IETF 106
TEEP Hackathon Report

Akira Tsukamoto, Nov. 19, 2019

What we planned

- Open Trust Protocol:
  - Evaluate OTrPv1 vs TEEP (aka OTrPv2) proposal
  - Test implementations of OTrP-over-HTTP
    - draft-ietf-teep-otrp-over-http-02

- Brought prototypes of TAM and TEEP device
  - TAM with node-js by Isobe-san
  - TAM with SGX by Dave Thaler
  - TEEP device on OP-TEE by Akira Tsukamoto
  - TEEP device on SGX by Dave Thaler

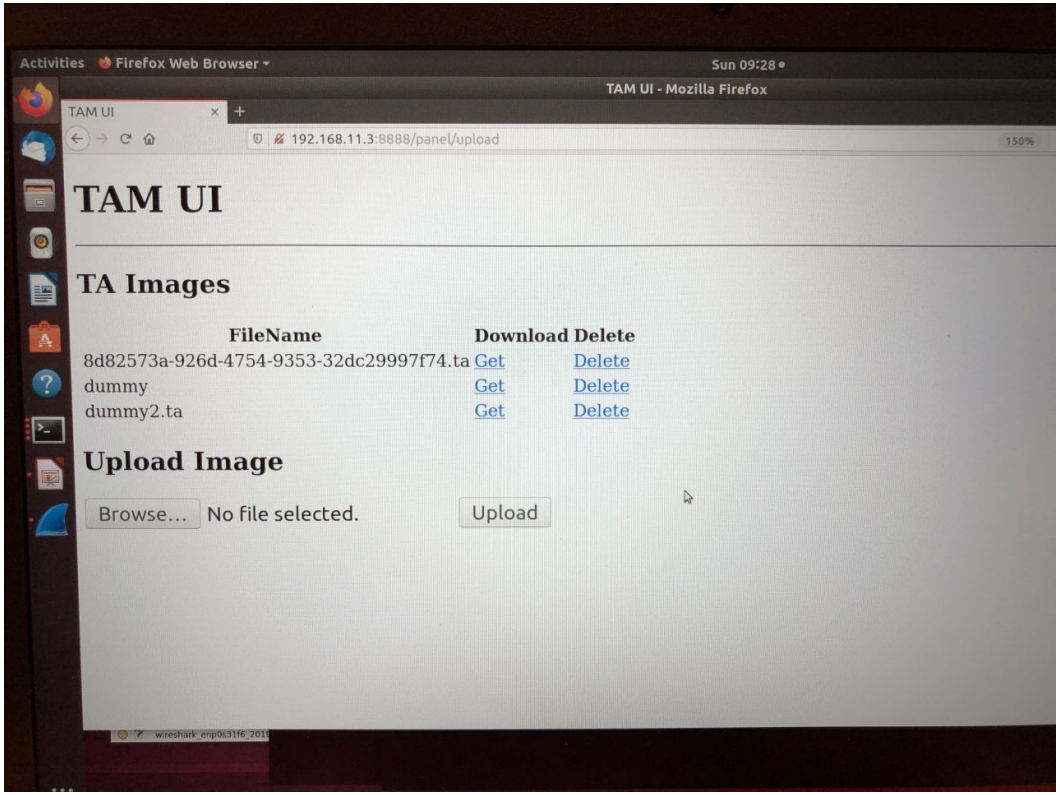
Great TEEm ᴍ

What got done

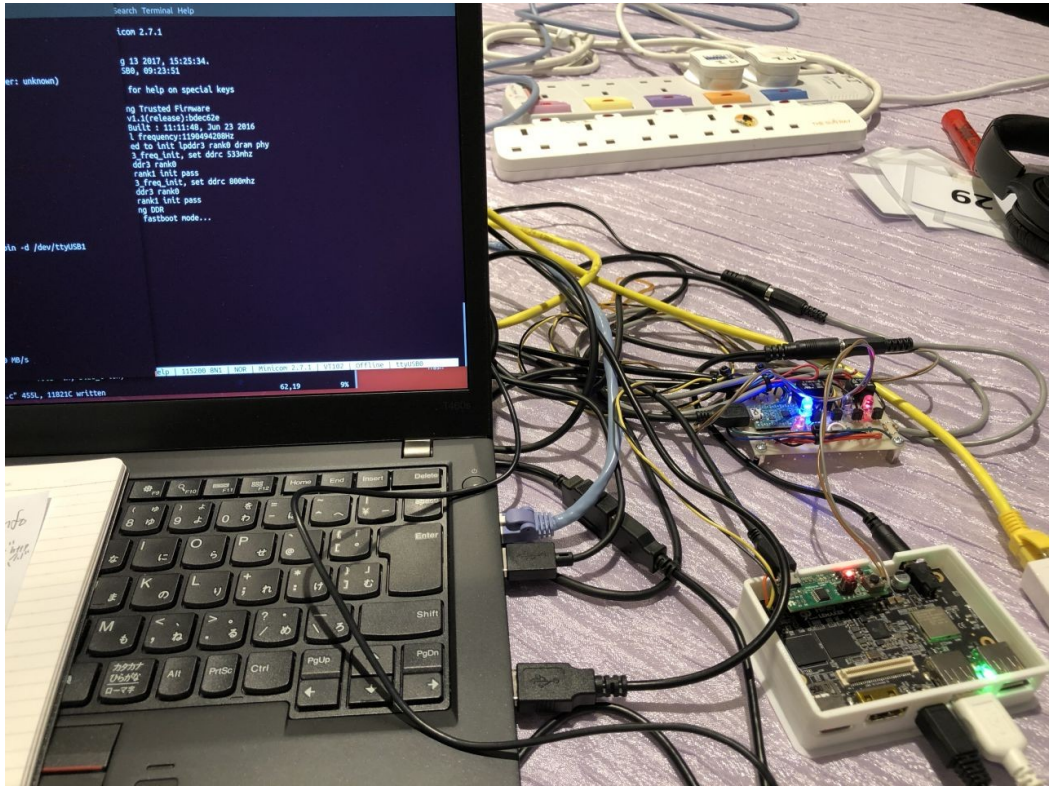
- First time to interop OTrP/TEEP protocol implementations built from specs.
  - See pictures on following pages.

On the Table

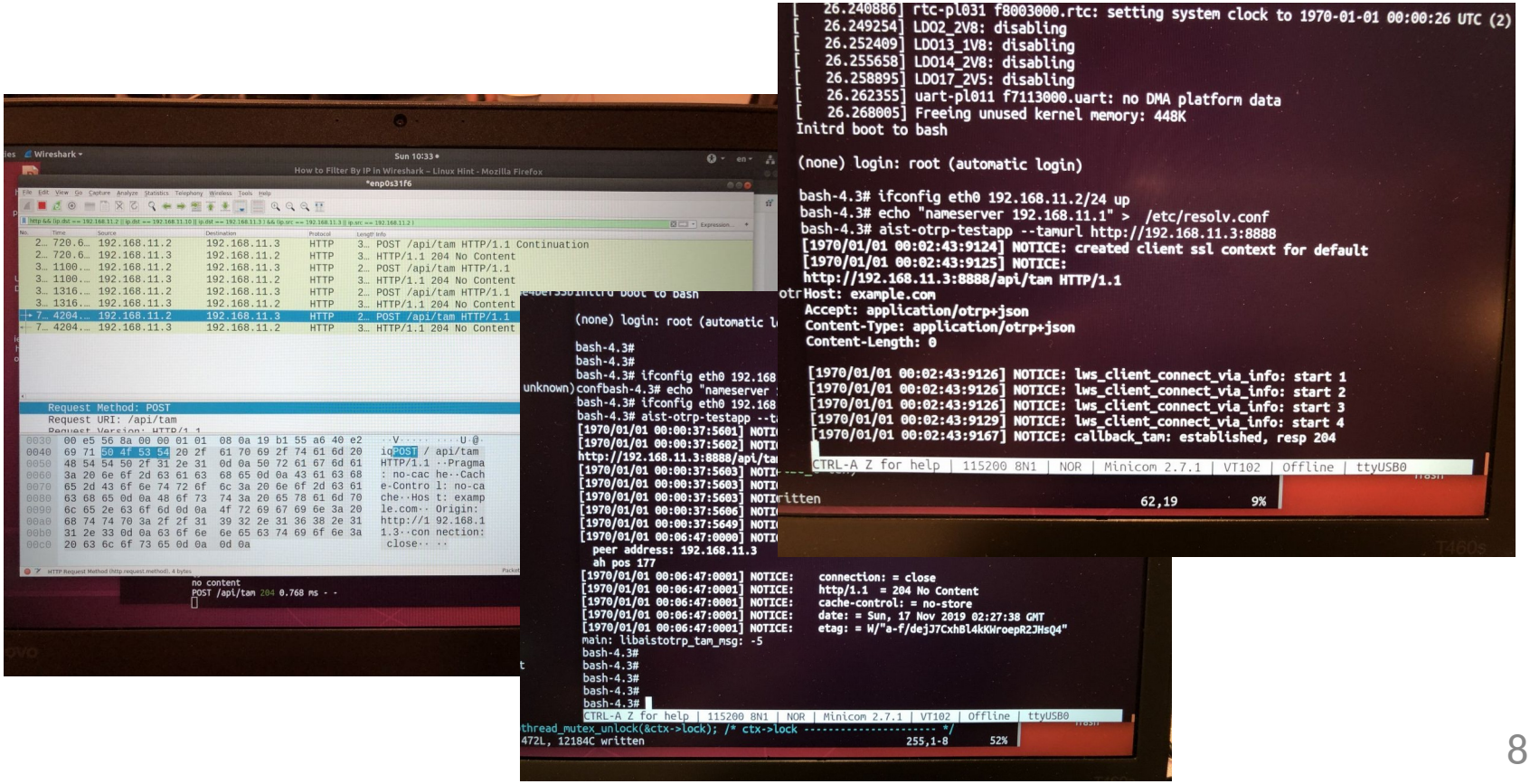
TAM`s UI for uploading TA



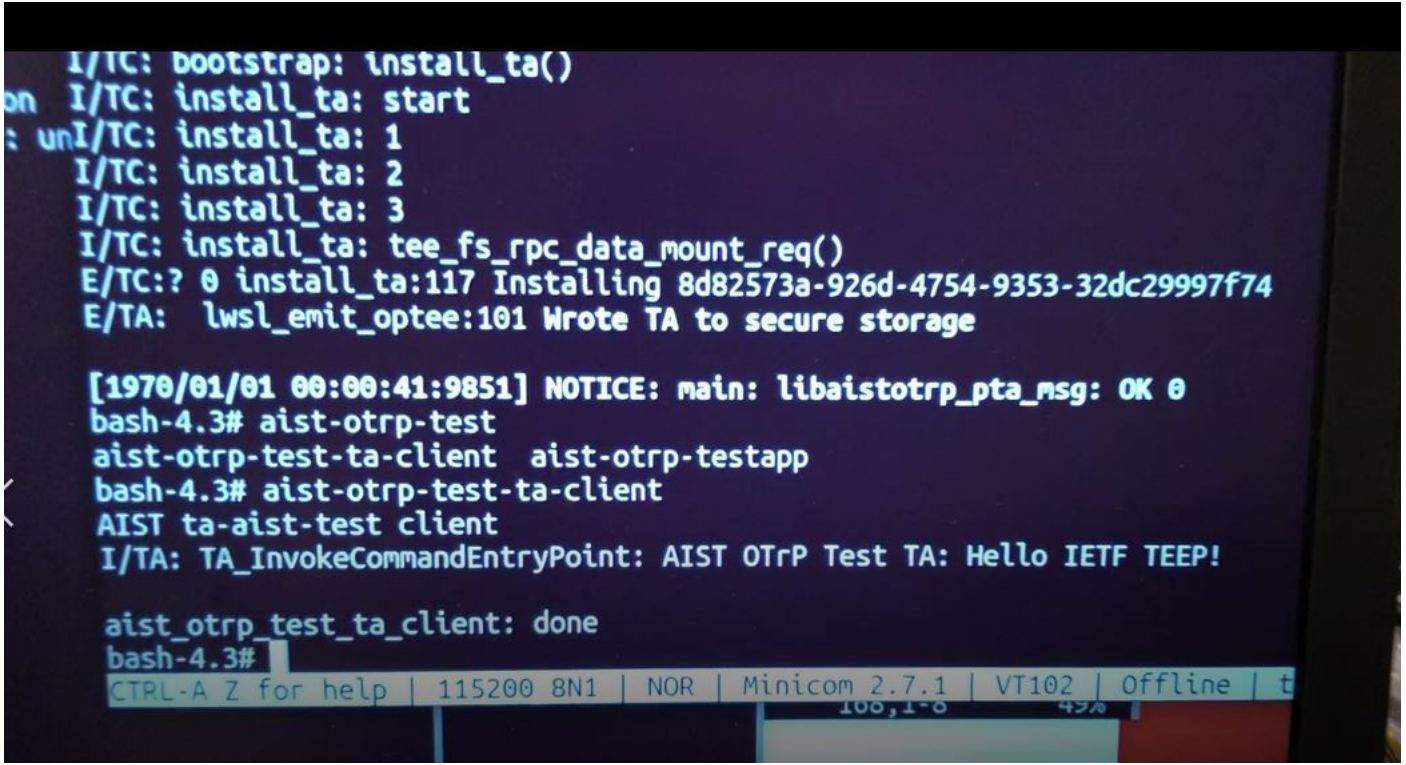
TEEP device


Search Terminal Help
icon 2.7.1
for help on special keys
ng Trusted Firmware
ng DDR
fastboot mode...
Home
End
Insert
Delete
Enter
Shift
PgUp
PgDn
Ctrl
Alt
PrtSc

Hacking, Debugging!



TEEP Device installing TA



What we learned

- Filed issues
  - draft-ietf-teep-otrp-over-http-03
    - #5: demuxing TEEP vs OTrP
  - draft-tschofenig-teep-protocol-00.txt
    - Would like to have JSON example

- A lot of implementation action items
  - Prerequisite required for OTrP/TEEP
    - HTTP, JSON, CBOR stack must be completely working
  - Understand TEE concepts, such as SGX, Arm TrustZone, knowledge of implementation details (e.g. OP-TEE)

What went well

- Constructing stand alone wired network on Hackathon table for TAMs and TEEP devices but having uplink
  - This will prevent harming IETF network when sending broken packets. ᴍ
  - My TEEP device needs to talk to ntp, since does not have RTC.
- Cross checking different TAMs and different TEEP device OTrP messages.
  - Dave`s TAM even sends back what was wrong in the message in the http response. e.g. Content-length missing etc.
- Able to come up for the future plan.

Future consideration

- How to make it easier to implementation TEEP system?
- What to do for reference implementation?
  - At the hackathon, I started of OTrP debugging and end up debugging http header and json parser.
- IDE Development environment for TA on TEE?

- Many selections for hardware and software stack for TEEP
  - Which hardware?
  - Which software stack to use on TEEP device?
    - JSON stack
    - HTTP stack
    - Crypto stack for TLS and JWE, JWS
    - CBOR parser

Hardware recommendation

- Reference TAM machine
  - Recommending IBM PC compatible machine?
  - Any other hardware requirement?

- Reference TEEP device (IoT device, Edge device and etc)
  - Recommended device for each Intel, ARM, RISC-V.
    - ARM, OP-TEE usable device
      - Raspberry Pi 3B (Cortex A53) or later?
    - Intel, SGX usable device
      - Laptop PC? (not all SGX usable)
    - RISC-V, PMP extension usable device
      - HiFive Unleashed? (the device only exist at the moment)

Software stack recommendation

- TAM
  - HTTP stack: Apache
  - JSON stack: Node.js
  - Crypto: openssl
  - CBOR: ?
- TEEP device (limited hardware performance)
  - rootfs: buildroot, Yocto/OE, openwrt?
  - HTTP stack: libwebsocket?
  - JSON stack: libwebsocket?
  - Crypto(TLS,JWE,JWS): openssl, LibreSSL, mbedTLS, wolfSSL, s2n?
  - CBOR: ? ?

Nice to have? Or out of scope?

- TEEP: Testbed on Internet
  - TAM: Everybody connecting from there own TEEP devices
- IDE Development environment for TA on TEE
  - OpenEnclave

- Hosting github for TEEP reference implementation?

- TAM: security hardware
  - SGX: Any other? OpenTitan?
- TEEP: security hardware
  - Any other? Azure Sphere IoT?

My notes from hackathon

- Fix header for HTTP compliant
  - I broke the HTTP header when revising OTrP messages.
- Add JSON parsing for every packet received
- Cleanup and dependency fix of Makefile
  - It does not detect some dependency when I change some of the code.
- microUSB cable for flashing bootloader
  - Suffered a lot of having bad connection, have to change both the 3D printed case and cable.
- Add dumping the all content of http packet every time
  - To reduce the time using wireshark.
- Buy reliable self-powered USB-hub.
  - One of the hub did not recognize the gpio board.

Wrap Up

Team members:

Akira Tsukamoto
Kuniyasu Suzaki
Kohei Isobe
Dave Thaler
Hannes Tschofenig
Nancy Cam-Winget

https://trac.tools.ietf.org/wg/teep/

This presentation of hackathon is based on results obtained from a project commissioned by the New Energy and Industrial Technology Development Organization (NEDO).