ICAO PUBLIC KEY DIRECTORY (PKD)

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ICAO PKD: one of the 3 interrelated pillars of Facilitation

Annex 9 ⟶ **ICAO TRIP Strategy** ⟵ **ICAO PKD**

Chapter 3:main SARPs related to the TRIP

Doc 9303 Part 12: PKI specs
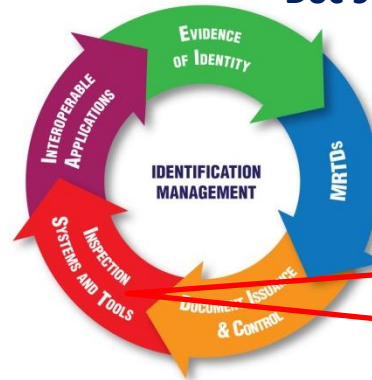
Mean to enhance security in cross-border movement. Inspection Tool for ePassports verification, validation and authentication of the digital signatures and content of the chip

ANNEX 9: Recommended Practice 3.9.1, 3.9.2 and 3.35.5

The Standards and Recommended Practice of Annex 9 recommend the following:

3.9.1: "Contracting States issuing, or intending to issue eMRTDs should join the ICAO Public Key Directory (PKD) and upload their information to the PKD."

3.9.2: "Contracting States implementing checks on eMRTDs at border controls should join the ICAO Public Key Directory (PKD) and use the information available from the PKD to validate eMRTDs at border controls."

3.35.5: "Contracting States utilizing ABC systems should, pursuant to 3.9.2 and 3.10.1, use the information available from the PKD to validate eMRTDs…."

WHAT is an eMRTD

Electronic Machine Readable Travel Document (**eMRTD**):
is a passport, card, Laissez Passer or other Travel Document that has a contactless integrated circuit embedded in it and the capability of being used for biometric identification of the MRTD holder in accordance with the standards specified in the relevant Part of Doc 9303 — Machine Readable Travel Documents.

Connection between PKD and ePassports

MRP

ePASSPORT

Machine Readable Passport (MRP)

CHIP RFID 14443

IMAGE FACE

Logical Data Structure (LDS)

0111001001010

PKI Certificate from the Public Key Directory (PKD)

Public Key Infrastructure (PKI): major role in eMRTD security

Operational View

ePassport Issuance
Issuing State

Personalization

SO$_D$

Document Signer:
Digital Signature

CSCA:
Root of Trust
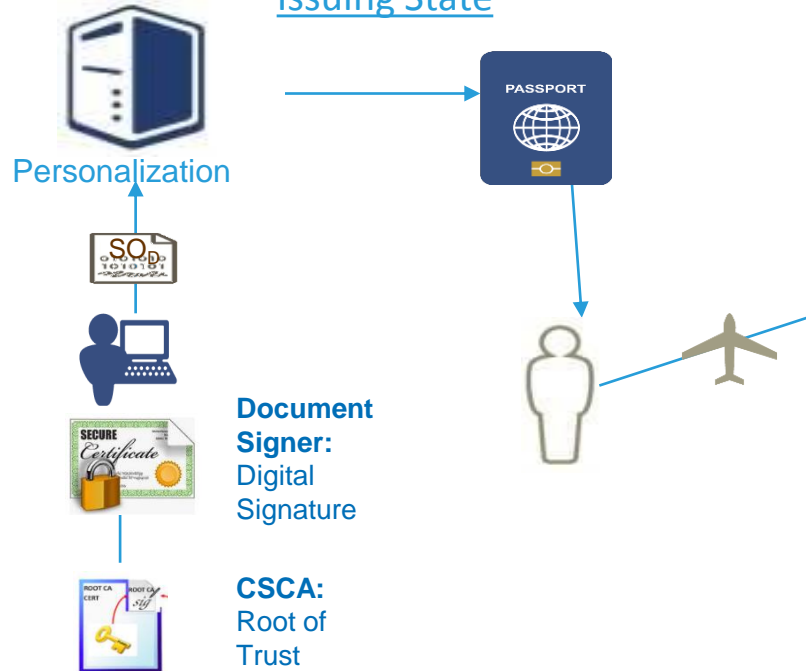
ePassport Inspection (Manual or Automated)
Receiving State

Importance of being **compliant** with **Doc 9303** - *Machine Readable Travel Document*

SO$_D$

Inspector / Inspection System
- Verify digital signature of State
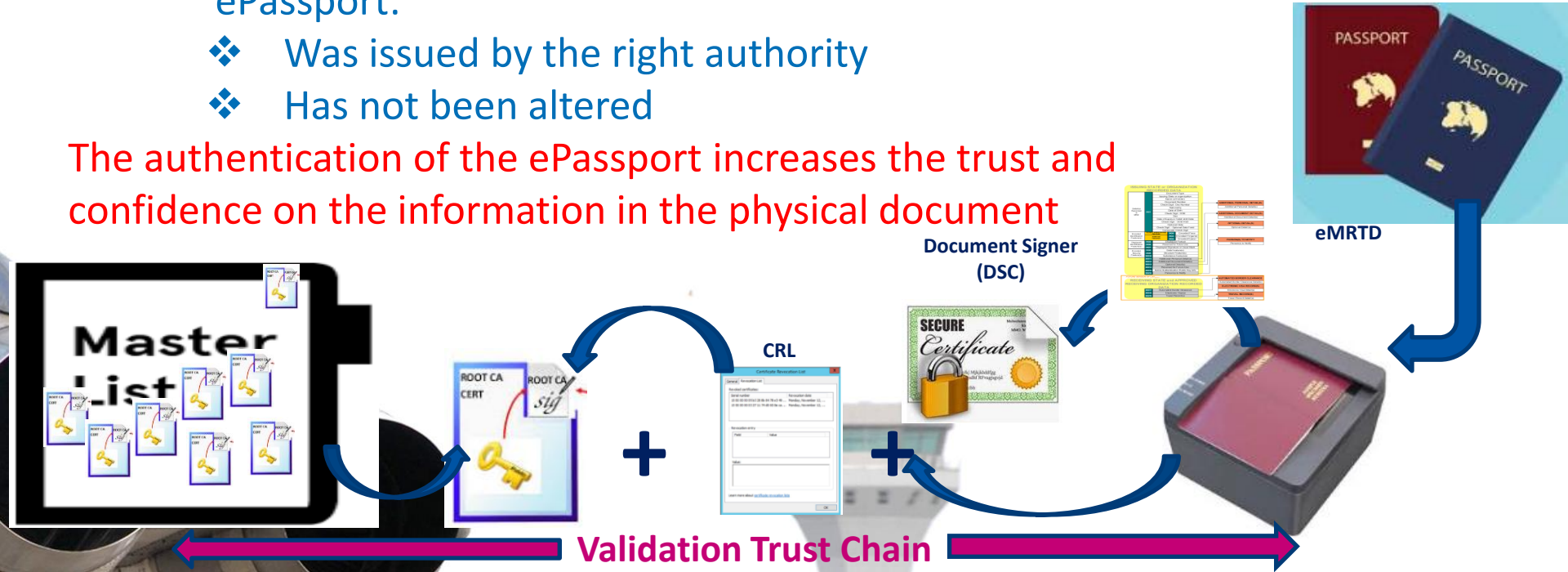- Validate data integrity and authenticity (Photo, etc...)
- Physical inspection

PKD

SECURE Certificate

+

CRL

+

ROOT CA CERT → Master List

✓   ✗
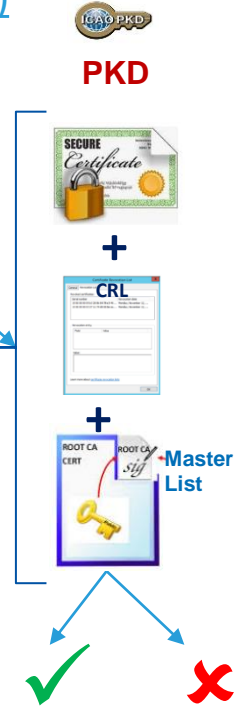
ePassport Validation And PKD

❖ It allows Border Control authorities to confirm that the ePassport:

  ❖ Was issued by the right authority

  ❖ Has not been altered

The authentication of the ePassport increases the trust and confidence on the information in the physical document

eMRTD

Document Signer (DSC)

CRL

Master List

SECURE Certificate

ROOT CA CERT

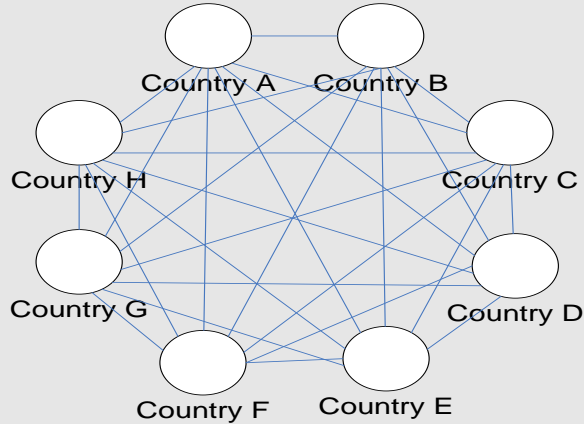**Validation Trust Chain**

What is the PKD and what is its role

❖ A central Repository that simplify and facilitates the sharing of PKI certificates required to authenticate ePassport.

❖ Minimizing the volume of certificate exchange:

➢ Document Signer Certificates (DSCs)

➢ Certificate Revocation Lists (CRLs)

➢ Country Signing Certificate Authority (CSCA) Master List
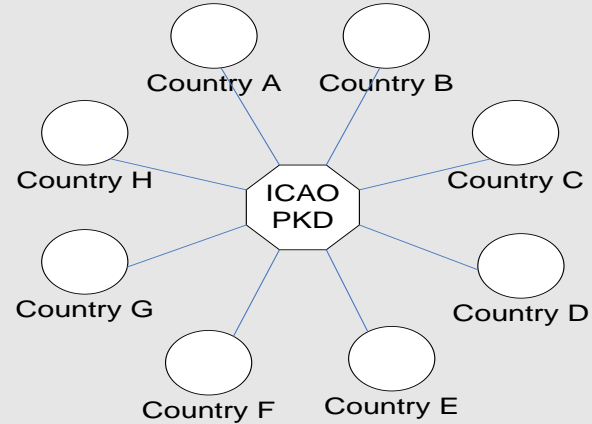
➢ Deviation List

❖ Ensuring timely uploads

Central Broker

Distribution of Certificates and CRLs

via bilateral Exchange

Country A   Country B   Country C   Country D   Country E   Country F   Country G   Country H

via ICAO PKD

Country A   Country B   Country C   Country D   Country E   Country F   Country G   Country H   ICAO PKD

This example shows **8** States/non-States requiring **56** bilateral exchanges (left) or 2 exchanges with the PKD (right) to be up to date with DSCs and CRLs. In case of **192** ICAO States **36,672** bilateral exchanges would be necessary while there are still 2 exchanges with the PKD.

Why Join the PKD

Issuer Perspective:

Border authorities around the world can validate the ePassports that you issue.

ePassports that cannot be validated must essentially be considered and treated as a non-electronic travel document.

And you are not capitalizing on the investment made to implement ePassports

➡️ The ICAO PKD provides a means of distributing your information to other States that is efficient, reliable, and always accessible.

Border Authority Perspective:

performing ePassport validation (according to Doc 9303 7th Edition, Part 12) and accessing the information necessary to perform it, provides confidence that the travel document under inspection has been issued by the proper authorities and that the information recorded on the document has not been tampered with.

➡️ The ICAO PKD provides a means of accessing the necessary information published by other States in a cost efficient way that is always available.

Traveler Perspective:

Validation through the ICAO PKD, confirms the authenticity and integrity of the data on the chip, and in turn facilitates the fast and secure cross-border movement of citizens by the ''frontline'' entities.

➡️ The ICAO PKD is the most efficient and reliable means of both providing and accessing the information required for ePassport validation.

62 PKD Participants and ePassports issuing States

Legend
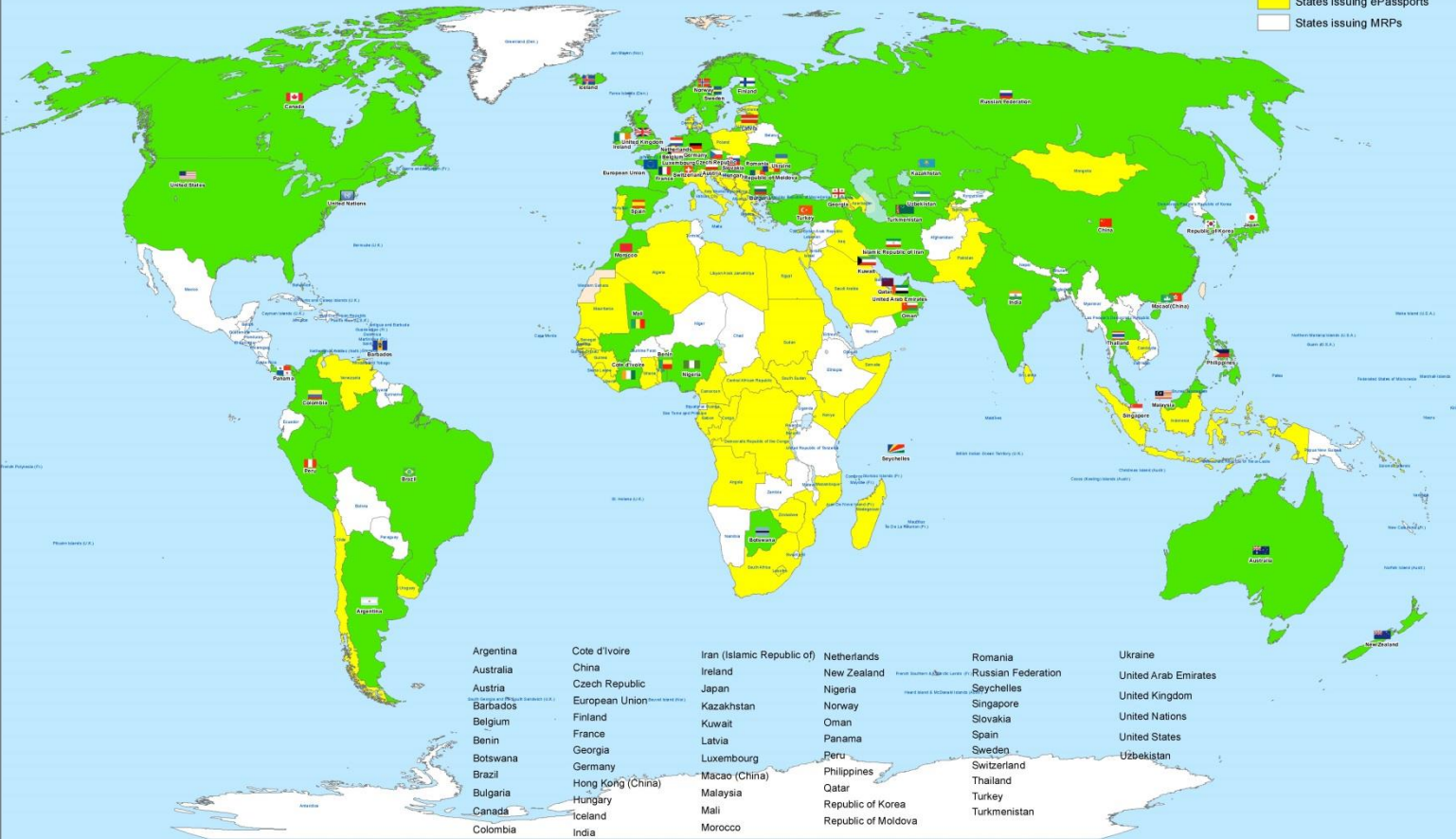- PKD Participants (green)
- States issuing ePassports (yellow)
- States issuing MRPs (white)

New Participants 2017
•Turkmenistan
•Peru
•Barbados
•Panama
•European Union

New Participants 2018
•Mali (June)
•Côte d'Ivoire (July)

Argentina	Cote d'Ivoire	Iran (Islamic Republic of)	Netherlands	Romania	Ukraine
Australia	China	Ireland	New Zealand	Russian Federation	United Arab Emirates
Austria	Czech Republic	Japan	Nigeria	Seychelles	United Kingdom
Barbados	European Union	Kazakhstan	Norway	Singapore	United Nations
Belgium	Finland	Kuwait	Oman	Slovakia	United States
Benin	France	Latvia	Panama	Spain	Uzbekistan
Botswana	Georgia	Luxembourg	Peru	Sweden	
Brazil	Germany	Macao (China)	Philippines	Switzerland	
Bulgaria	Hong Kong (China)	Malaysia	Qatar	Thailand	
Canada	Hungary	Mali	Republic of Korea	Turkey	
Colombia	Iceland	Morocco	Republic of Moldova	Turkmenistan	
	India				

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The steps to join the PKD

For a state or non-state entity:

1. Deposit a Notice of Participation with the Secretary General of ICAO.

2. Deposit a Notice of Registration with the Secretary General of ICAO.

3. Effect payment of the Registration Fee and Annual Fee to ICAO.

4. When ready, securely submit to ICAO, the Country Signing CA Certificate (CSCA).

5. Upload/Download to and from the PKD.

https://www.icao.int/Security/FAL/PKD/Pages/How-to-Participate.aspx

ICAO PKD MoU: Legal Framework

- Multilateral agreement to be signed by all States Participating in the PKD.
- Legally support formal arrangements between ICAO and each PKD Participating State in regards to joining the PKD.
- Notice of Participation: Attachment A to the PKD MoU

- https://www.icao.int/Security/FAL/PKD/Pages/Publications.aspx

MEMORANDUM OF UNDERSTANDING (MoU)
REGARDING PARTICIPATION AND COST SHARING IN THE
ELECTRONIC MACHINE READABLE TRAVEL DOCUMENTS
ICAO PUBLIC KEY DIRECTORY (PKD)

NOTICE OF PARTICIPATION

The_____Ministry of Interior_____
   (name of the Authority designated by the Participant concerned as its authorized organ)

of_____Republic of Utopia_____
   (name of Participant)

hereby gives the Secretary General of the International Civil Aviation Organization (ICAO)

notice of participation of_____

Identity and Passport Service Authority
Moon Street no. 123, 54321 Utopia City, Republic of Utopia
_____
   (name and address of the Participant)

in the *Memorandum of Understanding (MoU) Regarding Participation and Cost Sharing in the Electronic Machine Readable Travel Documents ICAO Public Key Directory (ICAO PKD).*

NOTE: Participation by a non-State entity in the ICAO PKD (the functions of which are technical and operational) will not afford such non-State entities the rights or privileges accorded to ICAO Contracting States under the Chicago Convention.

Signed at___Utopia City_____on___13 July 2010_____
   (place)   *(date)*

                                                    Republic of Utopia
On behalf of_____
                                                    Ministry of Interior
Name of Authority_____
                         Mr. Dolittle, Head of Division for Documents Law
Name, title_____

Signature_____

https://www.icao.int/Security/FAL/PKD/Pages/How-to-Participate.aspx

1. **Select PKD MoU**
2. **Select Notice of Participation (model)**

MODEL
NOTICE OF REGISTRATION

REGISTRATION FOR PARTICIPATION IN ICAO PKD	
PASSPORT DATA	
Estimated number of Document Signer Certificates that will be issued each year:	12
Estimated number of Certificate Revocation Lists that will be issued each year:	8
Number of expired and valid Country Signing CA Certificates:	3
Number of expired and valid Country Signing CA Link Certificates:	2
Average validity period for Country Signing CA (Link) Certificates:	10 years
Estimated number of Master Lists issued each year:	12
Estimated number of entries per Master List:	50

eMRTD AUTHORITY (EMA) DETAILS	
Name:	Mr. Dolittle, Ministry of Interior
Title:	Head of Division for Documents Law
Address:	Moon Street no. 111, 55555 Utopia City, Republic of Utopia
Telephone:	+333-222-1111 9999
Fax:	+333-222-1111 8888
E-Mail:	Doc@MoI.gov.uto
Designation (eMRTD System):	chief ePassports and ID-cards adviser
Senior Officer (eMRTD System):	Mr. Domuch, Ministry of Interior, CIO

eMRTD COUNTRY SIGNING CERTIFICATE AUTHORITY (CSCA)	
Name:	Mr. Dosomething, Identity and Passport Service Authority
Title:	Senior PKI Officer
Address:	Moon Street no. 123, 54321 Utopia City, Republic of Utopia
Telephone:	+333-222-2222 9999
Fax:	+333-222-2222 7777
E-Mail:	CSCA@ema.gov.uto
Designation (eMRTD System):	Head of N-PKD

https://www.icao.int/Security/FAL/PKD/Pages/How-to-Participate.aspx

1. **Select Notice of Registration (model)**

Participation fee

A. ICAO Registration Fee: **US $15,900**

B. Estimated Annual Fee 2018 based on 55+ Active Participants: **US $ 31,755** (Operator Fee US $ 24,500 + ICAO Operator fee US $ 7,255)

C. More Participants = reduction in Operators + ICAO Annual Fees

*ICAO prepares an annual operation budget every year which is divided over the total number of PKD participants. For 2018 the ICAO Operation Fees have been established at US $7,255.00.

Active Participants	Operator Fees (US $)	ICAO * Fees (US $)
50 Participants	27,000.00	7,351.00
55 Participants	24,500.00	7,351.00
60 Participants	22,500.00	7,351.00
65 Participants	20,900.00	7,351.00

Active Participation
PKD Integration

1. A PKD Participant should start active Participation (CSCA Import and PKD Upload) at the latest 15 months after paying The Registration Fee and becoming Effective participants.

2. Participant are required to have completed the testing of the PKD interface and successfully imported the CSCA into the HSM in Montreal.

3. The PKI Infrastructure between National and ICAO PKD should be implemented.

CSCA KEY CEREMONY

- the CSCA Certificate plays the main role as the anchor of trust in the validation process of the ePassports

- Each state participating in the ICAO PKD is required to securely submit its CSCA certificate to ICAO.

- The CSCA certificate, must be hand delivered by a State Representative to ICAO headquarter in Montreal where it is imported securely to the ICAO PKD (High Security Module, HSM) under the observation of the state's representatives and the ICAO security officials

- After the Key ceremony is complete, the DSCs and CRLs can be uploaded to the ICAO PKD. The authenticity of the DSCs and CRLs can now be verified using the public keys stored inside the CSCA certificates that are stored within the ICAO PKD.

It's not complicated : All you have to do is….

- Review national legislation:
  - Essential before introducing ePassport and joining the PKD
- Find out who is responsible:
  - Define roles and responsibilities of all those involved with the PKD (PKI, NPKD, etc…)
- Establish a budget line:
  - streamline the annual payment
- Address Technical Specifications:
  - ensure that the National PKD is technically compatible with the ICAO PKD
- Integrate the National PKD with the ICAO PKD:
  - This includes National PKDs uploading and downloading certificates (DSCs and MLs) and revocation lists to and from the ICAO PKD

Conclusion

- ICAO urges all ICAO Member States to join and actively use the certificates distributed by the ICAO PKD as a means to validate and authenticate ePassports at Border Controls.

25th PKD Board Meeting in ICAO, European and North Atlantic (EUR/NAT) Office