FUJITSU

shaping tomorrow with you

Activity of FUJITSU in OAI

AKIYAMA Yuko

FUJITSU LIMITED

Copyright 2017 FUJITSU LIMITED

Who we are

Japan's largest IT services provider and
No. 5 in the world.
(based on vendor revenue 2015)*

We do everything in ICT. We use our experience and the power of ICT to shape the future of society with our customers.

156,000 Fujitsu people support customers in more than 100 countries.

FORTUNE named Fujitsu as one of 'the World's Most Admired Companies' for the fourth consecutive year.

Copyright 2017 FUJITSU LIMITED

What makes Fujitsu different?

- Global scale in technology and service capability yet with a local face
- We integrate solutions in response to our customers' business needs

IT Service #1 in Japan #5 globally

Employees 156 thousand

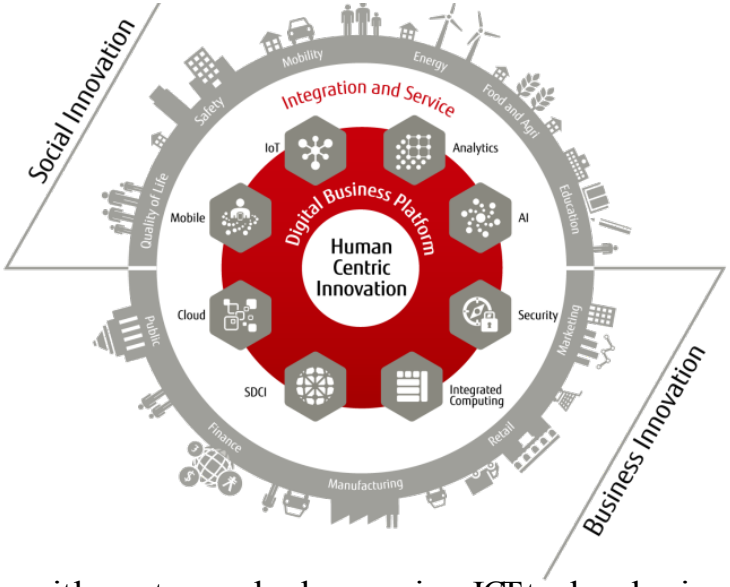
Data Centers 121

Service Desks 74

FORTUNE named Fujits as "one of the World's Most Admired Companies for 4th consecutive year.

Fujitsu Chosen for the Dow Jones Sustainability World Index for 16th time in 2015.

<Fujitsu's technology and services for achieving digital innovation.>



Fujitsu is a Japan-based global ICT vendor, seeking affluent society with customer by leveraging ICT technologies and our experiences.

Copyright 2017 FUJITSU LIMITED

Revenue by sector – FY2015

FUJITSU

Device Solutions

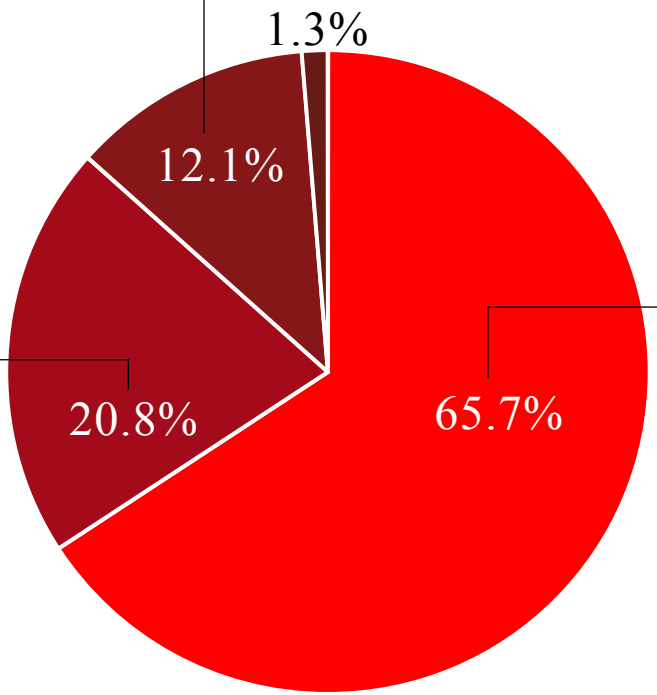
- LSI
- Electronic Components
- Others

¥603.9 billion
US$5.0 billion

Ubiquitous Solutions

- PCs
- Mobile Phones
- Mobilewear

¥1,040.9 billion
US$8.6 billion



Others

¥67.2 billion
US$560 million

Technology Solutions

- Solutions / SI
- Infrastructure Services
- System Products
- Network Products

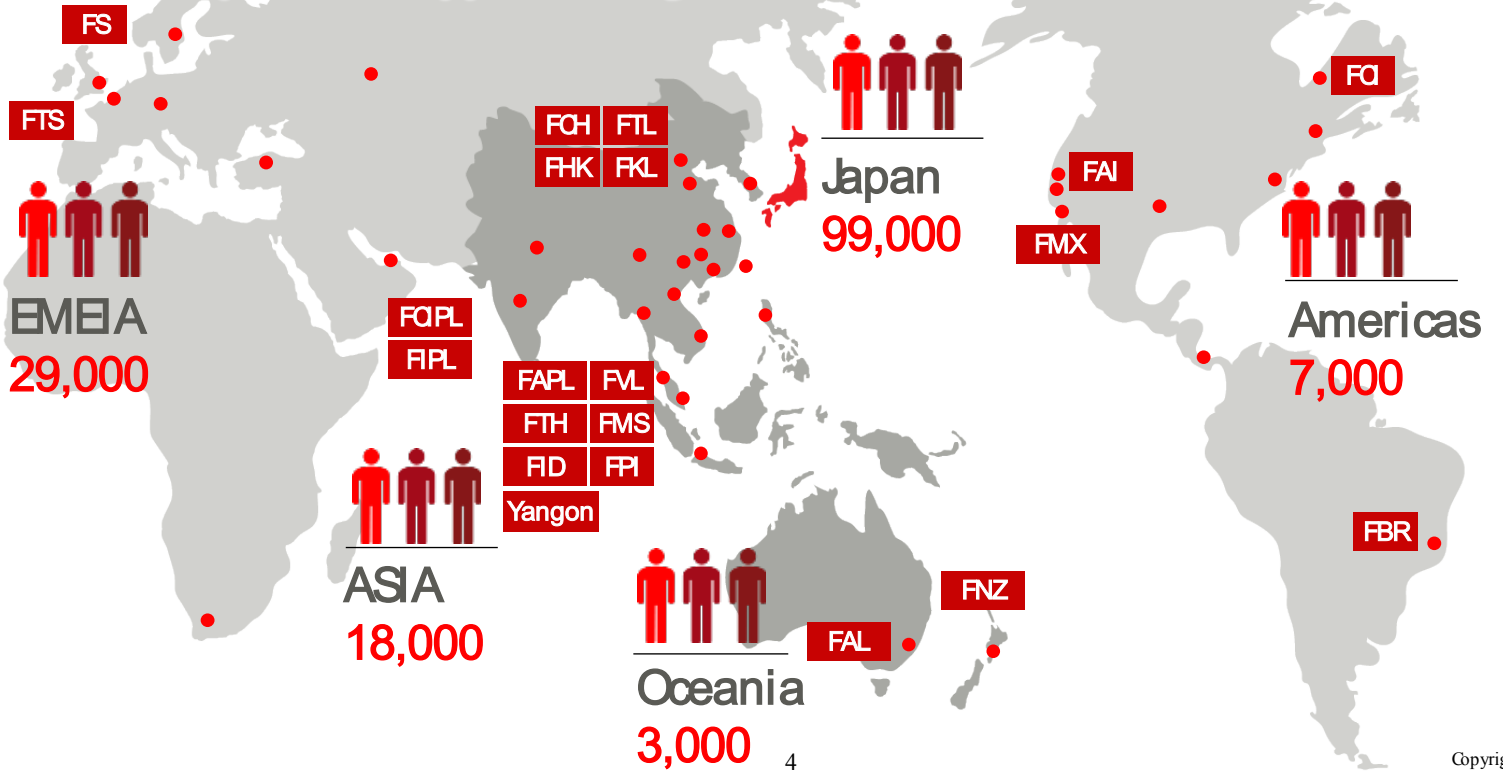
¥3,283.3 billion
US$27.3 billion

Note: **Consolidated Revenue by Business Segment, Including Intersegment Revenue**
US$1=120yen, the approximate closing rate on March 31, 2016.
FY2015 is fiscal year ended March 31, 2016.

Copyright 2017 FUJITSU LIMITED

Fujitsu's Organization

Fujitsu's 156,000 employees covering over 100 nations connect customers' HQs & their offices out of Japan and support their global businesses.



Copyright 2017 FUJITSU LIMITED

Working with world class customers

FUJITSU

Retail

Financial Services

Transport & Logistics

Utilities

Public Sector

Manufacturing

Communications

Health

Copyright 2017 FUJITSU LIMITED

Working with world class partners

FUJITSU

Copyright 2017 FUJITSU LIMITED

FUJITSU's products and services

Technology Solutions

Services

Our datacenters in the world

eNB & HeNB

Systems platform

FUJITSU Supercomputer PRIMEHPCFX10

FUJITSU Server PRIMERGY

FUJITSU Storage ETERNUS

Ubiquitous Product Solutions

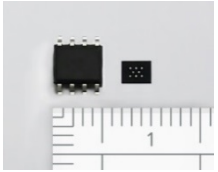
FUJITSU PC LIFEBOOK

FUJITSU Tablet arrows

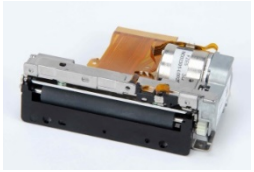
FUJITSU Smartphone arrows

FUJITSU UBIQUITOUSWARE vital sign sensing bands

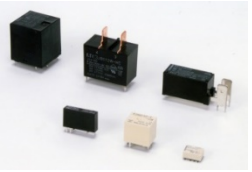
Device solutions



MB85RS1MT 1Mbit FRAM in very small package for wearable devices



High speed printing thermal printer FTP-62HMCL153

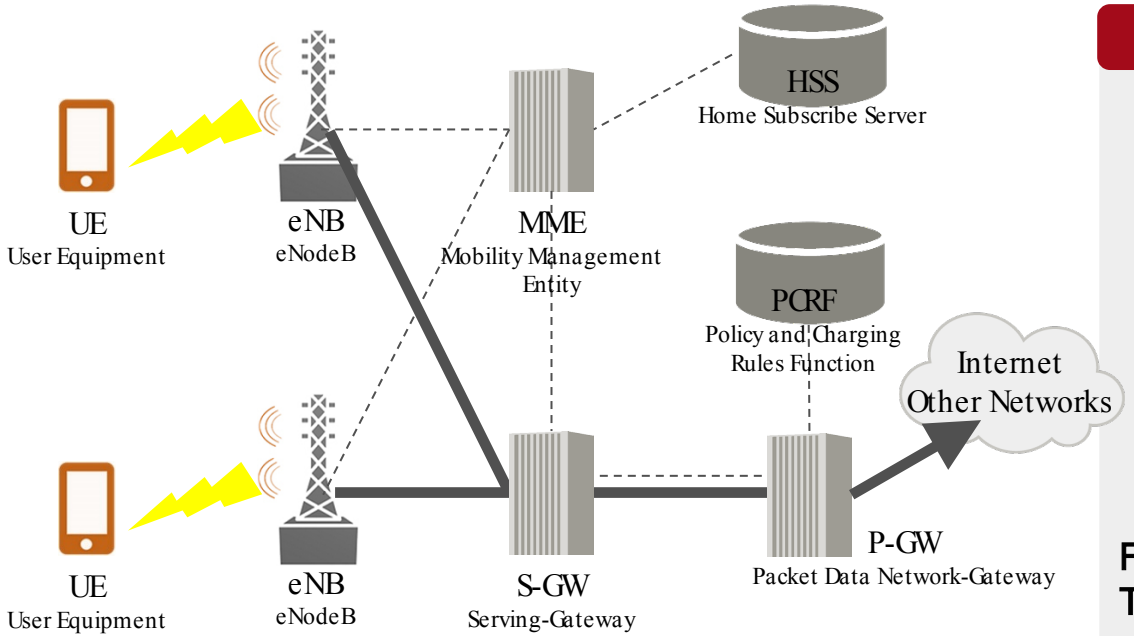


Relay lineup

Copyright 2017 FUJITSU LIMITED

Telecommunication

- Telecommunication is the one of the oldest business domain of FUJITSU.



Hello World!

FUJITSU

富士通

通信

Telecommunication

FUJI means Japanese Symbol Mt. FUJI.
TSU means telecommunication in Japanese.

Copyright 2017 FUJITSU LIMITED

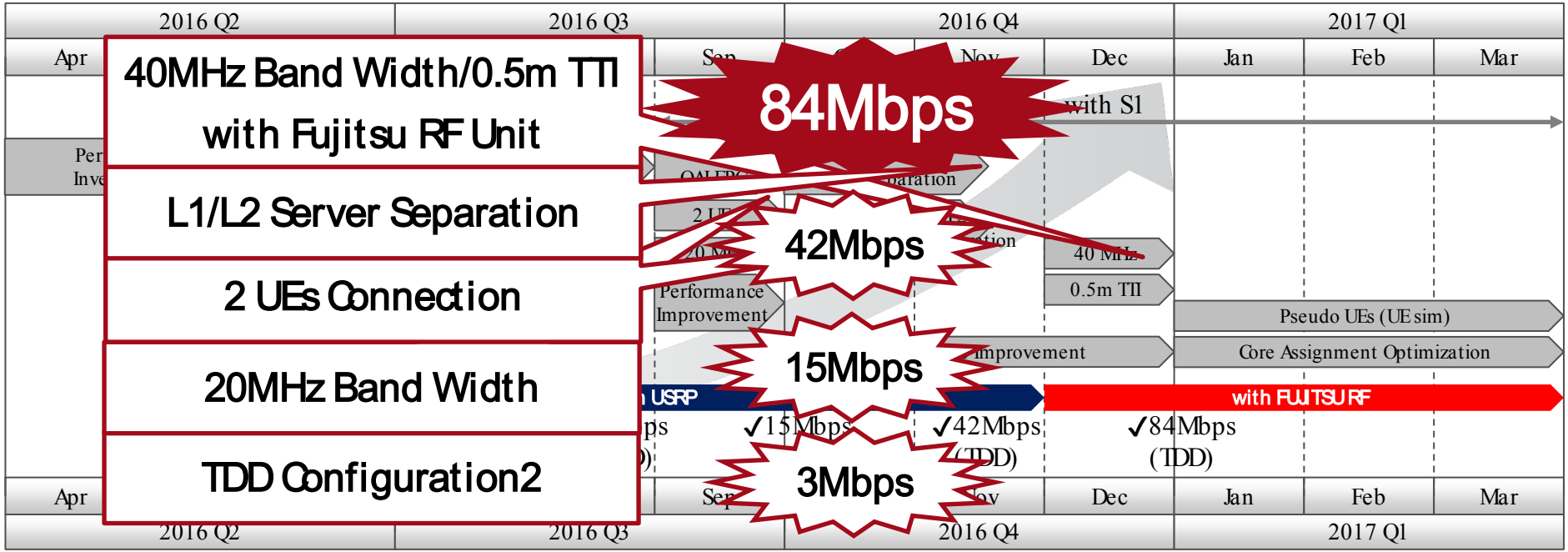
FUJITSU

Activities using OAI

Copyright 2017 FUJITSU LIMITED

Things has been done on OAI

FUJITSU



- Others

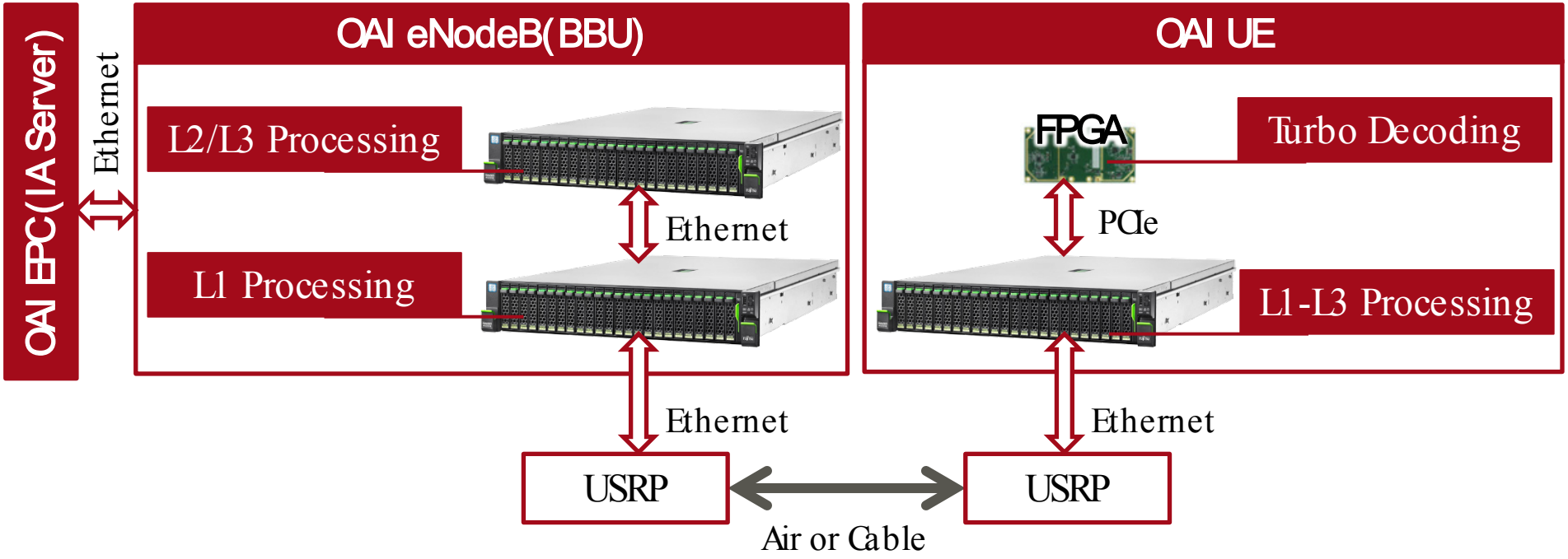
✓PUCCH format 3
✓Sounding RS(UE/eNB)
✓Turbo Decoder(UE) offloaded to FPGA
✓ TA/ Path Searcher
✓Performance Improvement(Error Free)

Copyright 2017 FUJITSU LIMITED

System configuration

FUJITSU

- We have Developed a Test system for 5Gusing OAI.

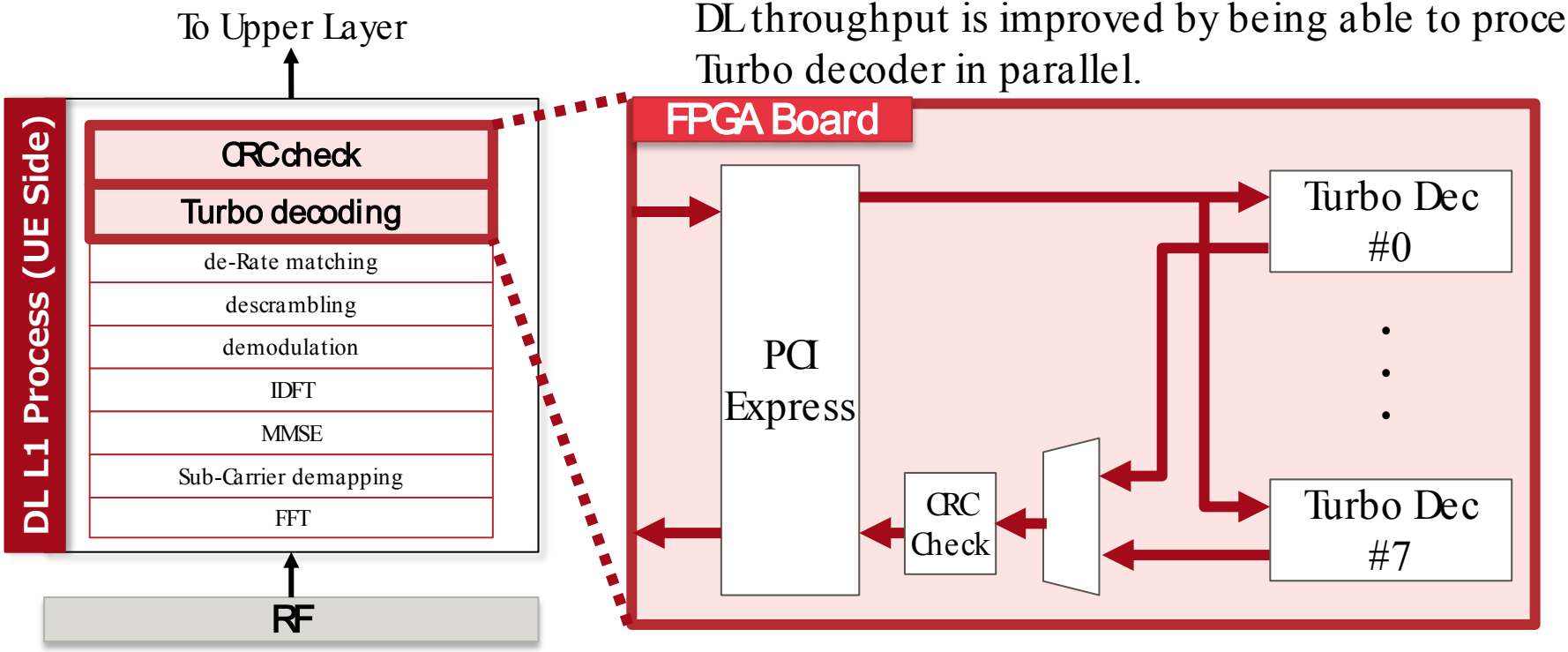


Copyright 2017 FUJITSU LIMITED

HW Accelerator with FPGA Board

- Turbo Decoder on the UE side is offloaded to FPGA Board

DL throughput is improved by being able to process Turbo decoder in parallel.



Copyright 2017 FUJITSU LIMITED

Current status

FUJITSU

- FUJITSU has been working on OAI modification
  - On top of OAI master 18th Jun 2016
- FUJITSU reached the following performance
  - 42Mbps (TDD Configuration2/BW:20MHz/TTI:1.0msec) with OAI-EPC, OAI-eNB, OAI-UE
  - 84Mbps (TDD Configuration2/BW:40MHz/TTI:0.5msec) with OAI-EPC, OAI-eNB, OAI-UE
    Note: Turbo Decode in UE is off loaded to FPGA
    Note: eNB is divided into 2 servers (L1 Server and L2 Server)
- FUJITSU reached the following stability (Error Free)
  - Ping success ratio 100%
  - No HARQ retransmission

Copyright 2017 FUJITSU LIMITED

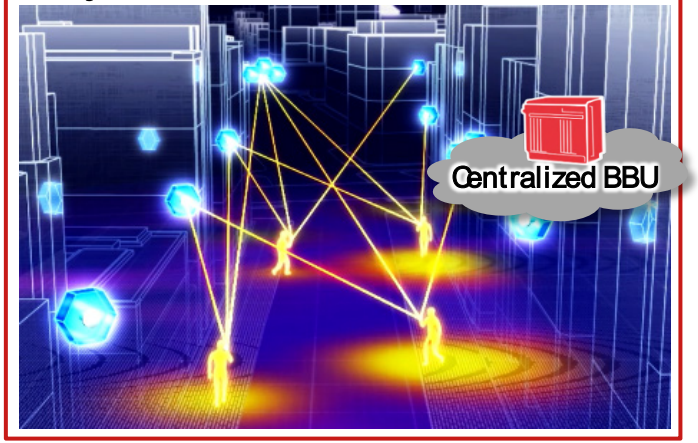
Fujitsu 5G Focus (Virtual Cell)

FUJITSU

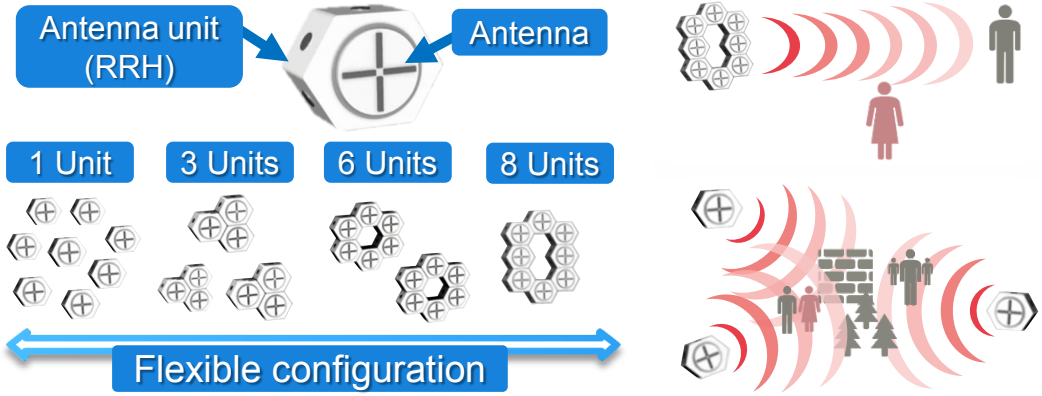
5G Technology Achieving High Capacity

◎ Ultra high-density small cell placement
◎ Coordinated scheduling for dynamic virtual cell control
◎ Flexible antenna unit configuration for high throughput in various environment

Dynamic virtual cell control



Flexible antenna unit configuration



- Centralized BBU controls high-density distributed antenna units (RRH) to generate user centric virtual cells which eliminate inter-cell interference.

Copyright 2017 FUJITSU LIMITED

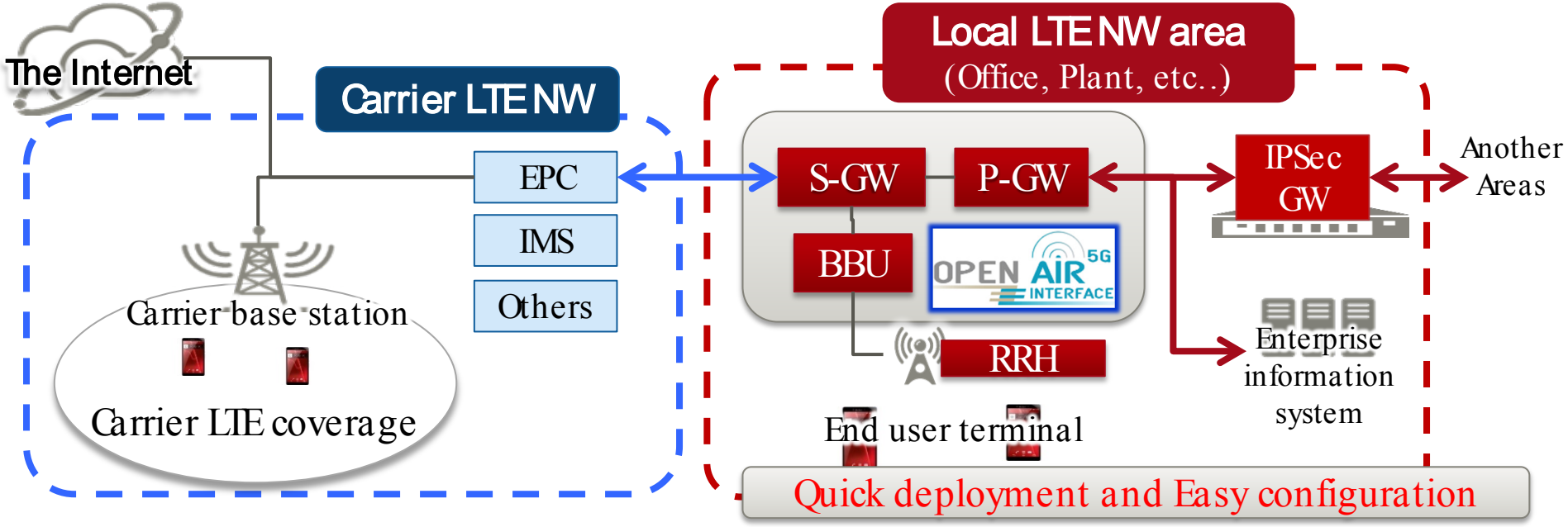
FUJITSU

Challenges

Copyright 2017 FUJITSU LIMITED

Service Vision

- We plan to provide the network service to the customer by using a local LTE Network.
- We would like to use OAI to build the network.

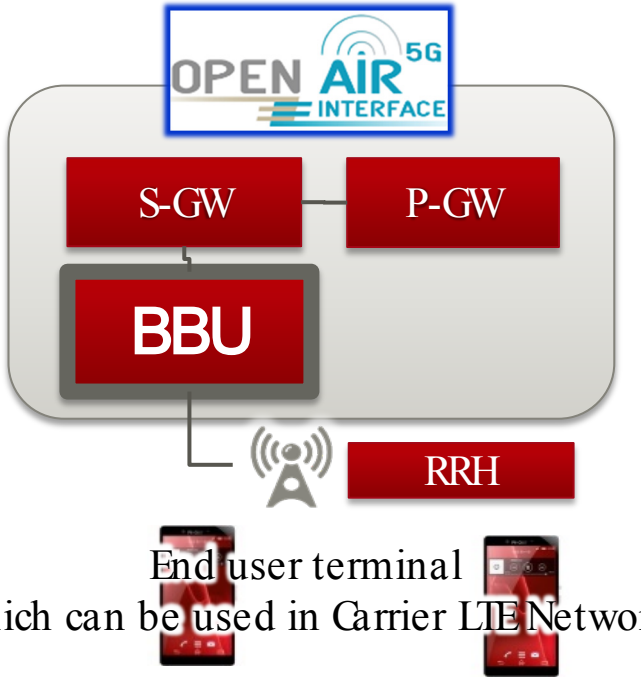


Copyright 2017 FUJITSU LIMITED

Future Development

FUJITSU

- We would like to improve OAI's quality and add important features to realize Local LTE network by OAI.



We plan to ...

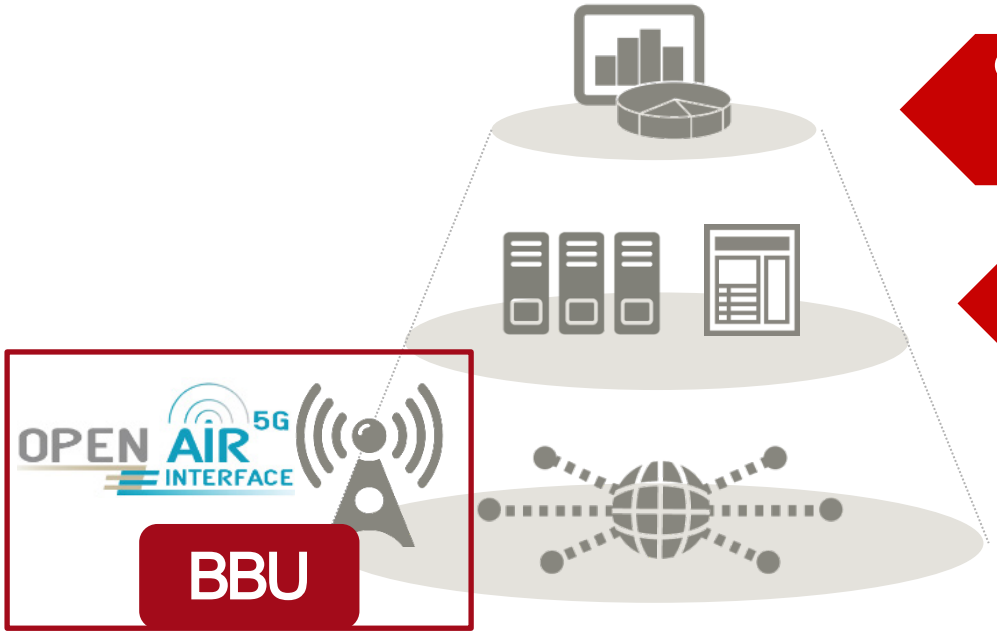
1. Develop Call Processing functions
   - 3GPP features for basic Call Processing
2. Improve OAI's performance
   - Enhance OAI's Specifications
3. Improve OAI's quality for commercial use
   - Bug fixes
   - Error handling

Copyright 2017 FUJITSU LIMITED

Target

FUJITSU

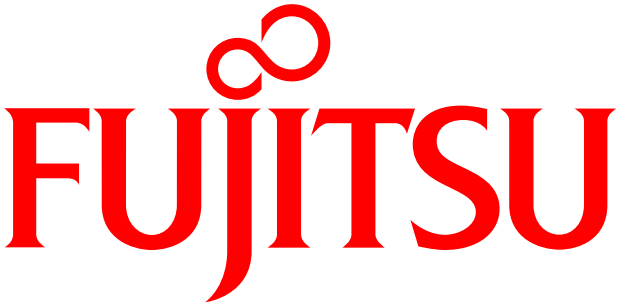
- We will combine OAI and the ICT solution of Fujitsu, and will develop services by the end of Mar. 2018.



- **Application**
  - Exchange/Lync/SharePoint
  - SAP/Oracle..etc.
- **Server / Storage**
  - PRIMERGY/NetApp
  - CISCO..etc.
- **Network**
- **Datacenters / Cloud**

Managed Service
- Service Desk
- Remote Operation
- Onsite Maintenance

Copyright 2017 FUJITSU LIMITED



shaping tomorrow with you