OpenAirInterface Workshop in Beijing

FUJITSU's contributions to OpenAirInterface in private LTE

4th Dec 2019

SAWADA Kentaro

澤田 健太郎

sawa-ken@fujitsu.com
FUJITSU’s contributions to OpenAirInterface in private LTE

Keep Focusing on Quality / Commercialization

2017

- OAI Workshop @Paris
  Improvement of Software Quality
  Approach to Commercial Use of OAI

2018

- OAI Workshop @Beijing
  New Potential of OpenAirInterface as the Private LTE

2019

- OAI Workshop @New Jersey
  Implementation and Evaluation for the Commercial Users of OAI

Challenges to use in commercials

- What is the best configuration for target use case?
- How to realize Operation and Management?
- Which L1/L2 performed the interoperability test?
- How to maintain the stability of software?

Kano Model

Academic Software engineers

Commercial Company

Field trial is effective!
KANO Model shows the reason why we need to enlighten both

- Well-Balanced 2 Qualities is the key to success.

**Attractive Quality**

Even if not implemented, it's OK. But once implemented, the customer becomes delighted.

- Example: NB-IoT, 5G-NR

**One-dimensional Quality**

The more you have, the more the customer gets satisfied.

- Example: Number of UEs, Throughput

**Must-be Quality**

Even if fully implemented, the customer’s reaction is neutral. But if not implemented, the customer gets really disappointed.

- Example: Stability, Very Basic Features (4G)

---

FUJITSU’s contributions to OpenAirInterface in private LTE

Two Wheels of an OAI Cart

KANO Model shows the reason why we need to enlighten both

- Well-Balanced 2 Qualities is the key to success.

---

![KANO Model Diagram](https://en.wikipedia.org/wiki/Kano_model)
FUJITSU’s contributions to OpenAirInterface in private LTE

How We Have Secured OAI Quality

**Stability**
- Utilized anechoic chambers to test OAI in wireless environment.
- Lucky to have anechoic chambers in our office.

**Robustness**
- Utilized Load Tester.
- Lucky to have Load Tester equipment.

**Secured Quality Maintenance**
- Introduced Continuous Integration.
- Daily Nightly Test / Weekend Test
- Thanks for your cooperation!!
FUJITSU’s contributions to OpenAirInterface in private LTE

Private LTE (4G)

- Out of Signal Area / Isolated Network
  - Offshore Oil Field
  - Mining
  - Dam
  - Iron Works
  - Plantation
  - Prison
  - Military Base

- sXGP on OpenAirInterface
  - 1899.3 MHz
  - 1880 MHz
  - 1920 MHz
  - Band 39 (TDD)

High performance NW realized by 5G!
Limited vendors can provide
NW vendor will increase?

Copyright 2019 FUJITSU LIMITED
FUJITSU’s contributions to OpenAirInterface in private LTE

OAI Demonstration in FUJITSU

<table>
<thead>
<tr>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
</tr>
</thead>
</table>

Every Week!!

- Telecom
- Internet Service Provider
- Government / Public Service
- Maker / Vendor
- Californian

Copyright 2019 FUJITSU LIMITED
FUJITSU’s contributions to OpenAirInterface in private LTE

Challenges for Commercialization

- Monitoring & Maintenance Tools
  - Introduced data collection mechanism and OSS monitoring tools such as KIBANA / ZABBIX.

- Security Policy
  - Software Management
    - Software Update
    - Remove Unnecessary Apps
  - User Management
    - User Account
    - Privileged Users for su / sudo
  - Network Management
    - Packet Filtering
    - Close Unused UDP/TCP ports
  - Operation Management
    - File Permission
    - Time Adjustment
  - Sustainability
    - Education / Training
    - BCP

- Fast Deployment to Customer

Software Update ➔ Test ➔ Build ➔ Delivery

Continuous Integration
Continuous Delivery

Copyright 2019 FUJITSU LIMITED
FUJITSU’s contributions to OpenAirInterface in private LTE

Software Modem & RRH

- Variety of Software Modem

FUJITSU RRH

OAI-eNB
- IA Server
- Note PC
- Core™ i7 Fanless
- Embedded

Interface Conversion Box
- Ether (Original)
- Ether (UHD)

Original I/F

RRH

LimeSDR Mini

bladeRF x115

USRP X310

Copyright 2019 FUJITSU LIMITED
FUJITSU’s contributions to OpenAirInterface in private LTE

Your Contributions Change The World

- The best indicator of OSS soundness
- Diversity & Inclusion

Your Contributions Today leads to Success Tomorrow
- Your contributions are about to be returned to the actual society through OAI.
- Your code may change the world, even save the world.
Let's look it back for a while

December 22, 2015
https://www.youtube.com/watch?v=h7b14IbqIKb

Become a very strong voice and maybe even a game changer in the 3GPP world

在3GPP世界里发出强有力的声音, 甚至引发一场革命
Fujitsu

shaping tomorrow with you