E-SECURITY & PKI: Towards an effective Arab-African Cooperation
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X.509 in a changing world

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Introduction

- E-Security and PKI are fundamental building blocks that enable trusted transactions
- Basis for e-commerce, IoT, Smart Grid, Mobility
- Enables economic grown among Arab-African countries
- Based on International Standards
Rec. ITU-T X.509 until now

- The base specification for public-key infrastructure (PKI)
- First edition in 1988
- Seventh edition in 2012
- Widely deployed in the world
  - Banking
  - E-government
  - Health
  - Etc.
What is PKI about?

PKI is about:

- Trust (trust anchor concept)
- Validation of authenticity of information
- But also:
  - Privacy and confidentiality
  - Non-reputation
- Tools and procedures for above
Today’s PKI

- Technically X.509 PKI works and is ubiquitous
- Most common use of PKI is SSL/TLS for secure communication with millions of web servers
- But most RPs (users) do not have certificates or relationships with any CAs
- Over 600 commercial CAs in existence – From many different countries
- How can an RP know if all of these are trustworthy? – Reading their CPs/CPSs is not practical
- How can an RP get damages if CA is untrustworthy or careless or is hacked etc.
- – When it has no formal relationship with CA – Taking into account cross border legal issues
A changing world

- New countries are entering the PKI world
- Cloud computing
- Mobile technology
- Machine-to-machine (M2M) communications
- In particular: Smart Grid with millions of entities
A changing environment

Constrained environments:
- Memory constraints
- Processing capacity
- Bandwidth constraint
- Time constraints
- Economic constraints

Mobile applications
Huge networks
Other requirements

- Higher level of security by adaptability to different applications
- Protection of the users
- Ease of PKI establishment
- Ease of PKI maintenance
What about Rec. ITU-T X.509?

Rec. ITU-T X.509 must respond to these changing conditions to allow for secure networks also in the future.
Future of Rec. ITU-T X.509

Eighth edition is a significant update expected in 2016:
- Removal of ambiguities
- Consistent and current terminology
- Whitelists (fast validation)
- Trust broker (secure validation)
- Machine readable policies (user assistance)
- Etc.
Supplementary specifications

X.509 needs supplementary specifications:

- Profiles and best practices (planned for 2016)
- Automated PKI establishment and maintenance (planned for 2016)
Summary

- X.509 PKI is now ubiquitous
- The PKI technology is pretty robust and secure – providing the algorithms are kept up to date and – the implementations are complete and correct
- The trust framework, policies, and procedures are the weakest areas
  - This is where most of the standards work is now focused, and where most of the successful attacks are

- New application domains are continually been found, with new requirements
  - New/revised/enhanced standards are required for these
Conclusions and Recommendations

- The intension is to enhance X.509 to meet future challenges
- We need to develop a new generation of PKI experts
- An educational project should be established
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