IETF 116 TEEP Hackathon

March 27, 2023

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Kohei Isobe, SECOM
Ken Takayama, SECOM
Shin'ichi Miyazawa, SECOM
Yuichi Takita, SECOM
Daisuke Ito, Roboc

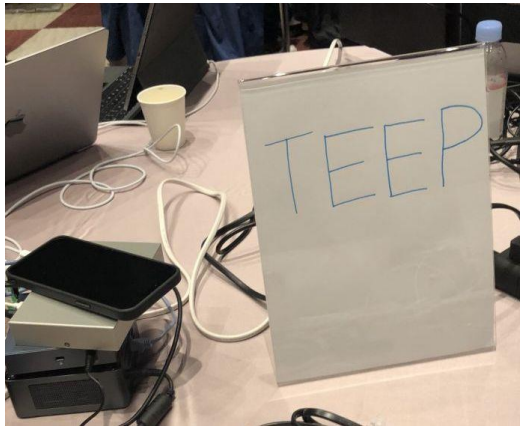
IETF 116 TEEP Hackathon

- Date March 25 Saturday, 26 Sunday
  - Jointly COSE, and TEEP

- Participants:

  Dave Thaler, Microsoft
  Kohei Isobe, SECOM
  Ken Takayama, SECOM
  Shin’ichi Miyazawa, SECOM
  Yuichi Takita, SECOM
  Daisuke Ito, Roboc
  Carsten Bormann, CDDL
  Laurence Lundblade, t-cose
  Akira Tsukamoto

Pictures



Objective and Plan

- Objective
  - Refine the draft from issues found in the implementation

- Action Item list

  - Clarification of cnf recently added to Query Response
    https://github.com/ietf-teep/teep-protocol/pull/321

  - Compromised Broker and keys in multiple TEEP-Agents on SGX
    https://github.com/ietf-teep/teep-protocol/issues/310#issuecomment-1467297393

  - Token and Challenge coexistence in TEEP Messages, from IETF110
    https://github.com/ietf-teep/teep-protocol/issues/127

  - Easy synchronization of cddl definitions between md file and cddl files.
    https://github.com/ietf-teep/teep-protocol/issues/208

- Work on implementations

Clarification of cnf recently added to Query Response
Only for Japan member

- After the consideration of compromised TEEP Agent discussion, the cnf was added to the Query Response.
- PR
  https://github.com/ietf-teep/teep-protocol/pull/321
- The cnf will contains the hash value of public key of the TEEP Agent.
- Among only Japan member, was not sure whether cnf only contain the hash value of TEEP Agent or both TEEP Agent and Verifier.

```
+ The Attestation Result must first be validated as follows:
+
+ 1. Verify that the Attestation Result was signed by a Verifier that the TAM trusts.
+ 2. Verify that the Attestation Result contains a "cnf" claim (as defined in {{Section 3.1 of RFC8747}}) where
+    the key ID is the hash of the TEEP Agent public key used to verify the signature on the TEEP message,
+    and the hash is computed using the Digest Algorithm specified by one of the SUIT profiles
+    supported by the TAM (SHA-256 for the ones mandated in this document).
```

- No, it was misunderstanding. The cnf only contains hash value of TEEP Agent

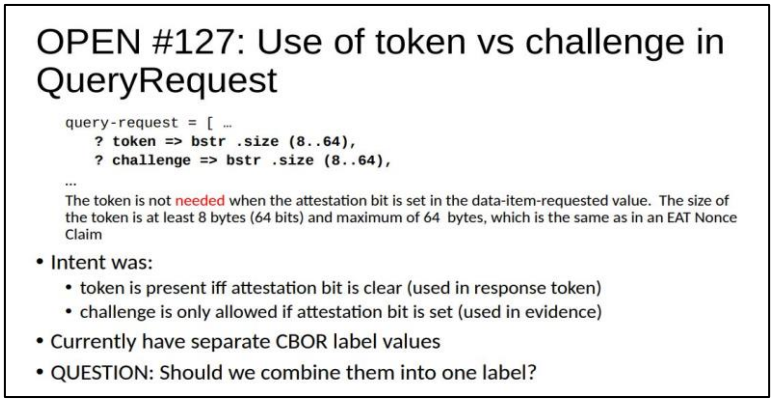
Compromised Broker and keys in multiple TEEP-Agents on SGX

- Initial discussion was compromised Agent.
  https://github.com/ietf-teep/teep-protocol/issues/310
- The TEEP Broker may be compromised but the TEEP Agent itself is protected by SGX.
- When TEEP Broker is compromised, it may have multiple TEEP Agent instances in the same SGX chip.

- Conclusion was we only consider compromised Broker and not Agent in the TEEP design.
- The key pairs are different in different SGX chip which do not contradict with the TEEP design.

Clarification of token and challenge in TEEP Messages

- This topic was resolved once at IETF 110. Revisiting.
- Decision was made to use either of token or challenge at IETF110.



- Always having token may make TAM implementation easier.

- Keep it as it is, and do not change the draft.
- If using timestamp for the freshness, able to reuse AR in QueryResponse.

Synchronizing cddl definitions between md file and cddl files

- Raised between IETF 113 March and IETF 114 July 2022 when attempting cddl syntax check before submitting the draft
  https://github.com/ietf-teep/teep-protocol/issues/208
- The downloading dependent cddl files were fixed between IETF 114 and IETF 115 hackathon.
- The cddl syntax check command in Makefile was added at IETF 115 hackathon.
- When updating md file, it is burden to manually making the same changes to cddl files without making mistakes.

- Updating Makefile to extract cddl file from md file.
- Do not require updating cddl file manually anymore.
  https://github.com/ietf-teep/teep-protocol/pull/322

Benefit of CBOR in TEEP (1/2)

CBOR がバイナリーになるまで (1/2)

- TEEP query-response の例
- CDDL (Concise Data Definition Language)

```
query-response = [
   type: TEEP-TYPE-query-response,
   options: {
    ? token => bstr .size (8..64),
    ? selected-cipher-suite => suite,
    ? selected-version => version,
    ? evidence-format => text,
    ? evidence => bstr,
    ? tc-list => [ + tc-info ],
    ? requested-
    ? unneeded-
    ? ext-list =>
    * $$query-r
    * $$teep-op
   }
 ]
```

- Diagnostic Notation

```
/ query-response = /
{
  2,  / type : TEEP-TYPE-query-response = 2 (uint (0..23)) /
  / options : /
  {
    20 : 0xa0a1a2a3a4a5a6a7a8a9aaabacadaeaf,
         / token = 20 (mapkey) :
           h'a0a1a2a3a4a5a6a7a8a9aaabacadaeaf' (bstr .size (8..64)),
           given from TAM's QueryRequest message /
    5 : 1,  / selected-cipher-suite = 5 (mapkey) :
           TEEP-AES-CCM-16-64-128-HMAC256--256-X25519-EdDSA =
           1 (.within uint .size 4) /
    6 : 0,  / selected-version = 6 (mapkey) :
           0 (.within uint .size 4) /
    7 : ... / evidence = 7 (mapkey) :
           Entity Attestation Token /
```

```
{
  2,  / type : TEEP-TYPE-query-response = 2 (uint (0..23)) /
  / options : /
  {
    20 : 0xa0a1a2a3a4a5a6a7a8a9aaabacadaeaf,
         / token = 20 (mapkey) :
           h'a0a1a2a3a4a5a6a7a8a9aaabacadaeaf' (bstr .size (8..64)),
           given from TAM's QueryRequest message /
```

] / component-id =
0a0b0c0d0e0f']

] / component-id =
0a0b0c0d0e0f']

Benefit of CBOR in TEEP (2/2)

CBOR がバイナリーになるまで (2/2)

- Binary Representation

```
82                  # array(2)
  02                # unsigned(2) uint (0..23)
  A5                # map(5)
    14              # unsigned(20) uint (0..23)
    4F              # bytes(16) (8..64)
      A0A1A2A3A4A5A6A7A8A9AAABACADAEAF
    05              # unsigned(5) uint (0..23)
    01              # unsigned(1) .within uint .size 4
    06              # unsigned(6) uint (0..23)
    00              # unsigned(0) .within uint .size 4
    07              # unsigned(7) uint (0..23)
      ...           # Entity Attestation Token
    08              # unsigned(8) uint (0..23)
    82              # array(2)
      81            # array(1)
        4F          # bytes(16)
          000102030405060708090A0B0C0D0E0F
      81            # array(1)
        4F          # bytes(16)
          100102030405060708090A0B0C0D0E0F
```

- JSON で変換(16進数)　259 Bytes

```
205B0A202020322C0A2020207B0A20202020203230203A203078613061316132613361346135613661376138613961616162616361646165616620C0A20202020203520 3A20312C0A202020202036203A20302C0A20202020203820 3A205B0A20202020202020 7B0A202020202020202020 3136203A205B20307830303031303230333034303530363037303830393061306230633064306530662 05D0A20202020202020 7D2C0A20202020202020 7B0A202020202020202020 3136203A205B20307831303031303230333034303530363037303830393061306230633064306530662 05D0A20202020202020 7D0A20202020202020202020 5D0A20202020207D0A205D0A
```

- CBOR で変換(16進数)　63 Bytes

```
8202A5144FA0A1A2A3A4A5A6A7A8A9AAABACADAEAF050106000882814F00010203040506
0708090A0B0C0D0E0F814F100102030405060708090A0B0C0D0E0F
```

Smaller binary than JSON

Started downloading dependent CDDL files with wget/curl

My procedure of cddl tool usage (1/2)

(1) Install cddl tool

```
$ sudo gem install cddl
```

(2) Prepare other CDDL files required for TEEP Protocol

(a-1) CDDL file for SUIT manifest

```
$ wget https://raw.githubusercontent.com/suit-wg/manifest-spec/master/draft-ietf-suit-manifest.cddl
```

(b-2) Fixing errors temporary by adding four lines to draft-ietf-suit-manifest.cddl just downloaded

```
COSE_Sign_Tagged     = 98
COSE_Sign1_Tagged    = 18
COSE_Mac_Tagged      = 97
COSE_Mac0_Tagged     = 17
```

(c) CDDL file for SUIT_Report
Create suit-report.cddl file by going at https://github.com/ietf-teep/teep-protocol/issues/212

(3) Creating CDDL file of TEEP Protocol

```
$ cat draft-ietf-suit-manifest.cddl suit-report.cddl draft-ietf-teep-protocol.cddl > check-draft-ietf-teep-protocol.cddl
```

(4) Run cddl tool

```
$ cddl check-draft-ietf-teep-protocol.cddl generate
```

16

Added CDDL Syntax check with Carsten's CDDL tool

- Added command 'validate-teep-cddl' in Makefile

To check syntax cddl syntax in TEEP file and not suit which is useful during debugging teep by using only QueryRequest which do not contain SUIT part.

```
make validate-teep-cddl
```

```
.PHONY: validate-teep-cddl
validate-teep-cddl: $(CONCATENATED_CDDL) ../cbor/query_request.diag.bin
	cddl $(CONCATENATED_CDDL) validate ../cbor/query_request.diag.bin
	@echo "Success: QueryRequest message matches TEEP Protocol CDDL"
```

TEEP with Passport model Verifier

Demo (1/3)

ARM OP-TEE

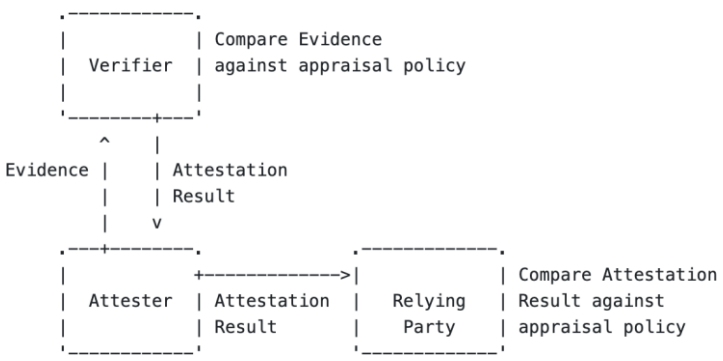
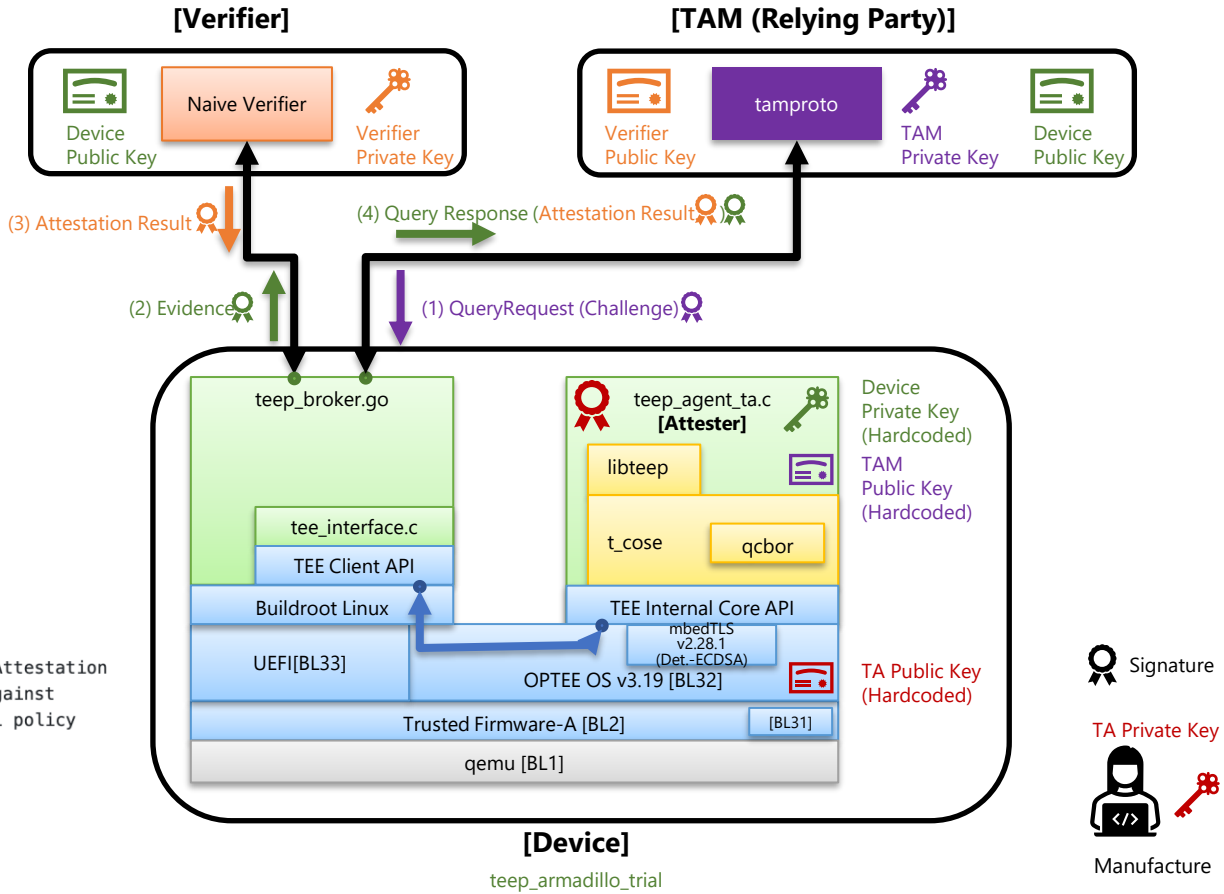


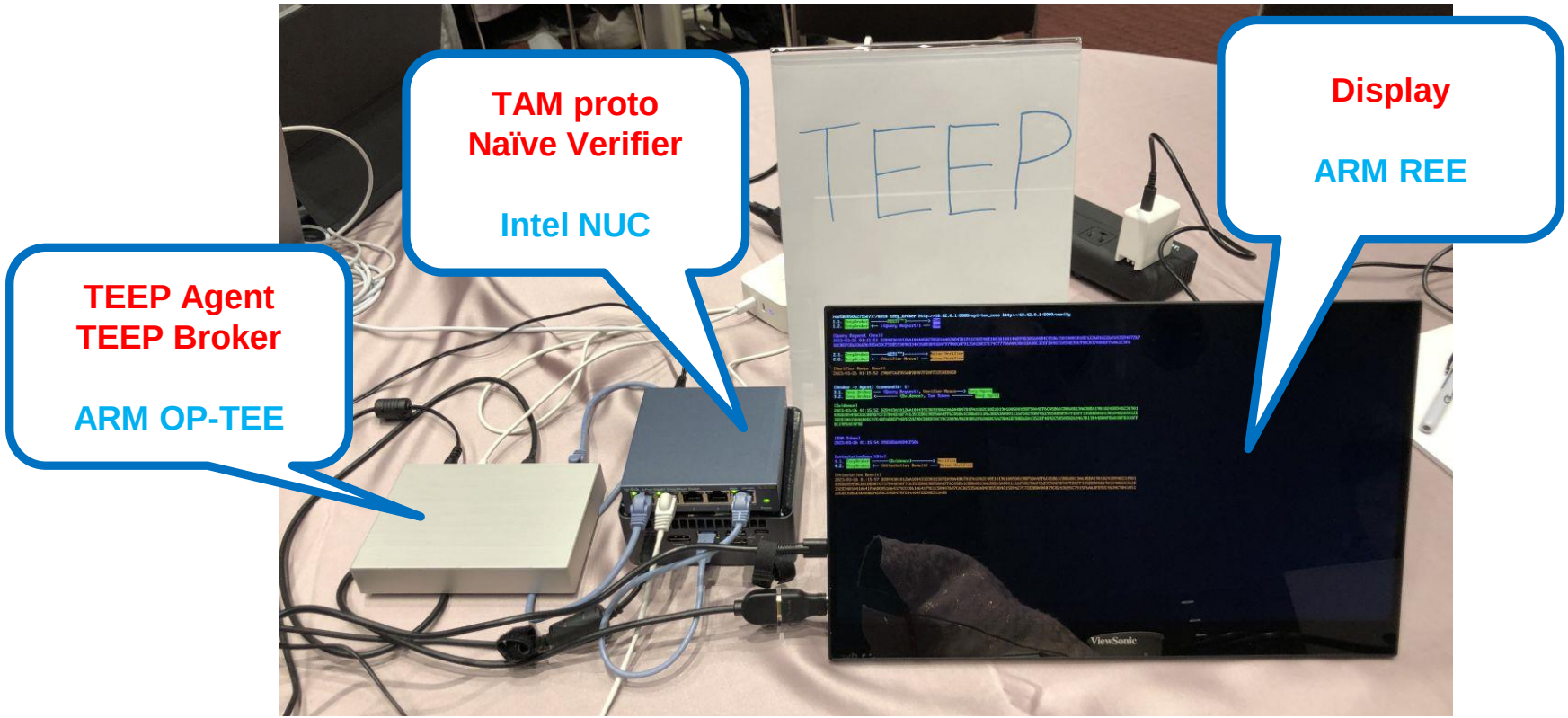
Figure 5: Passport Model

https://datatracker.ietf.org/doc/rfc9334/



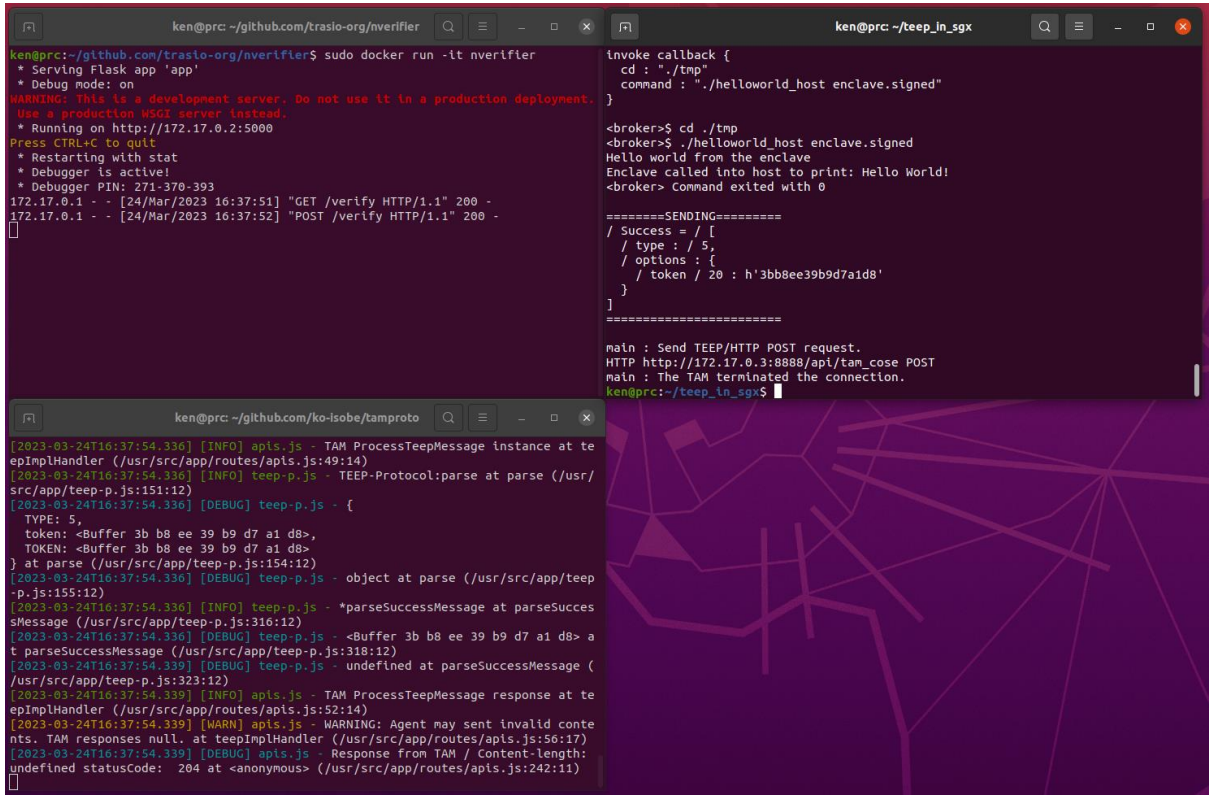
TEEP with Passport model Verifier

Demo (2/3) ARM OP-TEE



TEEP with Passport model Verifier on SGX

Demo (3/3)



Appendix

Items to tackle at Hackathon

- Clarification of cnf recently added to Query Response
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