Conformity and Interoperability – Key Prerequisites for Security of eID documents

Holger Funke, 27th April 2017, ID4Africa Windhoek
Agenda

1. About secunet Security Networks AG
2. Timeline of interoperability for eID documents
3. Requirements and technical guidelines
4. Interoperability as a result of conformity
5. Conclusion
Facts & figures

- Customer-orientated corporate culture
- More than 430 employees at ten sites in Germany
- Founded in 1997
- Listed as prime standard on the German Stock Exchange
- Largest shareholder (79%): Giesecke & Devrient GmbH
- 2016 turnover: €115.7m, 2016 EBIT: €13.7m.*
  (*preliminary results)
secunet stands for

Trust
- IT security partner of the Federal Republic of Germany
- In-depth customer understanding
- Protection of confidential customer data and infrastructures
- Partner of the Alliance for Cyber Security

Experience
- Almost 20 years in the market
- Outstanding expert knowledge and understanding of cryptographic processes
- Long-term customer relationships
- National and international project references

Internationalism
- Highest EU and NATO approvals
- Collaboration in international committees
- International project awards

Innovation
- Forward-looking, wide-ranging developments for complex tasks
- Tailored security through customised solutions
- Broad product and consultation portfolio

Premium IT Security Made in Germany
In order to protect our society from terrorism and crime, the unique identification of persons must be ensured. Security authorities must be able to securely exchange sensitive data over the Internet.

**secunet’s role**

- Protecting the communication of security authorities
- Secure solutions for the enrolment and processing of biometric data
- Conformity testing solutions for eID documents and readers
- Mobile, stationary and automated border control systems
- Solutions for the electronic processing of classified documents
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Some basics regarding ePassports

- An electronic passport contains a chip with encrypted biographic and biometric data of the holder and also cryptographic information.
- An integrated chip increases the security of the document.
- The “International Civil Aviation Organization” (ICAO) sets and manages the framework for issuing and managing passports (e.g. Doc 9303).
- Additional specifications for datapage, physical security features, background systems…
- Chip can be separated in several layers according to ISO / OSI layer model:

  - Layer 7: Data, Logical Data Structure (LDS)
  - Layer 6: Protocols and Cryptography
  - Layer 4: Transport (Transmission protocol)
  - Layer 3: Network (Initialisation protocol)
  - Layer 2: Link (Hardware)
  - Layer 1: Physical (Hardware)

Focus in this presentation.
Which information can be stored in an ePassport?
## Milestones of eID documents (chip)

<table>
<thead>
<tr>
<th>Year</th>
<th>Milestones</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>Basic Access Control (BAC)</td>
</tr>
<tr>
<td></td>
<td>- Facial Image</td>
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<tr>
<td></td>
<td>- Passive Authentication (PA)</td>
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<td></td>
<td>- N-PKD for CSCA certs</td>
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<tr>
<td>2008</td>
<td>PACE as a supplement for BAC</td>
</tr>
<tr>
<td></td>
<td>- Better entropy of keys</td>
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<tr>
<td></td>
<td>- Better protection against</td>
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<tr>
<td></td>
<td>- Skimming</td>
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<td></td>
<td>- Eavesdropping</td>
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<tr>
<td>2015</td>
<td>Extended Access Control (EAC)</td>
</tr>
<tr>
<td></td>
<td>- Fingerprint</td>
</tr>
<tr>
<td></td>
<td>Bi-lateral agreements between countries to read fingerprints</td>
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<tr>
<td></td>
<td>- Public Key Infrastructure (CVCA certs)</td>
</tr>
<tr>
<td></td>
<td>- Mutual authentication between reader and chip</td>
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<tr>
<td></td>
<td>- Terminal Authentication</td>
</tr>
<tr>
<td></td>
<td>- Chip Authentication</td>
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<tr>
<td>2017</td>
<td>eIDAS</td>
</tr>
<tr>
<td></td>
<td>- Restricted Identification (RI)</td>
</tr>
<tr>
<td></td>
<td>- Enhanced Role Authentication (ERA)</td>
</tr>
<tr>
<td></td>
<td>- Pseudonymous Signatures</td>
</tr>
<tr>
<td>201?</td>
<td>LDS 2.0</td>
</tr>
<tr>
<td></td>
<td>- Entry / exit stamps</td>
</tr>
<tr>
<td></td>
<td>- Electronic Visa</td>
</tr>
<tr>
<td></td>
<td>- Additional biometrics</td>
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<tr>
<td></td>
<td>Mobile ID</td>
</tr>
<tr>
<td></td>
<td>- Deviated ID</td>
</tr>
<tr>
<td></td>
<td>- Mobile Phone</td>
</tr>
</tbody>
</table>
Complexity of eID protocols

- BAC
- BAC + EAC Version 1
- (BAC) + EAC Version 1 + PACE
- (BAC) + EAC Version 1 + PACE + EAC Version 2
- (BAC) + EAC Version 1 + PACE + EAC Version 2 + eIDAS + LDS 2
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Test Specifications to assure Interoperability

ePassports and inspection systems must be conform to the following test specifications:

- BSI TR-03105
  - Part 3.2 eMRTD with EACv1
  - Part 3.3 eMRTD with EACv2
  - (Part 3.4 eSign for ID card)

- BSI TR-03105
  - Part 5.1 Inspection systems with EACv1
  - Part 5.2 Reader with EACv2
  - (Part 5.3 Terminal software for ID card reader)

- ICAO Technical Guidelines
  - Part 3: eMRTD with EACv1 and PACE
  - Part 4: Inspection systems with EACv1 and PACE
### Structure of Test Specifications

#### Components of Test Specification

- Description of general test requirements
- Test setup / Testing environment
- Definition of suitable test profiles / implementation profiles
- Implementation Conformance Statement (ICS)
- Definition of testing or configuration data
- Definition of test cases according to a unified data structure
- Each test case should concentrate on a single feature to be tested!

#### Structure of Test Case

- **Test case ID**: unique identifier for each test case
- **Purpose**: objective of the test case
- **Version**: current version of this test case independent from the test specification
- **Reference**: where is this feature / behaviour specified
- **Preconditions**: setup of test case
- **Test scenario**: description of test case, step by step and corresponding expected result
- **Postconditions**: setdown of test case
Official Interoperability Tests

- Since 2003 interoperability tests for ePassports were performed to assure international interoperability
- Crossover tests in combination with conformity tests
- Crossover tests:
  - Every ePassport is tested with every inspection system
- Conformity tests:
  - Every ePassport is tested against the test specification

Benefits of conformity testing:
- Less efforts (crossover test can only be handled with a low number of devices to test)
- Every feature of an ePassport or inspection system can be tested separately
- Detailed failure analysis allows to improve the stability of the whole eMRTD eco system
- Results help not only to improve the stability of ePassports and inspection systems but also to improve the quality of (test) specifications and test tools
Results and Experience of last Interoperability Tests

- **Madrid 2014 (ICAO)**
  - Focus on PACE
  - Companies and countries took part in the test
  - 10 inspection systems, 3 test labs
  - 52 completely different ePassports were tested
  - Detailed results:
    
    http://blog.protocolbench.org/2014/07/results-sac-interoperability-test-madrid-2014/

- **London 2016 (Security Document World)**
  - Focus on PACE and PACE-CAM
  - 17 document provides, 27 ePassports, 12 inspection systems, 2 test labs
  - Inspection system were tested in crossover tests
  - ePassports were additionally tested against subset of ICAO test specification
    
    - 8502 test cases were performed, 98% passed
  - Detailed results:
    
    http://blog.protocolbench.org/2016/05/results-emrtd-interoperability-test-2016/

- **Next InteropTest: End of September at Joint Research Center (JRC) in Italy organised by the European Commission and performed by JRC with focus on PACE!**
### Check Interoperability with tools automatically

<table>
<thead>
<tr>
<th>Golden Reader Tool (GRT)</th>
<th>GlobalTester (GT)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Reference implementation for ePassports with biometric data</strong></td>
<td><strong>For conformity tests of eID documents and inspection systems</strong></td>
</tr>
<tr>
<td><strong>Reads the data stored on the ICAO compliant chip and displays them</strong></td>
<td><strong>Support of all relevant protocols in context of eID documents (PACE, TA, CA etc.)</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Used at several interoperability tests worldwide since 2006</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Customers: chip vendors, application vendors, national security printers, test labs...</strong></td>
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<tr>
<td></td>
<td><strong>Detailed test report -&gt; certification</strong></td>
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One Result of Interoperability: Automated Border Control

**eGates:**
- Automated border control increases security:
  - Spend less time for standard tasks
  - More time for analysing critical ePassports

Source: blog.protocolbench.org
Example for Automated Border Control: EasyPASS

<table>
<thead>
<tr>
<th></th>
<th>2015*</th>
<th>2016*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall Entry (Germany)</td>
<td>39.9</td>
<td>40.9</td>
</tr>
<tr>
<td>Overall Exit (Germany)</td>
<td>39.4</td>
<td>40.4</td>
</tr>
<tr>
<td>EasyPass Users</td>
<td>9.1</td>
<td>12.1</td>
</tr>
<tr>
<td>Frankfurt Airport (overall)</td>
<td>25.5</td>
<td>24.9</td>
</tr>
<tr>
<td>Part of EasyPASS (Frankfurt)</td>
<td>18.0%</td>
<td>25.0%</td>
</tr>
</tbody>
</table>

* In million users, Source: Federal Police
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Conclusion

- Interoperability of eID documents is
  - the result of conformity testing
  - easily and automatically testable by using internationally established tools
  - key functionality for world-wide travelling
  - the key element for automatic border control

Security of eID documents is achieved by interoperability.
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