

FUJITSU achievements with OAI 5G

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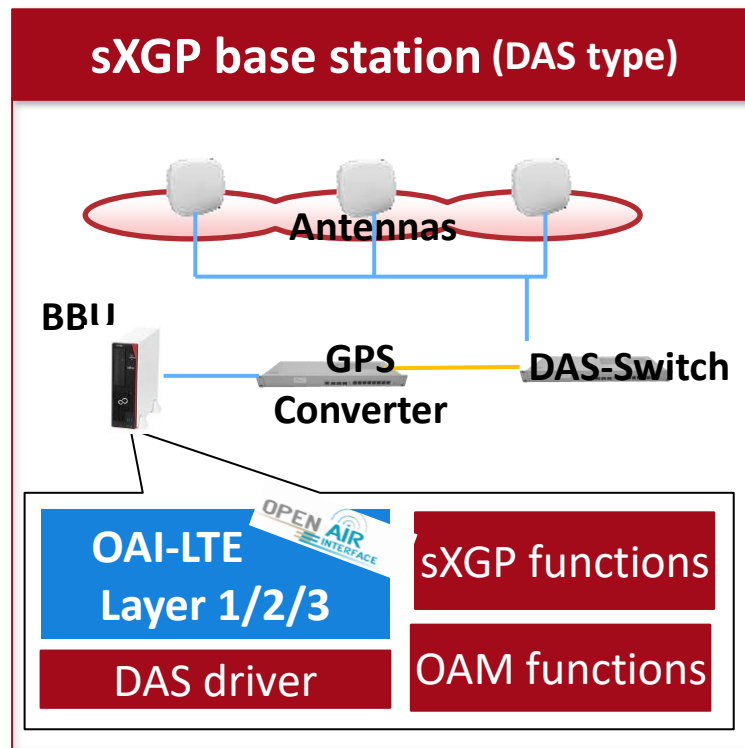
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■ Commercialization with OAI

- Induced CI in order to improve quality
- Feedback from Load Test, Field Test
- Added LTE functionalities
- Successfully shipped to customers

■ Participation to 5G development

- Attach through with COTS-UE
- Development of SA upper layer

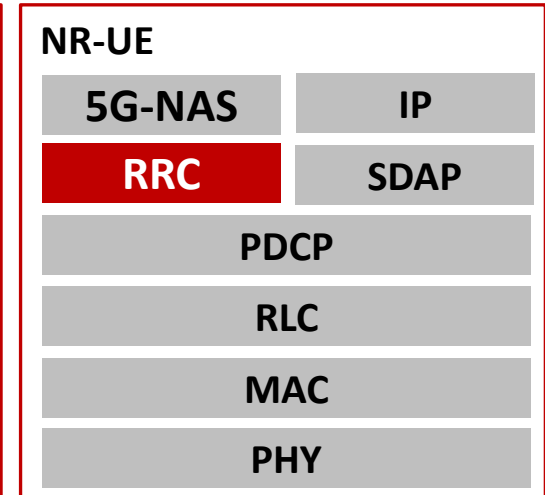
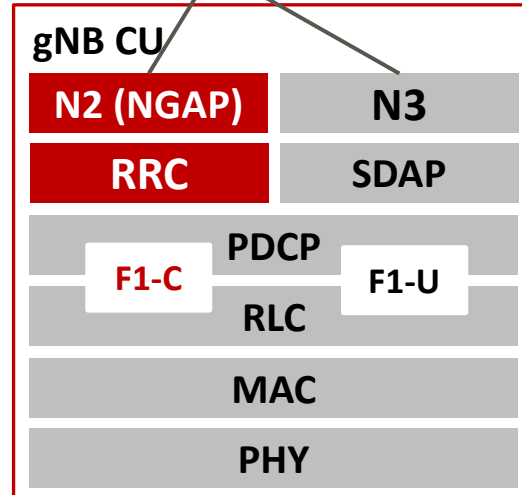


■ FUJITSU's development

- NGAP
- RRC(gNB/nrUE)
- ITTI simulator
- F1-C

5GC

■ Implemented

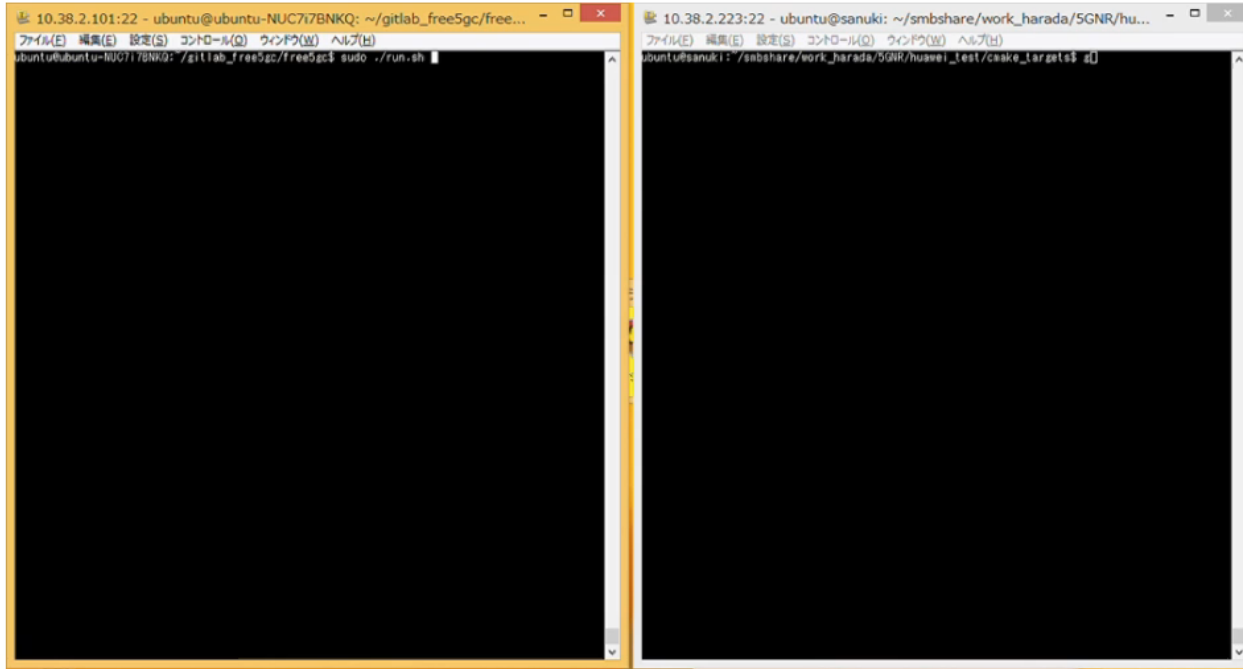


■ Integration

- OAI nrUE connection with Simulator
- COTS-UE connection
- Provided bug fix patches

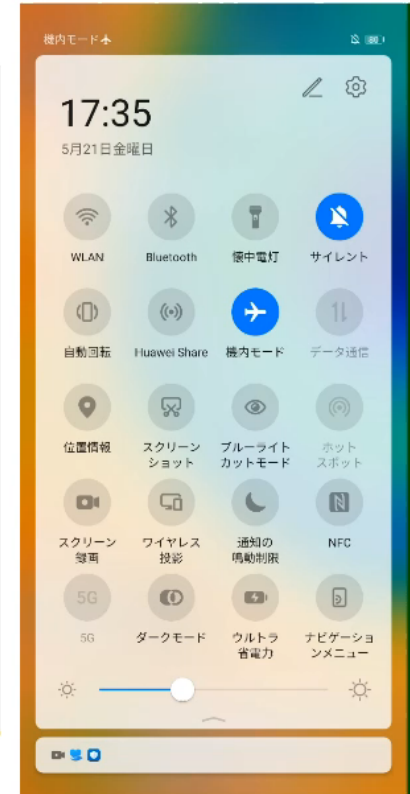


Video Clip of COTS-UE in 5G SA



5GC console

OAIgNB console



Phone screen

■ RRC message extension

- Re-establishment
- Paging
- Release

■ Stability improvement

- Repetitive massive test of Attach/Detach
- Multiple UE
- Inter-Operability-Test with various UEs

■ Connectivity test with COTS-UE

- SA connection
- NSA connection

Open Mobile Network Infra Community



FUJITSU

■ OMNI (Open Mobile Network Infra)

- Meta-community covering all major mobile-network OSS
- Exchanging various information and networking among engineers



- Number of members : 269 persons (as of June 14, 2021)

■ Activities



Meetup

Networking and Info Exchange



Communication

Info Exchange and Discussion



Contribution

Training of OSS Activities

Challenges of mobile-network OSS community in Japan

1. No place of information exchange and/or discussion beyond each OSS community
2. Barriers to entry due to lack of easy place to ask questions or consult
3. Psychological barriers to information in English

OMNI will



- **Address and resolve these 3 challenges**
- Boost building **co-creation relationship (ecosystem)** among mobile-network OSS developers / users

OAI introduction in OMNI community

OAI PR

- Introduce OAI and provide the latest info at Meetup
- Information sharing in Slack
- Provide Hands-on session



Open Mobile Network Infra Meetup #1

OpenAirInterfaceとは

- OpenAirInterface Software Alliance(OA)が提供する3GPPプロトコルに準拠したアクセラネットワーク、コアネットワーク系のソフトウェア
- LTE(EPC/eNB/UE)ネットワークをソフトウェア処理にて実現
- 5G (5GC/gNB/UE)は開発中

構成例

- COTS UE
- 汎用ソフトウェア無線機
 - ✓ Blade RF (Nuand社)
 - ✓ USRP (NI社) etc...
- PC or Server
 - ✓ Intel CPU
 - ✓ ARM CPU
 - ✓ AMD CPU etc...

モバイルネットワークを汎用ハードで構築可能

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OAI introduction at Meetup

```
[PNF] Sent NFAP1_PARAM_REQUEST phy_id:1
[PNF] Received NFAP1_PARAM_REQUEST phy_id:1
[PNF] Sent NFAP1_PARAM_RESPONSE phy_id:1 number_of_tivs:2
[PNF] param request ... exit
[PNF] Received NFAP1_CONF16_REQ phy_id:1
[PNF] Phy_info:timing window:30 NFAP1_CONF16:timing_window:30
timing info mode:3
timing info period provided value:128
[NFAP1_PNF] config_request() NFAP1_CONF16_CHANNEL_BANDWIDTH_TAG_N_B_0
1:30
[PNF] config_request() NFAP1_CONF16_PPHO_POWER_OFFSET_TAG tag:22 not
supported
[PNF] 1 vnf p7.127.0.0.2:50001 timing 30 3 128
[PNF] Sent NFAP1_CONF16_RESPONSE phy_id:1
[PNF] Received NFAP1_START_REQ phy_id:1
[PNF] P7 remote:127.0.0.2:50001 local:127.0.0.1:32123
subframe_buffer_size configured using phy_info->timing_window:30

priority = 99, CPU Affinity: CPU_0 CPU_1 CPU_2 CPU_3 CPU_4 CPU_5 CPU_6 CPU_7 CPU_8 CPU_9 CPU_10 CPU_11 CPU_12 CPU_13 CPU_14 CPU_15
[PHY] thread to created id=76
[PHY] thread id created id=77
[HW] [SCHED] [ANS] RAN_Tkxnp4.0
started on CPU_12, sched_policy = SCHED_FIFO , priority = 99, CPU Affinity: CPU_0 CPU_1 CPU_2 CPU_3 CPU_4 CPU_5 CPU_6 CPU_7 CPU_8 CPU_9 CPU_10 CPU_11 CPU_12 CPU_13 CPU_14 CPU_15
[NFAP1_PNF] nfnapi_vnf_list_find : config_vnf_list:0x7fa12c000629
[NFAP1_PNF] nfnapi_vnf_list_find : curr_vnf_id:0 p6_id:0
[HW] [SCHED] [ANS] RAN_Tkxnp4.1
started on CPU_9, sched_policy = SCHED_FIFO , priority = 99, CPU Affinity: CPU_0 CPU_1 CPU_2 CPU_3 CPU_4 CPU_5 CPU_6 CPU_7 CPU_8 CPU_9 CPU_10 CPU_11 CPU_12 CPU_13 CPU_14 CPU_15
[PNF] Sent NFAP1_PARAM_REQUEST [txrx] phy_id:1
p6:27
thread rtxx created id=78
[PHY] thread rtxx created id=79
```

以下コマンドをOAIのコンテナ上で実行し、OAI eNBを起動してください。

```
# cd /opt/5G/openairinterface/prepare_targets/
# ./start_5G_eNB.sh
```

5. OAI UE起動

OAI 使用するコンソールを起動してください。

```
# docker exec -it oai_5g_eNB /bin/bash
```

以下コマンドをOAIのコンテナ上で実行し、OAI UEを起動してください。

```
# cd /opt/5G/openairinterface/prepare_targets/
# ./start_5G_UE.sh
```

6. pingによる疎通確認

pingコマンドを実行しコンソールを起動してください。

```
# ping -c 4 40.40.40.1
```

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Hands-on session

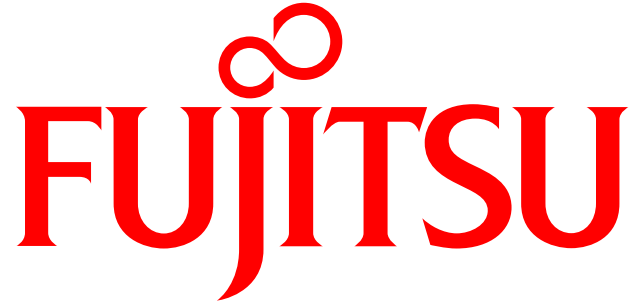
Thank you!!

■ Thank you all SA develop members

- Eurecom, Opencells, Allbesmart, BUPT
- Lot of trouble with merging, but we were able to make attach
- There are still some problems, but let's co-work to complete Release

■ Message

- I told you the mobile network community in Japan. I always feel their high expectation for OAI.
- We still need to work harder to increase software quality.

The logo features a red infinity symbol positioned above the word "FUJITSU". The word is rendered in a bold, red, serif typeface. The 'F' has a distinctive curved tail that extends downwards and to the left.

FUJITSU

shaping tomorrow with you