# Hackathon on Lightweight IoT Security

Paris, France | 21-22 May 2024

parishackathon.lakewg.org

Inria OpenSwarm

# Crypto agility in lakers

Main topic:

- Planning at issues 277 and 278
- Discussion on a common rust embedded cryptographic abstraction layer with the RIOT-rs team

Other topics:

- Interop testing with Marco Tiloca's implementation
- Fix credential-by-value in issue 273
- Lots of good discussions

# Porting lakers to Single-Chip µicro Motes (SCµM)

Keil uVision5 is used to obtain the compiled binary firmware on SCuM 

Synthesis: lakers-c can be suitable, but:

- Software-based crypto backend
  - Required flash memory size > SCuM instruction SRAM size (64kB)
- Hardware-based crypto backend
  - SCuM-3C has no hardware accelerators

Solution: use nRF52840-DK as crypto backend and the radio on SCuM (temporary), or just wait to get the next version of SCuM having hardware accelerators

Practical work:

- getting started with lakers (had to debug lots of errors to build it on my Windows machine)
- learning about the IEEE802.15.4 compliant radio on SCuM

# RIOT-rs: Integrating CoRE security

- Participated successfully in EDHOC interop.
- Demonstrated RIOT-rs as a platform for protected CoAP operations.
- Coordination for development with Lakers.

# Interop testing of EDHOC

- Marco (Eclipse Californium, I/R), Christian (Lakers on RIOT-rs, I/R)
  - Ciphersuite 2; Method 3; CCS credentials referred by ‘kid’
  - Successful interop - First time using the EDHOC + OSCORE combined request [1]
  - Found things to fix and now fixed!
    - Christian: encoding of credentials transferred by value
    - Marco: local retrieval of OSCORE Security Context when using the combined request
- Marco (Eclipse Californium, R), Geovane (Lakers, I)
  - Ciphersuite 2; Method 3; CCS credentials referred by ‘kid’
  - Successful interop
  - Found things to fix:
    - Geovane: handling received connection identifier encoded as a CBOR byte string
- Stefan with Marco or Christian (started)

[1] https://datatracker.ietf.org/doc/draft-ietf-core-oscore-edhoc/

# EDHOC and OSCORE profile of the ACE framework

- Had to prioritize EDHOC interop and related side meetings
- No big outcome: just set up the development ground at
  - https://bitbucket.org/marco-tiloca-sics/ace-java/src/edhoc-oscore-profile/
- Confirmed next steps
  - Set a node to be both ACE Client and EDHOC Initiator
  - Set a node to be both ACE Resource Server and EDHOC Responder
  - Morph the OSCORE profile into the EDHOC and OSCORE profile

# Interop testing of EAP-EDHOC

Developing & Testing EAP-EDHOC implementations

UM and UNIOVI's (so far)

**UM implementation**

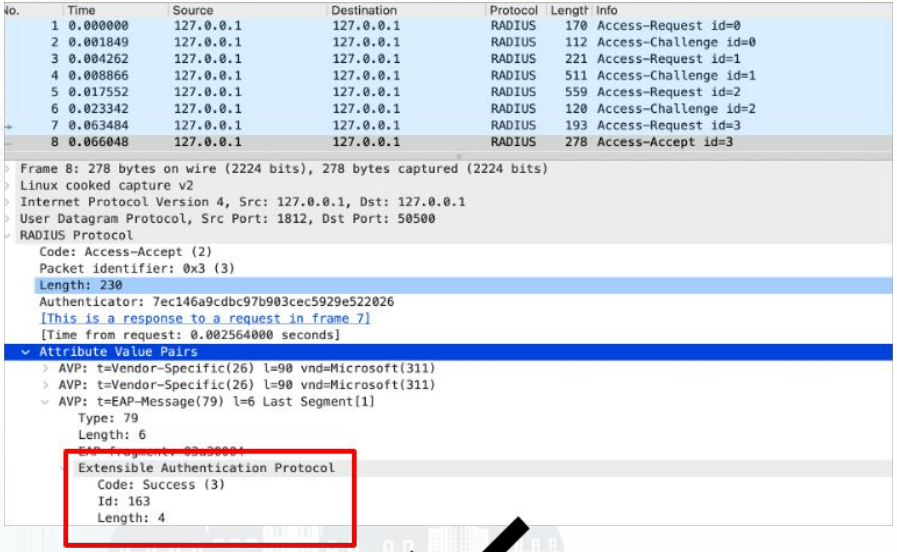
- *uoscore-uedhoc implementation (3.0.2)*
- EAP peer: wpa_supplicant 2.10 or 2.11-dev (also supports EAP-TLS (v1.3))
- EAP authenticator: hostapd 2.10 or 2.11-dev
- EAP server: Freeradius 3.2.3

**UNIOVI implementation**

- *uoscore-uedhoc (1.0.5)*
- EAP peer and authenticator: OpenPANA 0.2.4
- EAP server: FreeRADIUS 3.2.1

**Interop plan:**

- **UM's EAP peer and authenticator (wpa_supplicant/hostapd) and UNIOVI's EAP server (FreeRADIUS)**
  - **Different EAP method type (fixed)**
  - **MSK derivation was different (fixed)**
  - **uoscore-uedhoc version 1.0.5 and 3.0.2 interoperate!!!**
- **UM integration of last version of uoscore-uedhoc (3.0.4) (RFC compliant)**




**Future plan:**

- Continue with UNIOVI's EAP peer and authenticator (OpenPANA) and UM's EAP server (FreeRADIUS)
- Integrate EAP peer in a real IoT device
- Fragmentation support

# Formal Verification of Attested TLS

- Good participation in side meeting (9 attendees in total)
  - 2x one-hour sessions
- Several discussions and feedback (mostly ending up in philosophical ends)
- Still find no formal justification of derive_secret in TLS key hierarchy
  - John Mattsson also agreed that there is no practical issue by missing this
- Still find no other solutions to fix RA-TLS other than making it stateful within pre-handshake attestation
- Discussed formal semantics with Benjamin Lion. Thanks!
- Proposed some directions for “Attestation over EDHOC” draft
  - Will follow up on the ML

# Constrained BRSKI (cBRSKI) Onboarding for Thread devices

**Progress**: added function to OT-NS simulator to transport UDP datagrams between a Thread Border Router and an external server (e.g. BRSKI Registrar); and IP packets between any mesh node and external server.

- Basic unit tests added
  - Includes Python aiocoap external server as part of the tests
- Lots of debugging & code fixing!

- Next step: add cBRSKI specific handling in the Border Router.

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