTP based on national eID was first used in Malaysia in 1998, called MyKad at KLIA. The first instance in Europe was tested in Spain in 2010. The Spanish ID card, DNI, was used at Madrid Barajas Airport. Germany tested a system with ID card, nPA initially at Fraport, Frankfurt.

Three biometric technologies are in use: facial images in Malaysia, rolled fingerprint images in Spain and flat finger in Germany.

The biometric data needs to be held centrally.

It takes no more than 5 seconds to process each passenger. As these schemes are national-ID card-based, they are for local citizens only.

2. Visa

2.1. Scope of Visa and Processing
Visa processing is a kind of registered traveler program, with a focus on a different class of short term visitor. There are various visa-waiver programs, for example that of the USA, and the EU. Visitors to the EU who are non-EU citizens and from a non-VWP-country need a valid visa to enter a country. These maybe “tourist Visas” for short term visitors who have no right to work or stay longer than an agreed period, or another classification which permits a longer stay and the right to study, or work. To get a visa, the citizen must start an application process at an embassy of the target country of the visit. To get a EU Schengen area visa the citizen brings a photo and displays 10 fingerprints on a biometric scanner, pays a fee, fills in an application form and then, some days later, receives an ID2 sticker based on the ICAO recommendation 9303_2, with printed MRZ, photo, name, given name and validity of the document. In case of the Schengen visa, the print document has some optical security features, such as Guilloche print, rainbow-print and a hologram.

The validity of a visa is limited. In the case of EU Schengen area visas the limit is defined as 90 days. This could be much shorter, e.g. between China and Hong Kong, where validity is 16 days.

Electronic visas mean online registration and online fee payment before traveling into a country. This kind of e-visa processing is in use for example in Australia (ETA), Armenia, Bahrain, Cambodia, Nigeria, US (ESTA), and Oman.

2.2. Range of Visa type ID-documents for Travelers
Visas can be a stamped ink image – one stamp on the day of entry and one stamp on the day of exit – in the MRP-booklet, as well as a sticker. The sticker could have an individual size like a stamp (for example in
Egypt) or an ID2-format (for example in Europe). The ID2 format can carry a MRZ-line (for example in China), while ID2-stickers without an MRZ-line are also in use (for example in India). In some cases the visa is also a landing permit and has a 2D barcode (for example in Japan).

2.2.1 Electronic Visa document
Four different approaches are in the pipeline:

a) ID2-sticker with microchip
b) ID1 (Smart Card), as family concept with the electronic residence permit
c) ICAO_LDS2.0
d) ID1 (Smart Card), combined with a RTP

2.2.2. ID2-Sticker with microchip
This idea was tested and evaluated in the CY 2004 and 2005 based on the current ISO 14443 Standard for the RF-interface. These tests have shown a physical limit of a maximum 10 Visas placed in an ID3-booklet. With such knowledge ICAO NTWG does not promote this approach anymore.

2.2.3. ID1 (Smart Card) as family concept
This approach has been under discussion at the UK Border Agency (UKBA) for over two years. The idea is to issue an ID document, a so-called "biometric residents permit" to long-term visitors (e.g. students) or to give asylum seekers a document which defines their right to stay for a prescribed time. With this approach all foreigners (Non-EU citizens) data, including the biographic information, biometric data (face, 10 fingerprints) and status information can be stored in the same database. One database supports quick digital reviews on " overstayer", no fly lists, wanted lists and persons previously refused access into the country. Similar schemes are now being put in place across the EU as BRP are required by EU Directive.

2.2.4. ID1 (Smart Card) combined with RTP
Another option is a combination of the registration of visitors to get a visa with the issuing of a RTP-token in the format of a smart card. This approach is of interest in the case of frequent travelers. The first example of this is the frequent passage of citizens from Hong Kong to mainland China. To use proven technology the government has selected the ICAO framework, meaning ICAO data group (LDS 1.7), ICAO biometric (face photo) and ICAO security (BAC).

3. Synergies between Registered Traveler and Visa for frequent traveler
Many benefits are achievable with the synergy of RTP and visa processing of frequent travellers. Some examples are:

a) Databases can be simplified; this allows more precise and faster cross-checks;
b) Documents can have common design and security features; this reduces costs for data capturing, document production and document issuing;
c) Border control equipment can be simplified; this reduces capital costs and complexity of infrastructure;
d) Border staff training and effort reduction; reducing of fatigue effects and costs and improving time to focus on anomalies and fraud;
e) Traveler clearing rate can be increased dramatically;
f) Waiting time at border control station can be dramatically reduced.

3.1 Steps required to align eRTP and eVisa programmes
The conformity of the data sets is a key step, the data gathered by the RTP scheme may, especially if managed by a 3rd party, not be aligned with that of the Visa issuance process. When aligning these two data sets it may be an option to consider the latest data file format supported by ICAO; this will provide a basis for long term interoperability not only nationally but regionally as well. The latest specification is ICAO LDS2.0
3.1.1 ICAO LDS2.0 Options
Since 2010 LDS2.0 has been in the standardization process. Today all MRTDs use the Logical Data Structure (LDS) V1.7. In the ICAO NTWG an extended data set combined with an extended security set for extended application is in definition – LDS2.0. One possibility could be a travel record data set stored in the microcontroller of the MRTD-booklet. With this approach, the border police can get the standard data set of the MRTD with name, given name, MRZ No, validity of the document, country of issuing of the travel document and photo of the holder as well as the information of all previous travels.

3.1.2 Commonality of Verifications
Trust in the unseen electronic interchange between a scanner, the server and the border control point is crucial, not only for border control authorities but for the citizens they are trying to protect. If the data gathered by the various schemes is valid, then electronic certificates are issued and stored in the servers and in some cases the token the travelers hold. These certificates must be verifiable at all points of entry and exit within a country. The cross-certification process between RTP and Visa schemes requires further levels of trust to be built up, not only at the electronic level but at the operational levels between the schemes.

4. Summary
If Visas and Register Traveler Programs are aligned the synergies that result bring benefits to all the stakeholders in the travel industry. It would seem logical that in the future Visa schemes and RTP schemes should have interoperable tokens as well as back office controls. This might increase the consumables cost i.e. when comparing an inked stamp to that of eVisa but the reduction in fraud, ease of use for the traveler and reduction in time taken at manual border controls would be immense. It would increase trust in users and reduce the growing plethora of non-interoperable schemes.

Abbreviations
ABG    Automatic Biometrische Grenzkontrolle (automatic biometric border control)
ABC    Automatic Border Control
API    Advanced Passenger Information
BAC    Basic Access Control
BIG    Brussels Interoperability Group
BRP    British Residence Permit
CY     Calendar Year
DNI    Documento Nacional de Identidad (national ID card; Spain)
EAC    Extended Access Control
eMRTD  electronic Machine Readable Travel Document
eRTP   electronic Registered Traveler Program
ETA    Electronic Travel Authority
ESTA   Electronic System Travel Authorization
EU     European Union
1G/2G/3G 1st generation, 2nd generation, 3rd generation
ICAO   International Civil Aviation Organization
ID1/2  Identity document format, according ICAO standard
JPEG   Joint Photographic Expert Group
KLIA   Kuala Lumpur International Airport
LDS    Logical Data Structure
MRTD   Machine Readable Travel Document
MRZ    Machine Readable Zone
NTWG   New Technical Working Group
nPAA   neuer Personalausweis (new ID-card; Germany)
PNR    Passenger Named Record
RTP    Registered Traveler Program
SAC    Supplemental Access Control
UKBA   United Kingdom Border Agency
VWP    Visa Waiver Program
2D     Two Dimensions
EUROSMART, the international Smart Security Industry association, valued the market for security chips in official documents in 2011 to be about 240 million microcontroller chips. Infineon’s products are used in the public domain of about one-third of the 192 UN member states, which represent a total population of more than 3 billion people. According to the market research company IMS Research Infineon holds a 27 percent market share of the overall chip card IC market.

Infineon’s Chip Card and Security Solutions
Based on its core competencies in the fields of security, contactless communication and integrated microcontroller solutions (Embedded Control), Infineon offers a comprehensive portfolio of semiconductor-based security products for many chip card and security applications. Infineon uses this expertise to increase security in an increasingly mobile and networked world, e.g. for mobile payments, system security and secure electronic identity documents. Infineon has developed innovative, hardware-based security solutions for over 25 years and has been the world market leader for 14 years. Further information on Infineon’s chip card and security solutions is available at www.infineon.com/security

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Infineon Technologies AG, Neubiberg, Germany, offers semiconductor and system solutions addressing three central challenges to modern society: energy efficiency, mobility, and security. In the 2011 fiscal year (ending September 30), the company reported sales of Euro 4.0 billion with close to 26,000 employees worldwide. Infineon is listed on the Frankfurt Stock Exchange (ticker symbol: IFX) and in the USA on the over-the-counter market OTCQX International Premier (ticker symbol: IFNNY).

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