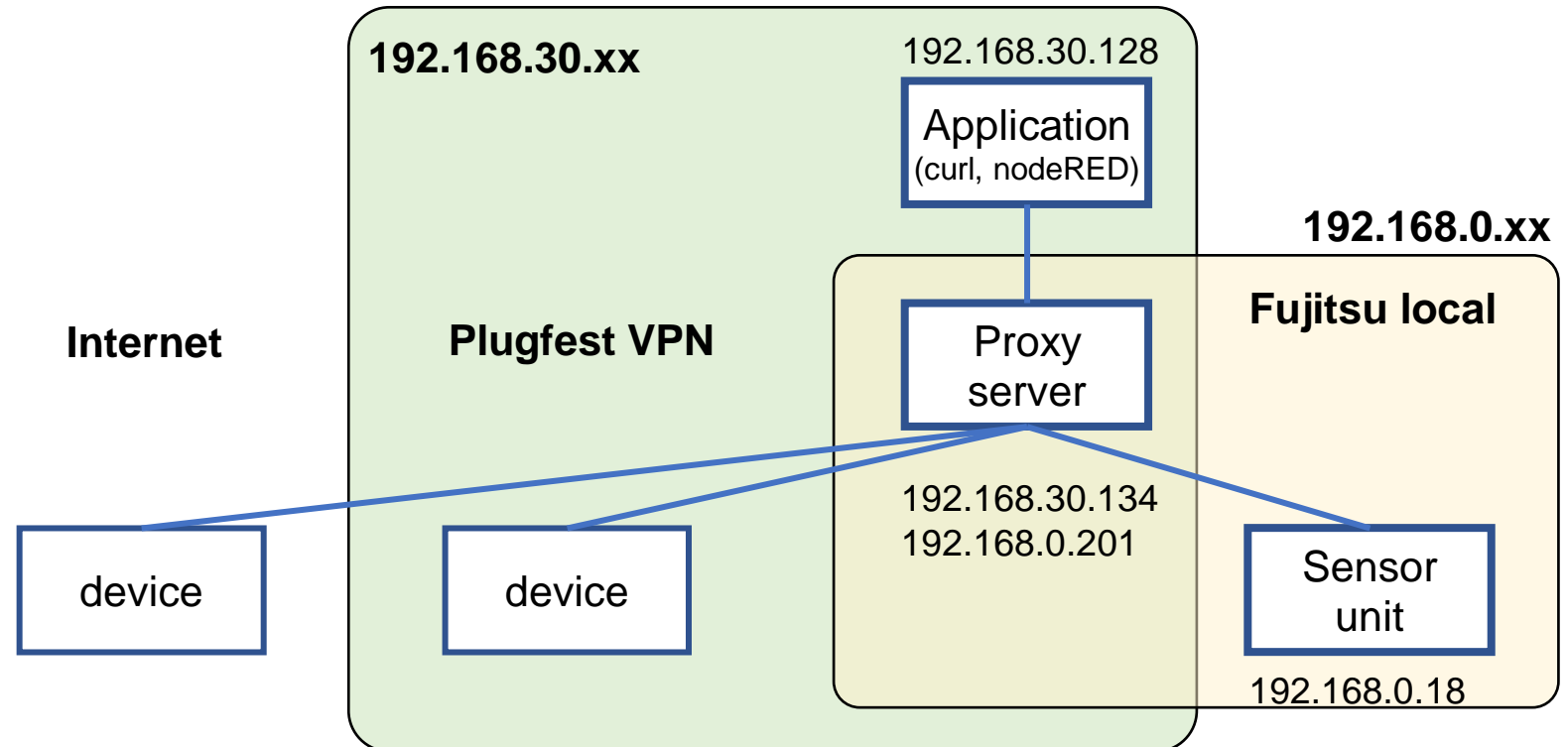# Plugfest project – Shadow Proxy

Presenter

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Diagram in this plugfest

- Fujitsu provides three services
  - Sensor unit (temperature, humidity and air pressure)
  - Proxy server
  - Application

192.168.30.xx   192.168.30.128

Application
(curl, nodeRED)

192.168.0.xx

Internet   Plugfest VPN   Proxy
server

Fujitsu local

192.168.30.134
192.168.0.201

device   device   Sensor
unit

192.168.0.18

Sensor unit

- 3 sensors: temperature, humidity and air pressure

- ESP32 with Wi-Fi

- Developed in C++ using Arduino

- mDNS support
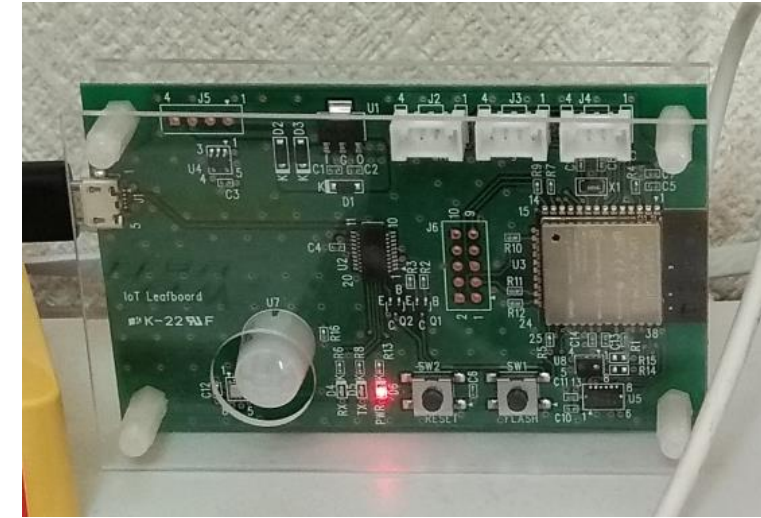

```
% avahi-browse -r _wot._tcp
+ eth0 IPv4 fjsensor-esp32                          _wot._tcp          local
= eth0 IPv4 fjsensor-esp32                          _wot._tcp          local
    hostname = [fjsensor-esp32.local]
    address = [192.168.0.18]
    port = [80]
    txt = ["type=Thing" "td=/.well-known/wot-thing-description"]
```

Proxy server

- Objectives
  - prevent direct access to real devices.
  - allow multiple devices connected with different protocols and authentication methods to connect using one protocol and one authentication method.

- Shadow device
  - are created on request from real device
  - exposes the endpoint to applications instead of real device

Proxy server (2)

- Developed in JAVA on RaspberryPi (Linux)
- Advertising the proxy address to real devices and applications with mDNS

```
% avahi-browse -r _wot._tcp
+ vpn_vpn IPv4 wot-proxy                                    _wot._tcp        local
= vpn_vpn IPv4 wot-proxy                                    _wot._tcp        local
    hostname = [ip-192-168-30-134-ec2-internal.local]
    address = [192.168.30.134]
    port = [80]
    txt = ["register=/Things" "retrieve=/Things"]
```

APIs of Proxy server

- Registration and unregistration of shadow devices

```
curl -X POST -H 'content-type: application/json' -d @tdfile http://192.168.30.134/Things
```

```
curl -X DELETE http://192.168.30.134/Things/urn:com:fujitsu:sensor
```

- Getting a list of registered shadows

```
curl http://192.168.30.134/Things

(response) ["urn:dev:mac:b827ebfffe4b6d0b","echonet:temperatureSensor:19216815001101","urn:com:fujitsu:sensor"]
```

- Retrieving shadow TDs and real TDs

```
curl http://192.168.30.134/Things/urn:com:fujitsu:sensor
```

- Search APIs are NOT implemented.
  - APIs to search for devices with their description and attributes as a key

Results: checked devices

- 4 devices are connected (Internet, VPN and local)
  - Fujitsu sensor can find the proxy and register own TD to it automatically
  - Others are register manually
  - All devices can be controlled from the application on the VPN via the proxy

192.168.30.xx

192.168.30.128

Application (curl, nodeRED)

192.168.0.xx

Internet

Plugfest VPN

Proxy server

Fujitsu local

192.168.30.134
192.168.0.201

device

device

Sensor unit

192.168.0.18

counter(Siemens)

hitachi-led(Hitachi)
temperaturesensor(ECHONET)

fjsensor(Fujitsu)