Automated Border Control (EasyPASS): Monitoring the system performance

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Section D 13 – Inspection Infrastructures

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Outline

• eMRTD operational tasks @ BSI

• EasyPASS operational monitoring
  – architecture and components
  – usage/application scenarios
  – shapes of monitoring output

• EasyPASS ABC system
  – system overview
  – facts and figures
  – eMRTD performance reporting
eMRTD operational tasks @ BSI

- **PKI**
  - Country Signing Certificate Authority (CSCA)
    - national trust anchor to protect chip data
  - National Public Key Directory (NPKD)
    - trustworthy CSCA certificates for document inspection
  - Country Verifying Certificate Authority (CVCA)
    - access to sensitive chip data (root instance of national EAC-PKI)
eMRTD operational tasks @ BSI

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- **Monitoring infrastructure**
  - *centralized monitoring* regarding *operational aspects* of *key components* of the *national inspection infrastructure*
  - *statistics* and *performance assessment*
    - to allow for system optimization, to ensure reliability, quality,...
EasyPASS operational monitoring – architecture and components

- Distributed Data-Warehouse system operated by BSI and Federal Police
- In-house development based on open source software
  - MySQL, Pentaho, Saiku,...
- Receives and processes XML log files from EasyPASS systems and also from manual border control
  - XML logging schemes according to BSI Technical Guidelines
    - BSI TR-03121 (Biometrics)
    - BSI TR-03135 (MRTD authentication)
    - Both guidelines available on https://www.bsi.de
- Independent from e-Gate and/or inspection system vendors
EasyPASS operational monitoring – what is it applied for?

• Acceptance tests
  – first time installation on each site
  – system improvements (revised hard- and/or software components)
• Monitoring of day-to-day operations
  – usage statistics
  – performance evaluations
    – processing times/speed
    – document authentication
    – biometric verification
  – system failure detection
• Detection and characterization of system optimization potential, e.g.
  – country or document type specific error rates
EasyPASS operational monitoring – shapes of monitoring output

- Ad-hoc analysis
  - flexible views on Data-Warehouse content
- Dashboards
  - workload and usage
  - rejects and errors
  - unknown certificates
- Reports (periodically)
  - usage statistics
  - performance evaluations
    - high level summary
    - detailed performance reports on
      - eMRTD authentication
      - biometric verification
EasyPASS at a glance

- EasyPASS := German Automated Border Control (ABC) system
  - e-Gate setting := Integrated 2-Step
    - Step 1: eMRTD authentication
    - Step 2: biometric face verification
- Open for citizens of EU + SAC (32 European countries; 18+ years old)
  - in addition: registered travelers from USA, Hong Kong and (from 2018-12-01 on) South Korea
  - in addition: travelers from selected third countries (on exit only)
    - ARE, AUS, BRA, CAN, CHL, ISR, JPN, KOR, NZL, SGP, TWN, USA
- Supported eMRTDs:
  - ePassport
  - German electronic ID card
EasyPASS guidance video
EasyPASS history

• 2009 – 2011: pilot project of German Federal Police and BSI
  – 4 e-Gates at FRA airport
  – development, setup and connection to background systems
• 2012 – 2013:
  – cost-benefit analysis
  – requirements specification (Technical Guidelines)
  – tender process
  – contract awarded to the consortium Bundesdruckerei GmbH / secunet Security Networks AG
• Since 2014:
  – roll-out and live operation
EasyPASS facts and figures
(10 weeks, since 09/2018)

• **190 e-Gates** in operation at **7 airports**
  – FRA, MUC, DUS, HAM, CGN, TXL, SXF/BER

• **400.000** travelers per week
  1. German eMRTDs (DEU): **67%**
  2. UK ePassports (GBR): **9%**
  3. other nationality ePassports: **24%**
EasyPASS dashboard – overall workload/usage statistics

Übersicht Nutzerstatistik

Schleusenstatus

Flughafen: Alle

Auslastung 8h

24510 Durchgänge

Auslastung 24h

60836 Durchgänge

Standort

1 Tag
(Durchgänge: 60836)

1 Woche
(Durchgänge: 385250)

1 Monat
(Durchgänge: 1648885)
EasyPASS facts and figures
(10 weeks, since 09/2018)

• 190 e-Gates in operation at 7 airports
• 400,000 travelers per week
• 12.6 Sec. processing time per traveler
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  - 0,01% rejects due to electronic document checks
EasyPASS electronic document checks – detailed results

<table>
<thead>
<tr>
<th>Prüfung</th>
<th>Anzahl Prüfprozesse</th>
<th>Anzahl Prüfprozesse erfolgreich</th>
<th>Anteil Prüfprozesse erfolgreich [%]</th>
<th>Anzahl Prüfprozesse unbestimmt</th>
<th>Anteil Prüfprozesse unbestimmt [%]</th>
<th>Anzahl Prüfprozesse fehlschlagen</th>
<th>Anteil Prüfprozesse fehlschlagen [%]</th>
<th>Anzahl Prüfprozesse nicht durchgeführt</th>
<th>Anteil Prüfprozesse nicht durchgeführt [%]</th>
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</thead>
<tbody>
<tr>
<td>Chipzugriffsprüfung</td>
<td>4.037.947</td>
<td>4.037.847</td>
<td>100,00%</td>
<td>0</td>
<td>0,00%</td>
<td>0</td>
<td>0,00%</td>
<td>100</td>
<td>0,00%</td>
</tr>
<tr>
<td>Terminalauthentifizierung</td>
<td>4.037.947</td>
<td>512.940</td>
<td>12,70%</td>
<td>0</td>
<td>0,00%</td>
<td>0</td>
<td>0,00%</td>
<td>3.525.007</td>
<td>87,30%</td>
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<tr>
<td>Chipsechtheitsprüfung</td>
<td>4.037.947</td>
<td>3.664.433</td>
<td>90,75%</td>
<td>1</td>
<td>0,00%</td>
<td>209</td>
<td>0,01%</td>
<td>373.304</td>
<td>9,24%</td>
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<tr>
<td>Chipsignaturprüfung</td>
<td>4.037.947</td>
<td>4.037.802</td>
<td>100,00%</td>
<td>11</td>
<td>0,00%</td>
<td>34</td>
<td>0,00%</td>
<td>100</td>
<td>0,00%</td>
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<td>Ausstellerzertifikatsprüfung</td>
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<td>105</td>
<td>0,00%</td>
<td>125</td>
<td>0,00%</td>
<td>100</td>
<td>0,00%</td>
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<tr>
<td>Integritätsprüfung</td>
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<td>4.037.812</td>
<td>100,00%</td>
<td>101</td>
<td>0,00%</td>
<td>34</td>
<td>0,00%</td>
<td>0</td>
<td>0,00%</td>
</tr>
</tbody>
</table>
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    - 2.6% rejects due to biometrics
      - 1.3% score below threshold (@ 0.1% FAR)
      - 0.4% failure to acquire
      - 0.9% PAD alert
EasyPASS biometric evaluation workflow – monitoring the biometric point of operation
EasyPASS biometric evaluation workflow – monitoring the biometric point of operation

Cognitec FaceVACS v9.1.1

Detection Error Trade-Off (DET)
EasyPASS facts and figures
(10 weeks, since 09/2018)

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    • 0.01% rejects due to electronic document checks
    • 2.6% rejects due to biometrics
    • 3% rejects due to other reasons
      – optical document checks
      – background checks
      – traveler behavior (e.g. pushing door)
EasyPASS eMRTD performance reporting

• eMRTD performance reports are compiled for each EasyPASS-enabled country
  – compiled on a annual/quarterly basis
  – allow performance comparison for eMRTDs of different countries within EasyPASS
  – yet bilaterally exchanged with some few countries (within Frontex and ICAO working groups)

• eMRTD performance report (DEU, 10 weeks, since 09/2018)
  – eMRTD chip reading times
  – eMRTD electronic check results

<table>
<thead>
<tr>
<th>Country</th>
<th># eMRTD</th>
<th>Average [sec]</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEU</td>
<td>2.734.800</td>
<td>2.65</td>
</tr>
<tr>
<td>All countries</td>
<td>&gt; 4.000.000</td>
<td>2.82</td>
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<tr>
<td>Country (min)</td>
<td>&gt; 300</td>
<td>1.39</td>
</tr>
<tr>
<td>Country (max)</td>
<td>&gt; 60.000</td>
<td>5.54</td>
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</table>

<table>
<thead>
<tr>
<th>Country</th>
<th># eMRTD</th>
<th>Success rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEU</td>
<td>2.734.800</td>
<td>100.00%</td>
</tr>
<tr>
<td>All countries</td>
<td>&gt; 4.000.000</td>
<td>99.99%</td>
</tr>
<tr>
<td>Country (max)</td>
<td>&gt; 2.000.000</td>
<td>100.00%</td>
</tr>
<tr>
<td>Country (min)</td>
<td>&gt; 100</td>
<td>72.81%</td>
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</table>
EasyPASS eMRTD performance reporting

• eMRTD performance report (DEU, 10 weeks, since 09/2018)
  – Biometric face verification times
  – Biometric face verification results

<table>
<thead>
<tr>
<th>Country</th>
<th># Verifications</th>
<th>Average [sec]</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEU</td>
<td>2.734.800</td>
<td>2.32</td>
</tr>
<tr>
<td>All countries</td>
<td>&gt; 4.000.000</td>
<td>2.34</td>
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<tr>
<td>Country (min)</td>
<td>&gt; 9.000</td>
<td>1.84</td>
</tr>
<tr>
<td>Country (max)</td>
<td>&gt; 7.000</td>
<td>3.42</td>
</tr>
</tbody>
</table>

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<thead>
<tr>
<th>Country</th>
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<th>Success rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEU</td>
<td>2.734.800</td>
<td>98.59%</td>
</tr>
<tr>
<td>All countries</td>
<td>&gt; 4.000.000</td>
<td>98.37%</td>
</tr>
<tr>
<td>Country (max)</td>
<td>&gt; 4.000</td>
<td>99.76%</td>
</tr>
<tr>
<td>Country (min)</td>
<td>&gt; 300</td>
<td>87.71%</td>
</tr>
</tbody>
</table>
Take home messages

• ePassport is the **key enabler** for implementing and running ABC systems

• Electronic document checks
  – distribution/availability of CSCA certificates is still a main challenge
  – **certificates (public keys) need to be public !!!**

• Operational monitoring
  – essential tool to support day-to-day operations at the border
    • usage statistics, performance evaluations, system failure detection, etc.
  – to be done/to be improved:
    • **harmonized/common metrics** regarding ABC/eMRTD performance assessment
    • **communication/exchange** of **performance reports**
Thank you very much!

Contact

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