Cybersecurity cooperation between France and Japan

Activities on IoT and 5G by KDDI

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KDDI’s Business Domain

Expanding the business domain to every aspect of customers' daily life
Telecommunication Services as Core Business

Need to strengthen our Core Business

- High Quality Network
- New Technology
- Low Cost Operation
- Technology Alignment
- Open Innovation
For further customer experiences

KDDI utilizes promising technologies such as 5G, IoT, Big data analysis and AI
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Long experience in M2M/IoT by KDDI

- 2001: COCO SECOM
- 2004: Toyota Motor G-BOOK
- 2007: Isuzu Motor System
- 2009: GPS service
- 2010: New Closed NW
- 2013: MISAWA Home GAINET
- 2014: Smart Metering
- 2015: Toyota Motor Global Comm. PF
- 2016: Global M2M
- 2017: KDDI IoT Cloud Std.
- 2018: KDDI IoT LPWA

Other services and products:
- 2002: Toyota Motor System
- 2003: KDDI IoT Cloud Creator
- 2012: KDDI IoT Cloud Data Market
- 2015: KDDI IoT Cloud API Market
- 2016: KDDI IoT Cloud Drone Package
- 2018: Toyo Keiki Gas Smart Metering
- 2018: IoT Cloud Std.
KDDI started LPWA using LTE-M from Jan. 2018

- LTE-M is based on LTE, which
  - has nation-wide coverage area
  - does not need new nodes and facilities in KDDI network

**LPWA?**

Lower power consumption of terminals and wider service coverage

- **Low Power**
- **Wide Area**
KDDI IoT Services

Supports prompt service launch, customization, cost reduction, and efficiency improvement for customers

More than 2,000 types of sensors, including location, temp., humidity, flow, human sensors, etc.

Customization of human interface and daily reports.

Real time monitoring of surveillance cameras

Location and map functions using GPS sensors.

In English and Japanese. Support of other languages planned.
✓ Vacancies of restrooms are checked by smartphones
✓ Water consumption is saved up to 50% by adjusting amount of water
In combination of short range local radio network “Wi-SUN” and 3G/LTE network.

- Urban
- Suburbs
- 3G/LTE Network

e.g.#2 Smart metering of electricity
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Three areas to be accomplished in the 5G World

- Exciting exhilarating experience
- Convenient, Safer and Securer Society
- Richer and Real-time Communication
Explore 5G possibility in collaboration with partners

- **Mobility**
  - Car (>190km/h)
  - Train (100km/h)

- **Low Latency**
  - ICT Construction
  - Tele existence

- **Safer and securer**
  - Security System
  - Smart Station

- **Better Society**
  - Live video from drone
  - Smart School
  - Stadium Entertainment
  - Free Navigation
  - VR Travel

*Part of the projects are carried out as 5G trails supported by MIC.*

High Definition Video, VR/AR
Remote control of construction machinery
Remote Control of Construction Machinery

Japan’s first 5G demonstration using 4K3D monitoring for application to remote construction by KDDI, NEC and OBAYASHI Corp.

Outcome: -35% of time for remote control

The project was carried out as part of 5G field trials supported by MIC, Japan.
Entertainment in a Stadium
“Free navigation video” to 5G tablets

✓ At a professional baseball game on June 26, 2018.
✓ First success globally.
✓ Create video from any angle a viewer wants using sixteen 4k video materials.

Okinawa Cellular Stadium
Telexistence
“Telexistence”: Avatar in the near future

Telexistence is a robot enabling synchronized remote control. You can feel temperature, pressure, feelings through your hand.
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What’s new in 5G (compared to 4G)?

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<th>Major change in 5G NW</th>
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<td>People</td>
<td>People and <strong>things</strong></td>
<td>(a) Massive simultaneous connections</td>
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<td>NW capability</td>
<td>MBB, IoT</td>
<td>eMBB, mIoT, <strong>uRLLC</strong></td>
<td>(b) Higher frequency, Local breakout (including CUPS)</td>
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<td>Configurability</td>
<td>Operator</td>
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<td>(c) Exposure func. and API for 3rd party</td>
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Realized by low cost!
## What’s needed in 5G NW

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<th>Major change in 5G NW</th>
<th>What’s needed in 5G NW?</th>
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<td>(a) Massive simultaneous connections</td>
<td>NFV, Massive capacity at NW nodes</td>
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<td>(b) Higher frequency, Local breakout (including CUPS)</td>
<td>More BS, More GW, MEC, New architecture in RAN (CU-DU splitting)</td>
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<td>(c) Exposure func. and API for 3rd party</td>
<td>NEF and AF in 5GC</td>
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![Diagram of 5G network architecture]

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Concerns about security in 5G

Summary of “changes” in 5G

- NW
  - Virtualization including NFV not only in mobile core but also IP networks and RAN
  - Software portion will increase
  - New NW nodes such as MEC and CU-DU in RAN will appear
  - More RAN nodes will be deployed
  - More nodes will be located closer to customers
  - Exposure functions enabling NW slicing open a new application interface with customers (or 3<sup>rd</sup>-party)

- Terminals and devices
  - Massive IoT will bring variety of IoT devices

Needs robust and light security SW and systems
Designing The Future

KDDI

あたらしい自由。

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