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RELEASED IN PART B4 P565

Notes From Meeting of ICAO New Technologies Working Group
Berlin, Germany
June 25 – 28, 2002

Attendees: CA/PPT: Georgia Rogers, Richard McClevey, Judy Penn
CA/VO: Mike Regan
U.S. Customs Service: James Jeffers
U.S. INS: Paul Hunter
Other Member States Represented: Japan, UK, Germany, The Netherlands, New Zealand, Australia, Latvia and Canada
Other Organizations Represented: International Air Transport Association (IATA), Airports Council International (ACI), Interpol, ISO

Overview:
The meeting covered a broad range of issues including:

- discussion of the impact of border security laws on Member States
- the general formulation of a proposed biometrics strategy for ICAO
- biometrics test results from Member States
- the adoption of a resolution of the NTWG regarding its recommendation for a globally interoperable solution for biometrics in MRTDs
- further discussions on E-visas, enhanced document storage media (2D barcodes, RF chips, optical stripes), and Public Key Infrastructure as applied to MRTDs
- approval of a logical data structure for storing data in new storage technologies for MRTDs.

Key Issues:

- By unanimous vote the NTWG voted to accept the following resolution:

  "The NTWG endorses the use of facial recognition as the globally interoperable biometric for machine assisted identity confirmation with MRTDs.

  The NTWG further recognizes that Member States may elect to use fingerprint and/or iris recognition as additional biometrics technologies in support of machine assisted identity confirmation."

- The NTWG also finalized its work on the development of a Logical Data Structure (LDS) for storing data and biometrics on optional storage media (i.e. barcodes, mag stripes, RF chips, and optical memory stripes) for MRTDs.
  - Three additional data groups were added to the existing structure. They are E-Visas, Border Schemes, and Electronic Stamps and Cachets.
  - The completion of the LDS means that countries now have a globally interoperable format that can be used for testing and implementing data storage on chips, optical

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memory and barcodes. This approval opens the door for testing and use of these storage media in MRTDs. This is the equivalent to the adoption of the OCR machine readable zone currently used in passports, visas and travel cards. **Any new document produced by the Department and INS that contains one of the above media, should use the LDS format.** Formal ICAO approval of the LDS will occur at the next ICAO TAG in early 2003.

- U.S. representative raised one concern to be addressed before technical report is finalized, regarding the need to decide which fingers will be stored and in what order should they be stored if fingerprints are used. This is necessary to ensure global interoperability. Issue will be researched.

Border Security Laws:

The meeting generated discussion about the impact of new U.S. border security laws on other Member States. All Member States expressed confusion regarding the requirements to be imposed upon them. Delegates expressed a strong concern about being able to meet the schedules for implementing biometrics solutions once the biometrics requirement has been chosen. Concern was expressed that laws were unilaterally structured, forcing difficult requirements upon the visitors to the United States that must comply with requirements for Visa Waiver and/or visa issuance. They also were highly concerned about the national acceptance of biometrics that might be imposed upon their citizens. It was stated that in many countries and cultures, a fingerprint will not be acceptable, and potential visitors will chose to not travel to the United States. New Zealand asked if the United States has considered the impact upon its economy for the number of persons who will no longer visit the United States.

Overall, the Members expressed sympathy to the United States for the events of September 11 and understood the need to fight terrorism ands to implement new processes to protect its borders. However, many view the new laws as a "knee-jerk" reaction to September 11 that may result in short short-term requirements that will not provide global interoperability and will not provide long term solutions to the facilitation of secure border crossing.

The Japanese delegate said that Japan supports the United States in its fight against terrorism and offered condolences to the United States offering that many Japanese also lost their lives on September 11. He stated that 'the Japanese people are saddened by the approach of the United States'. They do not understand 'why the United States can no longer trust Japanese citizens'. Over 17 million Japanese visit the United States each year and the new requirements will have a negative impact upon the Japanese people. Japan is concerned by the unilateral approach by the United States and finds it very difficult to implement a biometrics solution in the short timeframe required. Japan asks that the United States consult with Japan and other countries to harmonize its efforts.

Nearly every delegation commented on the difficulty and inability to implement a solution in the short timeframe, particularly since no biometric solution has yet been selected. Many also reminded that the solution requires the establishment of an infrastructure within

their countries for capturing a biometric as well as selection of a storage medium for storing a biometric on their passport. Finally, it was noted that there is no agreed upon PKI strategy for securely ensuring that the biometric cannot be changed. All of these issues must be resolved once a biometric has been determined.

While the biometrics solution is yet to be determined, Member States nonetheless expressed a concern for the potential capturing of full images of biometrics as opposed to templates. The storage of templates is one thing, but the storage of full images raised privacy issues as well as the issue of the potential for skimming data from particular storage media. Furthermore, the issue of storing full images in lieu of templates virtually eliminates the potential use of barcodes in travel documents and instead drives countries into the use of costly high capacity RF chips in passports (an issue that requires more time and testing). The Members expressed strong concern that the use of full images as a biometrics identifier would take a long time to download from the chip or stripe; thus, resulting in delays in passenger processing.

NIST Testing of Biometrics:

The delegates are aware of the testing of biometrics on the part of NIST. Discussion by most nations indicated a strong concern that the biometrics testing and selection must consider the practical collection, capture, storage and use of biometrics. There was a concern for the general laboratory approach for testing that may occur with no regard for the practical application of the technology.

ICAO NTWG chairman offered to meet with appropriate NIST officials in an effort to convey ICAO concerns for practical, interoperable solutions.

ICAO NTWG chairman also offered to meet with the General Accounting Office officials who are conducting independent study on the implementation of the Patriot and BS laws and the entry/exit system to express ICAO position.

Presentation by INS and Need for Communication with Foreign Governments:

In response to requests by NTWG Member States, arrangements were made for INS to conduct a PowerPoint presentation on the border security laws, providing explanation of the laws and status and timeframe for implementing the requirements of the laws and the United States' Entry/Exit System.

Originally Bob Mocny of INS was scheduled to make the presentation. Due to scheduling conflicts, he could not attend. Paul Hunter of the INS Entry/Exit Project Team made an excellent presentation that was well received by the delegates. Paul presented a general synopsis of the laws, their requirements and a schedule of events for implementing the laws and for establishing an entry/exit system. E-copies of the presentation were requested by and provided to delegates from Japan and Latvia. The Japanese delegate was required to

report the results of the presentation and NTWG proceedings to his embassy in Berlin by the end of the week.

NOTE: It became apparent from the discussion that some form of global communication to foreign countries is necessary in the near term with periodic follow-ups in the future to explain the border security laws, their requirements and schedule for implementation. This can take the form of:

- A joint briefing of the Washington Diplomatic Corps by the Department, INS and Homeland Security. (a separate paper is available on specifics of this proposal).
- Local briefings by U.S. post officials to host governments.
- Dissemination of a hard-copy package and/or CD would be appropriate for either local or a Washington-based briefing.

The communicative process would be aimed at minimizing the concerns of foreign governments and promoting buy-in to the partnership that must be formed to implement the laws successfully. By informing the governments now and continuing to provide periodic updates of information to them on a regular basis, the governments will have a better opportunity to complete the actions necessary to meet the legal requirements and avoid any restrictions on or disruptions of travel of their citizens to the United States. At the least, these communicative gestures should be looked upon as a courtesy to friendly governments that will hopefully take some of the sting out of the requirements and help governments understand the need for this unilateral action.

PKI Technical Report:

Discussion addressed the need to secure data that is stored in optional memory space on MRTDs (barcodes, chips, optical memory, mag stripes). A draft report about PKI will be posted on the ICAO website within the week.

The British delegate strongly suggested that the notion of implementing a PKI infrastructure is burdensome since it requires the management of public and private keys and transferring those keys among governments. Nevertheless, he recognized the need to prevent data on optional storage media from being changed.

The British delegate asked that NTWG explore alternatives to PKI. Canada accepted the challenge to seek out alternatives and report them to the NTWG.

Use of RF Chips in MRTDs:

- The globally interoperable use of RF chips in travel documents will require that the chips be read by any reader in any country.
- The use of RF chips will have to be comprehensively defined by ICAO:
  - Will be use memory vs. smart chips (smart chips are 4 –6 times more expensive).
  - There are seven different coding schemes for chips.

- There are three different techniques for identifying data transmission errors (parity checking, redundancy checking, etc.)
- There are three different anti-collision techniques.
- We must select a common operation frequency (13.56 MHz)
- We must assume the use of the following ISO Standards:
  - ISO/IEC 10536 Close Coupled Cards
  - ISO/IEC 14443 Proximity Cards (readable from distance of 5 – 10 cm at speed of 2K per 1/5 second).
  - ISO/IEC 15693 Vicinity Cards (readable at distance of 35 – 75 cm at much slower speeds than Proximity Cards).
- Policy Issues:
- With contactless RF chips, there is always the chance of data skimming. (someone with proper equipment can read card from short distance).
  - Discussion indicated that proximity chips with shorter range are preferred for privacy/security reasons.
  - An aluminum sleeve that would cover passport and card when not in use could be used to eliminate the potential threat.

- The German delegate suggested that if a chip is read, one must also read the OCR machine-readable zone to link the chip to the passport book.
- This was rejected by New Zealand, IATA and United States representatives as being unnecessary and defeating the purpose of the enhanced technology which is to facilitate passenger movement across borders and at airline boarding processes.
- Australia is testing contactless RF chip technology in its passport. It is working with 3M company which has developed and tested a method for securely inserting chips in passports. Antennae are touted as being unbreakable. In a test passport, the chip operated successfully after having been smashed by the heel of test personnel. At request of U.S. representative, Australia will share results of testing.
- Australia stated its goal to be the first country since Malaysia to implement a chip passport.

Issues Relating to the Logical Data Structure:

- ISO WG3 has concluded that ICAO can use the rules of the Common Biometric Exchange File Format (CBEFF) for biometrics on MRTDs.
- ICAO needs to register as a CBEFF patron.
- In 30 days a new draft for the LDS will be posted to the NTWG Web-site.
- In 60 days, the LDS will be put in an ICAO technical report format. This is the final version that will be submitted to the ICAO/TAG.
- The new technical report on the LDS will take out references to magnetic stripes and will include new LDS information.
- It was noted that countries that store biometrics and MRTD in databases should also consider storing that data according to the format of the LDS to facilitate easy interchange between MRTDs and databases.

- It was agreed to add three new data groups to the LDS: E-Visas, Border Schemes, and Electronic Stamps and Cachets.
- New Zealand initiated discussion on the possibility of adding a new data group for internal controls within passport processes that would permit storage of unique printer numbers and operators of printers that produced the document. No decision was reached since many countries already store this information in their databases.

Biometrics Issues:

Facial Recognition

- Recent analysis on facial recognition by ICAO member states indicates that:
- Resolution of the captured image is a huge issue in the success of facial recognition. It appears that at the minimum, a total of 50 pixels between the center of the eyes is required at data capture for successful use of FR. Even higher level would be better.
- It is recommended that the compression standard should be JPEG and not JPEG 2000. JPEG 2000 still has some problems.
- Compression of facial image of 12.5 : 1 is too much to ensure success of facial recognition. The compression standard is yet to be determined but will be much less than 12.5 : 1.
- Specifications for quality of digital pictures is an important consideration in success of facial recognition. I.E. persons in picture wearing a flowered dress can have major impact upon compression and subsequently the results of facial matching.
- We need to specify a specific region of the face and seek to have software cut out things like flowered dresses in enrolled photos.
- Success with facial recognition can be enhanced by registering data points in the face and storing those data points in the database. Conclusions confirmed by New Zealand in its testing with Biodentity of Canada.
- For an image 125 pixels high and 100 pixels wide, the suggested center of the eye would be 78 pixels from bottom, 25 pixels from the top and 37 pixels from the left/right edge of image.
- We should seek out the AAMVA specifications for facial recognition as prepared by ISO WG10.

Fingerprints

- Canada indicated that due to national laws, it will not be possible to store images of fingerprints in a database.
- United States raised the issue of which fingerprints are preferred for fingerprint technology. Suggested that ICAO will need to specify which ones work best and require them or their templates to be placed in prescribed order in LDS.

Iris

- A proposal was made to eliminate Iris technology from consideration as ICAO biometric because of its proprietary status and sole source situation.
- United States made case that it is far too early to remove Iris at this time for any reason.

- It is the most accurate technology and fits possible business models for passport and visas and for unattended border gate scenarios. IATA and The Netherlands supported the U.S. position.
- *Members agreed to not remove Iris at this time.*
- There was discussion that perhaps ICAO should approach Iridian to indicate that under its current sole source and proprietary business arrangement, ICAO may no longer be able to consider Iris technology for global interoperable solution.
- NTWG instead determined ICAO should not do this, but individual Member States are encouraged to make it clear to Iridian that Iris technology may be removed from consideration unless Iridian changes its proprietary business model to make it acceptable for consideration by governments for border crossing use.

Results of Biometrics Scenario Testing:

New Zealand:

- Verification testing resulted in 89.9 percent accuracy. When photos as recent as 1 – 3 years old are used, accuracy goes well above 90 percent.
- Accuracy of facial recognition is affected by age.
- Somewhere between the ages of 18 and 24, images of persons become stable and then remain so.
- NZ is using 2.5 million images and creating four templates (10 million templates). They are using 199,000 duplicate images for tests. Will soon add a fifth template.
- Failure of software to locate eyes is biggest burden. Once eyes were located, accuracy of facial matches increased to 99 percent accuracy.
- NZ joint testing with German Bundesdruckerei is taking best of breed components of existing software packages and combining them to make an overall successful software package. (I.E. taking component from one software package that finds eyes the best and combining it with other best components.)
- New Zealand expects to produce a draft report in mid September. It will be jointly published with Bundesdruckerei. New Zealand is prepared to make a business case for facial recognition for its renewal business.

Australia:

- The Australia RFI netted 27 responses of which four companies were selected. There are now only three left in testing.
- Australia testing indicates that they can get to 95 percent accuracy rate for verification.
- They expect border control accuracy of 90 percent.
- Australia is now seeking to hire a biometrics integrator. RFI goes went on the street on July 1.
- Australia's next goal is to personalize a chip in the passport.

Canada:
Canada plans to have a proof of concept for in-process use of facial recognition completed in December and a deployed system in April, 2003.
This use will only involve use of facial matches in its lookout list in its passport issuance process.
Canada's ultimate goal is to use facial recognition in travel documents.
Testing thus far indicates that the higher degree of resolution of images plays a huge role in successful use of facial recognition.

UK IrisScan Testing:

- The Heathrow trail of IrisScan technology is proceeding at terminals 3 and 4.
- UK is working with EyeTicket.
- British Airways and Virgin Atlantic aircrews are involved.
- Both irises are enrolled. System produces a ticket like a visa for users to enter country.
- Goal is to have totally unsupervised entry.
- 800 persons are enrolled. 200 have used the system.
- The system is highly reliable with negligible error rates.
- Success had led to plan to extend to UK visa issuance posts.
- Originally this test was scheduled to end after six months but due to success, it will be extended to visa process.
- The plan is to store the Iris template (code) in a database and not on the visa.

UK Facial Recognition Trial:
UK is planning a facial recognition trial for foreign arrivals from Europe who then seek asylum in the UK.
Will capture the image at arrival and will run facial recognition when they claim asylum.
UK will also conduct facial recognition in conjunction with one-one verification of passport and one-many to check for multiple issuance control.
Report will be prepared soonest (no specific date).

Minimum Security Requirements for MRTD Issuance Processes:

- The report on the subject paper, originally produced by the United States for G8 use, was well received by the NTWG representatives.
- Only suggestion was an additional notion by the U.S. representative that it might be useful to include a statement about biometrics enrollment processes since such processes soon will become a new segment of issuance processes and that the integrity of the biometrics enrollment process must be ensured.

2D Barcodes:

- It was reported that two new barcode technologies are either in the public domain or have applied to be in the public domain (DataStrip and DataMatrix).

- A discussion was held about the need to standardize on a single barcode format for the purposes of global interoperability.
- There was also discussion about eliminating the original 2D barcode technology (PDF 417) from ICAO specifications since it is now found to not support enough storage capacity for ICAO purposes.
- It was also suggested that in order to promote global interoperability, ICAO should settle on one 2D barcode and may have to refrain from accepting any others for consideration for use in MRTDs.
- ISO representative, Charles Chatwin, will conduct information research on the subject and will report back to NTWG on suggestions. He will develop a proposed strategy and a statement of policy for public domain symbologies and software.

Status of ICAO Specifications:

ISO is fast track balloting ICAO 9303 Part III. Ballot is expected in August.
WG3 will convene on October 7/8 in Copenhagen.
Mary McMunn of ICAO/FAL indicated the following status of ICAO Specifications:
Part I is undergoing edits and revisions. Goal is to be out by December.
Part II is currently with DCAF Working Group.
Part III second edition is on the street for use.
ICAO responded to a NTWG recommendation that it make specifications available on the Internet. ICAO proposes to make downloads available for a fee. While this is not quite what NTWG had in mind, the Chairman of NTWG said that the fee, while a nuisance, is the secondary issue.

Other Miscellaneous Notes:

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- We toured the Bundesdruckerei operations for producing the new German passport. This is truly the most sophisticated centralized passport operation on the planet.
- 15 new production units are personalizing the variable text and photograph in a holographic image in addition to the normal data page text and image that are produced on film.
- Name is also now laser engraved on outside of overlay of datapage.
- Bundesdruckerei is using IBML ImageTrak scanners like U.S. passport system. Their ImageTraks are capture four-color photo data at 90 dpi per color which results in truly photo-like image printed in passport.
- Facial recognition system being developed by Bundesdruckerei appears to be successful for verification and identification.

- Conical laser burning process for numbering continues to be highly useful for linking data page and visa pages.
- Other detail notes on Bundesdruckerei are available upon request.

ICAO Schedules and Events:

- It is difficult to expect next ICAO TAG until first week of April, per Mary McMunn.
- If next TAG were in January, papers would be required by November.
- Next NTWG in Wellington during week of December 9.

Prepared by CA/PPT/IML: RPMcClevey, 7/5/02