Japan's 5G Policy Perspectives

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Transition of Mobile Phones and BWA Subscribers

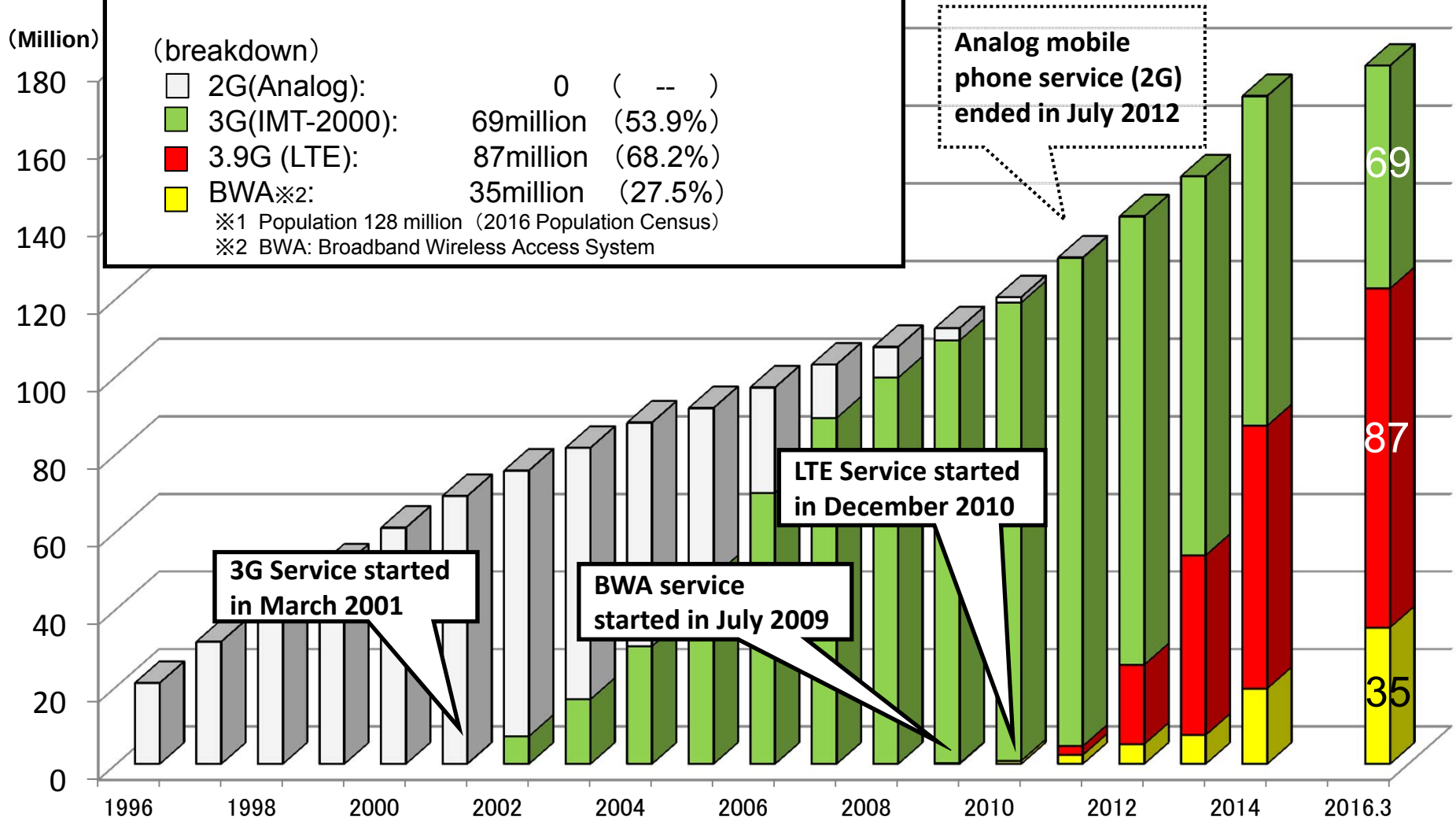
Number of Subscribers (as of March 2016)

- Mobile Phones and BWA Total：
  163million （127.1%） (deduplication of intra group transaction)
  196million （152.8%） (Simple Sum)

（breakdown）

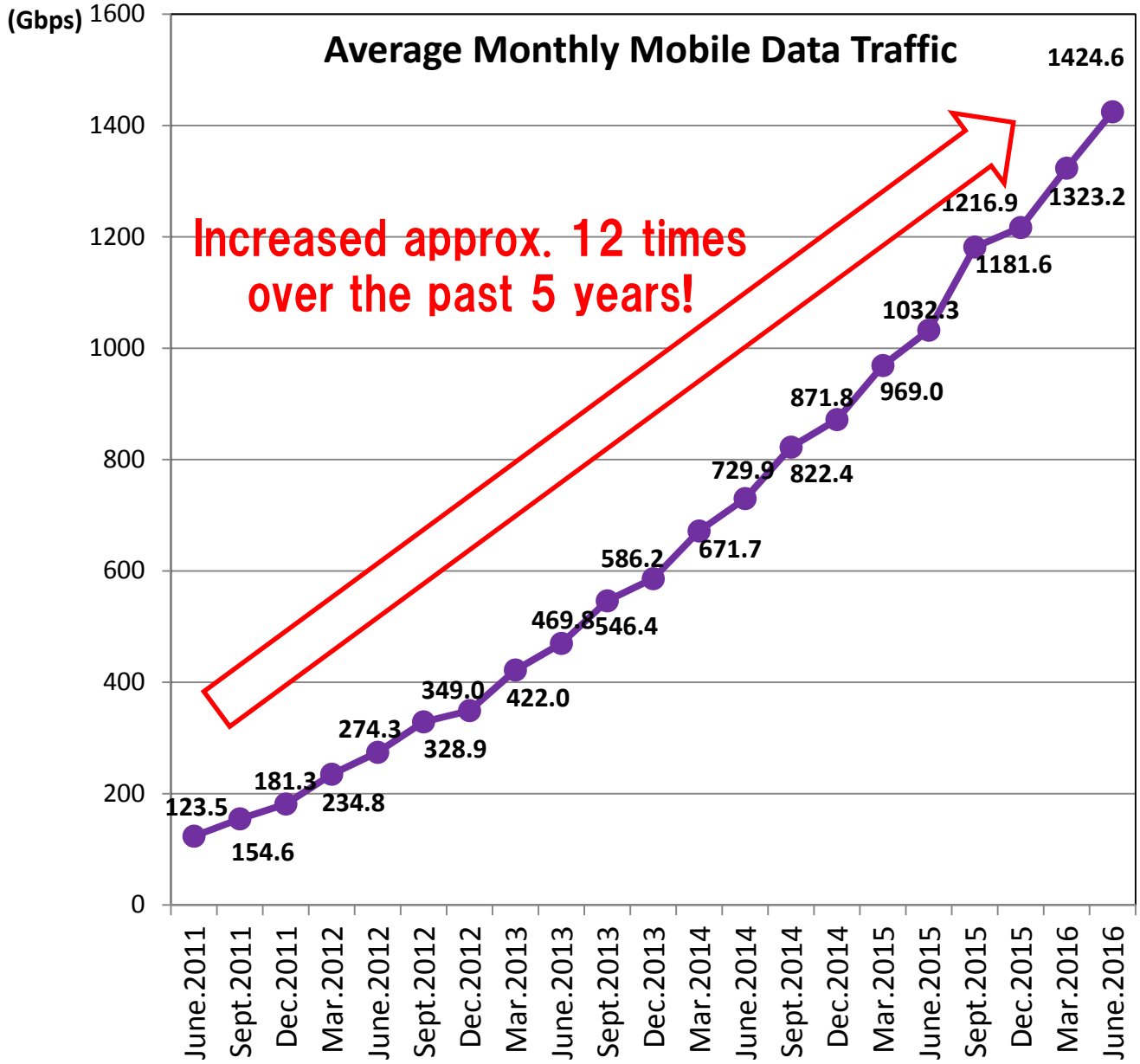
2G(Analog):	0	（ -- ）
3G(IMT-2000):	69million	（53.9%）
3.9G (LTE):	87million	（68.2%）
BWA※2:	35million	（27.5%）

※1 Population 128 million（2016 Population Census）
※2 BWA: Broadband Wireless Access System



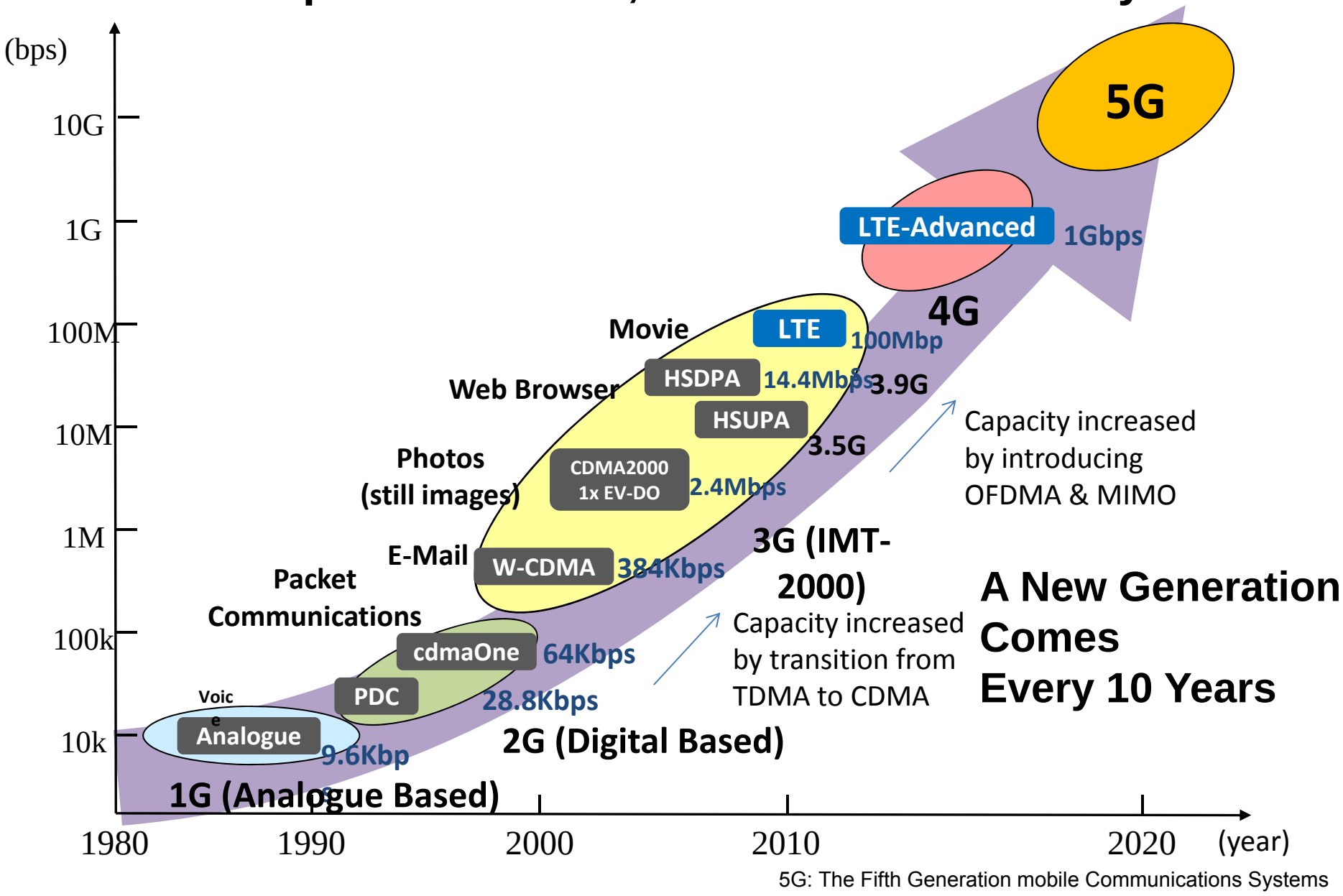
Source: Ministry of Internal Affairs and

Increase of Mobile Data Traffic



Evolution of Mobile Communications Systems

Traffic speed will be 10,000 times faster in 30 years

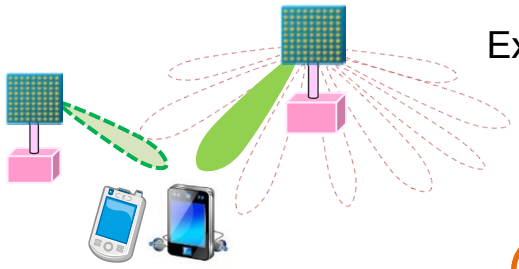


5G: The Fifth Generation mobile Communications Systems

Key Capabilities of 5G

✓ Key Capabilities for 5G (IMT-2020) :
1 Ultra high speed data **(eMBB)** ➡ Peak data rate **10 (20) Gbps** (100 (200) x current LTE)
2 Ultra Low Latency **(URLLC)** ➡ Ultra Low Latency **1ms**（1/10 of current LTE system）
3 Massive Machine Type Connections **(mMTC):**
➡ Connection Density **1 million devices/km²**
（100 x current LTE）

✓ 5G is expected to **create a new market as a key infrastructure of IoT**

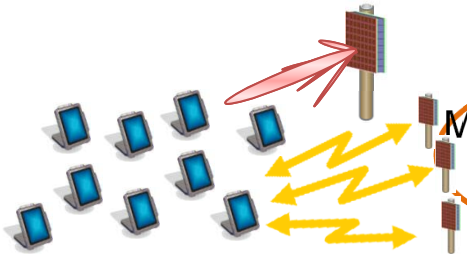


Ex: Quick transmission of Ultra high definition TV (4K/8K). **comparable to optic fiber**

Ultra High Speed Data (eMBB)

Key Capabilities for 5G

Large numbers of devices, sensors and terminals



Massive Machine Type Connections **(mMTC)**

Ultra Low Laten **(URLLC)**

Automated Driving

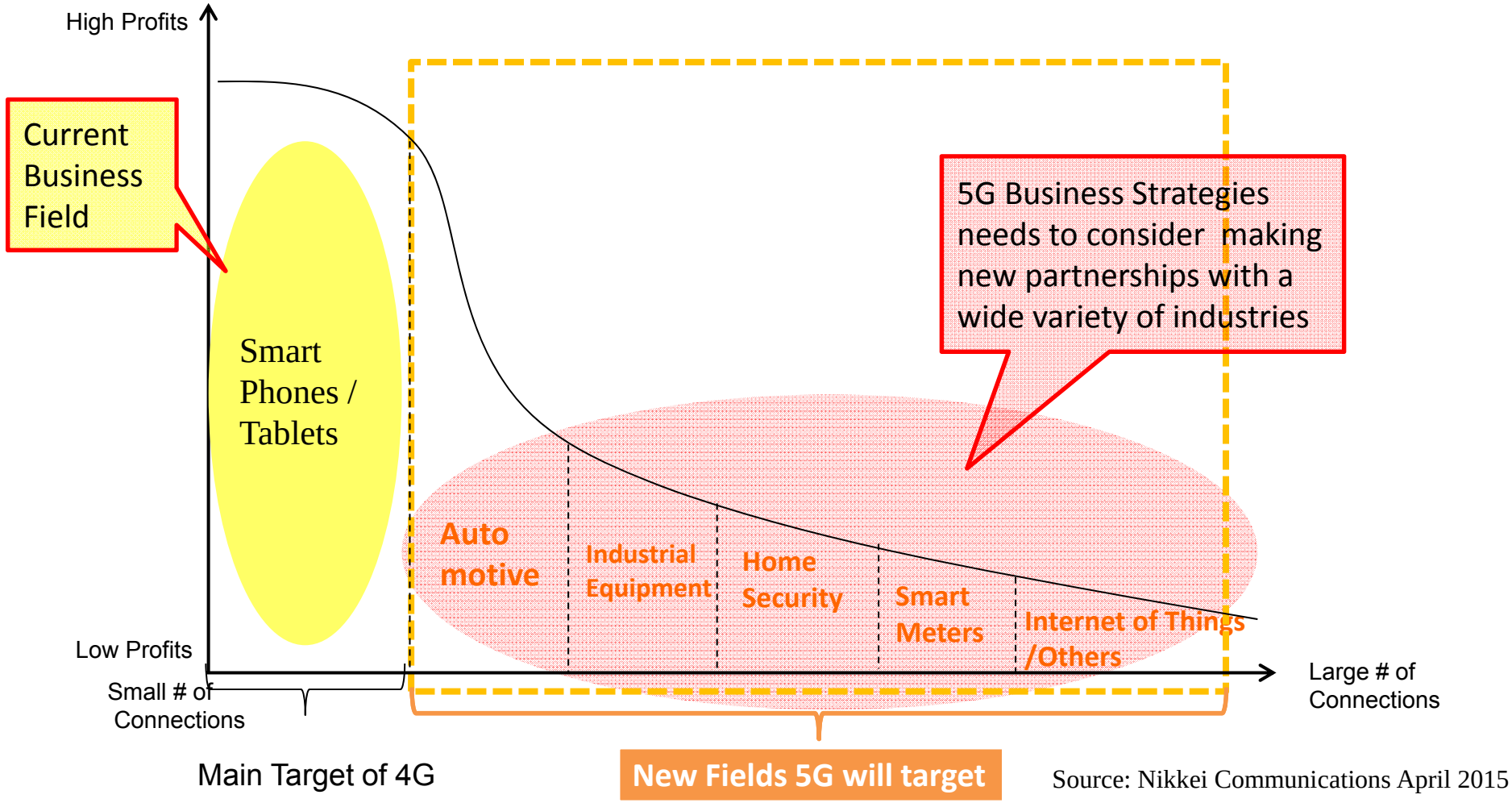
Ex: Massive Simultaneous **Connections for sensor networks** in small area, Smart Meters, Infrastructure Maintenance etc.

Ex: Automated Driving, Remote control Robots (**real-time remote control**, IoT for mission critical)

Source: MIC, Nikkei Communications 4/2015

Changes in the industrial structure in the age of 5G

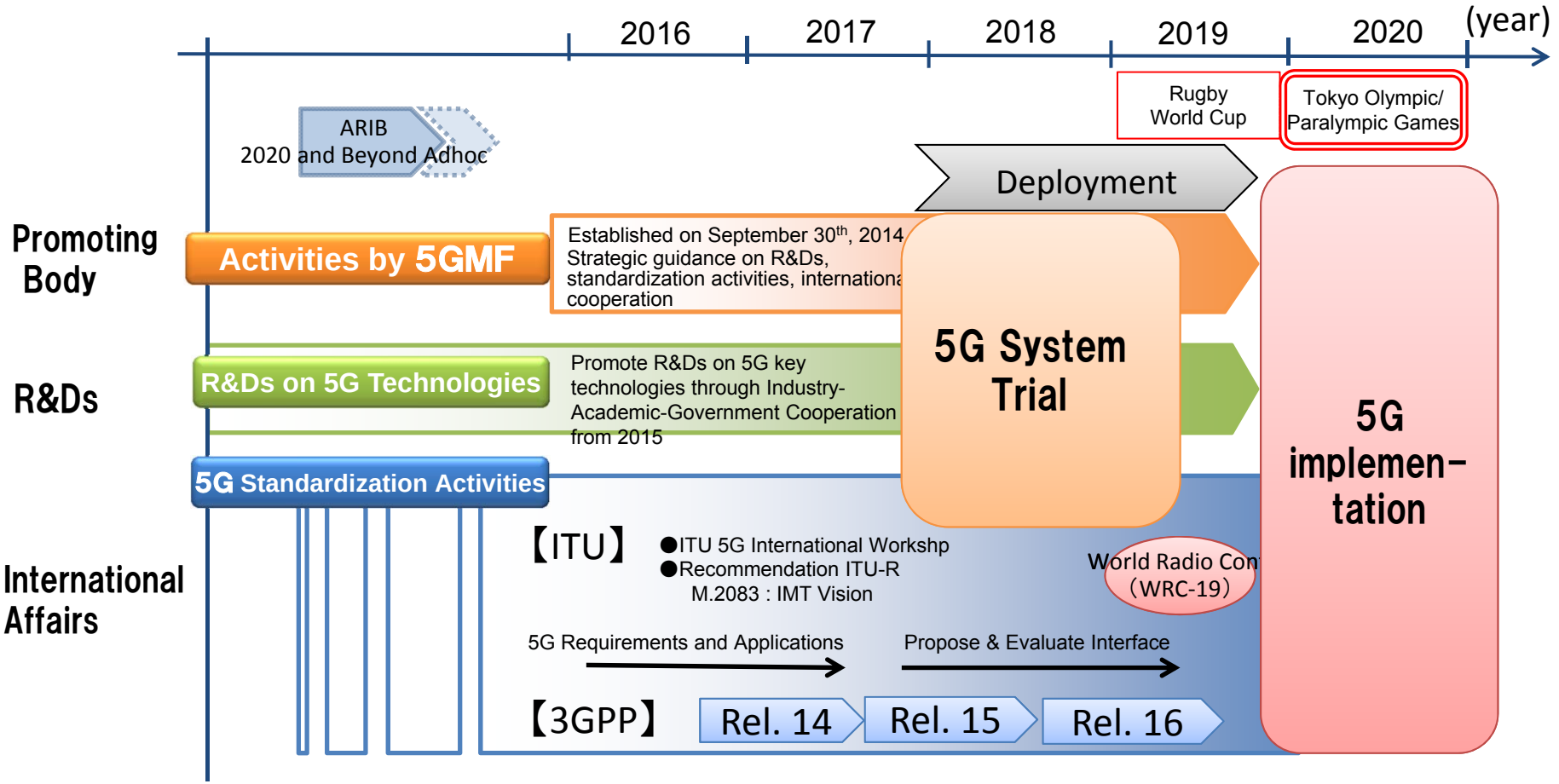
- ✓ Once 5G arrives, new markets will be created for the Internet of Things such as cars, industrial devices, and smart meters rather than in businesses in traditional devices such as smartphones
- ✓ There will be a need to make new partnerships with wide a variety of industries to deal with the changes in profit structures that will come about due to 5G mobile



Source: Nikkei Communications April 2015

5G Roadmap towards 2020

- ✓ Promote three activities to support 5G realization for 2020 and beyond
  1. Support activities by Fifth Generation Mobile Forum (5GMF)
  2. R&Ds on 5G Technologies through Industry-Academic-Government Cooperation
  3. Standardization Activities at the ITU and 3GPP
- ✓ The 5G System Trial to test radio access, networks, and applications for 5G will be started in Tokyo and local cities of Japan in FY2017



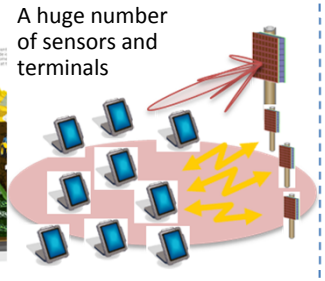
Promoting the following projects from 2017 for the achievement of 5G services in 2020 ahead of the rest of the world.

Promotion of 5G implementation project

Wireless IoT project

Supporting a large number of simultaneous connections.

Achieving the world of the IoT where the number of things (e.g., sensors) connected will increase several hundred times.



Ultra-broadband project

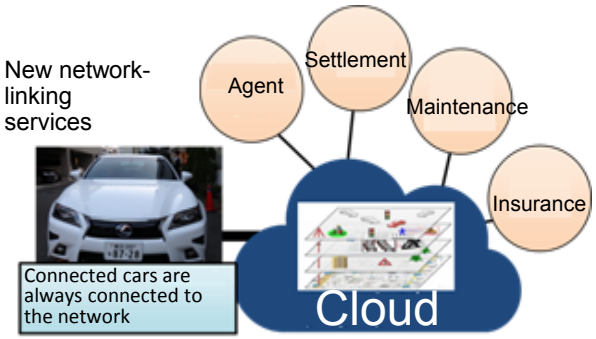
Supporting ultra-high speed.

Providing broadband services 100 times as fast as the current mobile communications systems.

Next-generation ITS project

Ensuring ultra-low latency.

The connected cars and cloud on the network will link together and provide new services.



Research and development for the realization of a pilot model.

- Promoting research and development with a demonstration of elemental technologies toward the achievement of a pilot model system assuming utilization scenes including wireless realistic performance and next-generation connected cars.

Securing global frequencies

- Securing frequency bands in addition to international standard bands in coordination with major countries promoting 5G proactively.
- Frequency expansion for wireless LAN use

Development of 5G test beds

- Developing open test beds of user participation type
- Creating new regional-type services by developing them in regional areas as well as Tokyo.

Promotion of international standardization and international expansion

- Construction of a strategic partnership with other countries (e.g., an expansion of initiatives, such as the joint declaration of Japan and the EU)
- Promotion of international standardization under public-private cooperation.

Promotion of 5G Projects and Application Fields for 5G

① Sports (Fitness)

② Entertainment (Games / Tourism)

③ Office / Workplace

④ Medical (Health / Welfare)

⑤ Smart house/Life (Daily Goods/Communications)

⑥ Retail (Finance / Payments)

⑦ Agriculture, Forestry, Fishery

⑧ Smart Cities/Areas (Construction/Maintenance)

⑨ Transport (Commute / Logistics)

Three Project Areas

Ultra-broadband

Wireless IoT

Next-Gen ITS

Development of ITS utilizing Radiocommunications

Now
(Already become popular)

Provision of traffic jam Information, charge setting, etc.

Optical Beacon

Radio Beacon

FM multiplex broadcasting

Car navigation, etc.

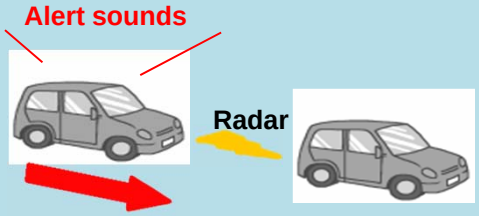
VICS

ETC

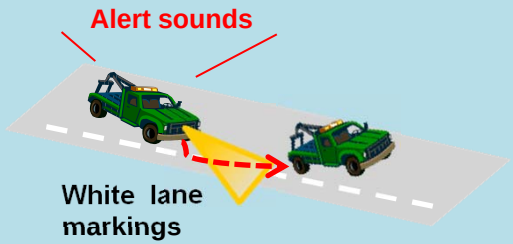
ETC 2.0

Now～Near Future
(Recently becoming popular)

Advanced driving support by utilizing camera or radar （**autonomous type**）



Pre-collision Brake
(Automated braking)



Lane keep assist

5G *etc.*

Future

Highly advanced driving support by combining V2V communication with high-resolution radar, etc. （**autonomous plus cooperative type**）

Connected Car

Automated Driving

Development of ITS

Study of the 5G Technical Specifications

- Inquiry on the technical specifications of next-generation mobile communication system [October 12, 2016]

- Information and Communications Council (Telecommunications Technology Sub-Council) started its study

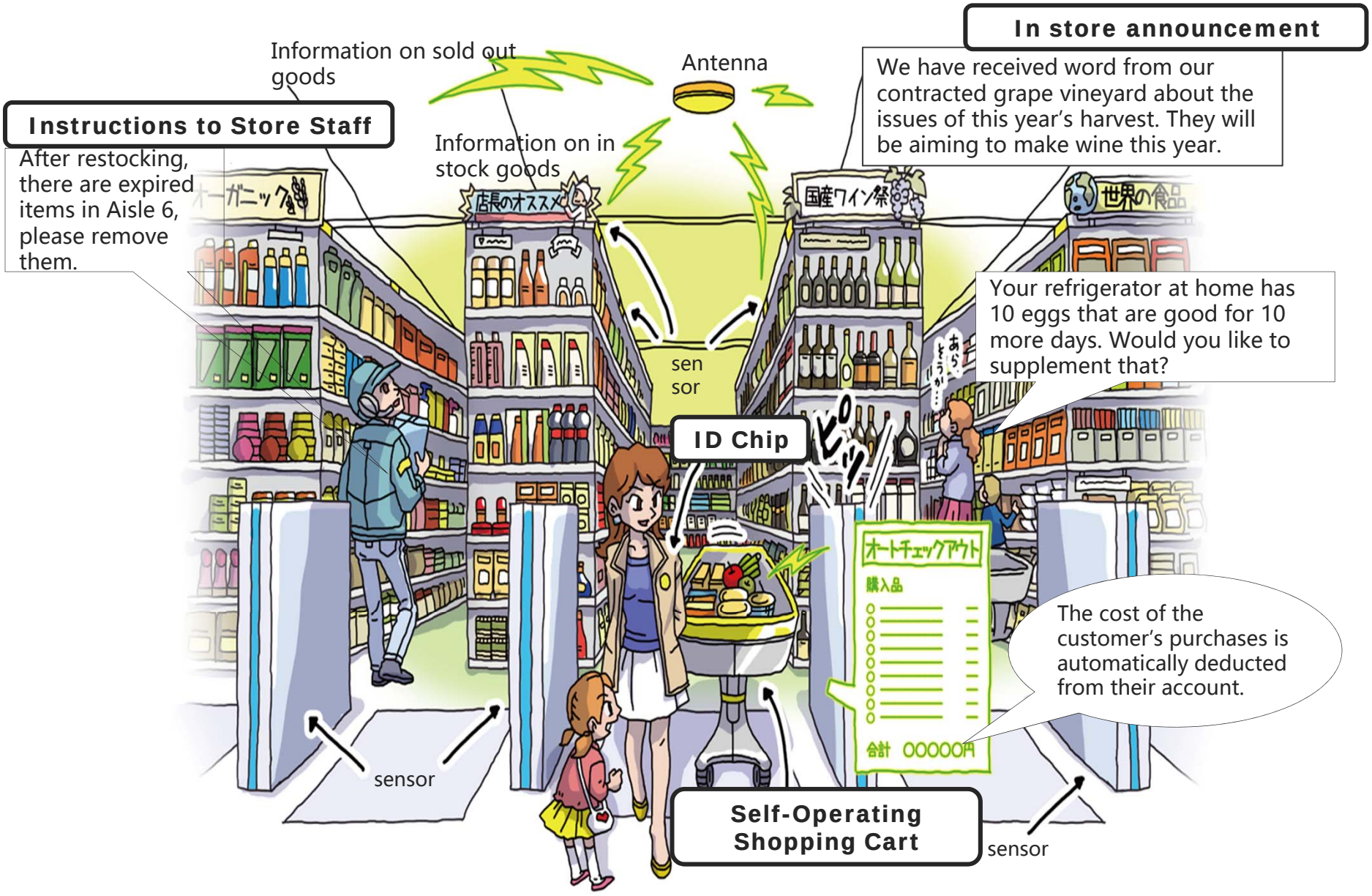
(Study Items)

- Basic Concepts
- Network Architecture
- Service Images
- Requirements
- Migration Scenario (4G to 5G)

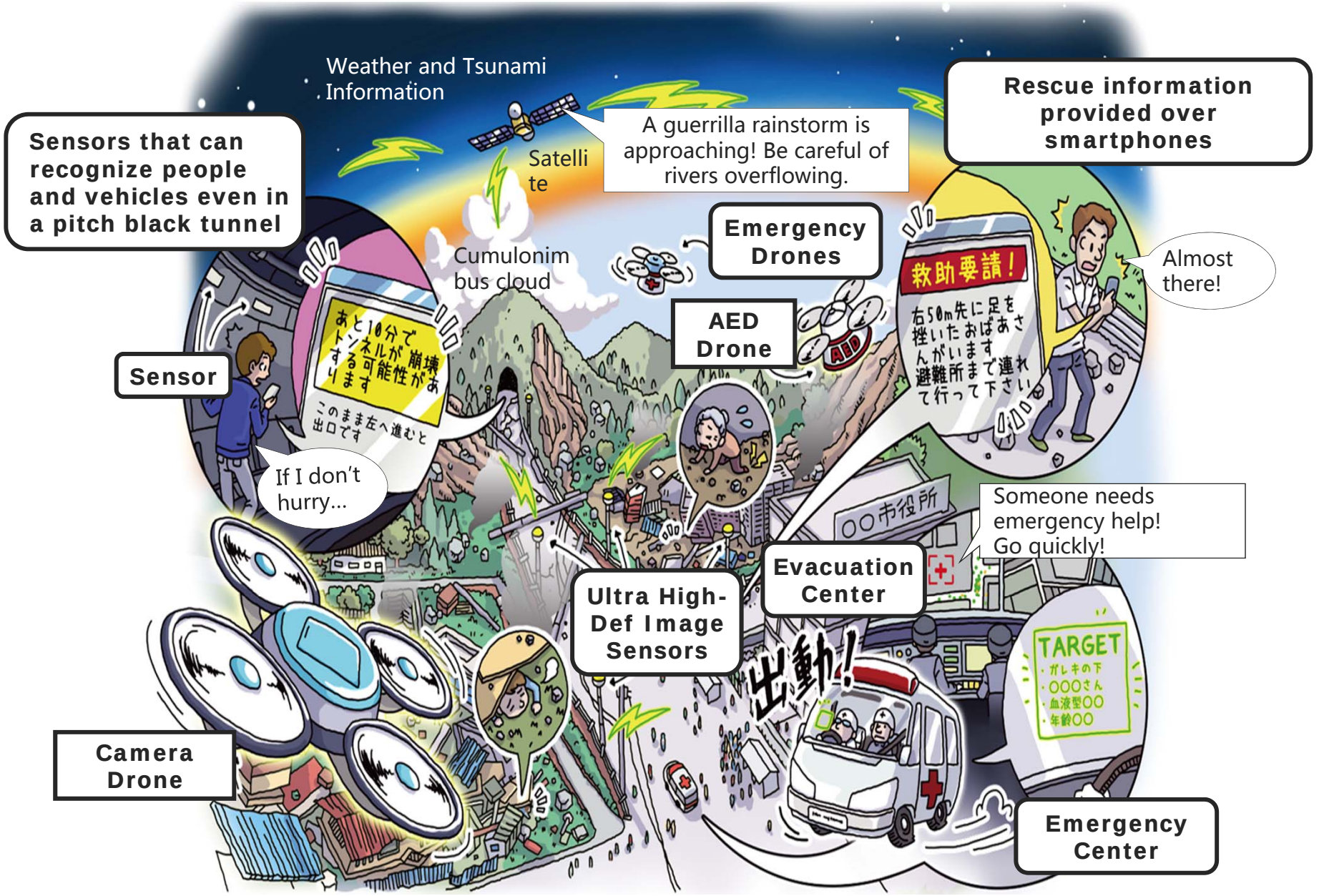
Technical Specifications for various Frequency Bands

- Results of the study at the Council will be reported to the Minister for Internal Affairs and Communications around Summer 2017 and afterwards

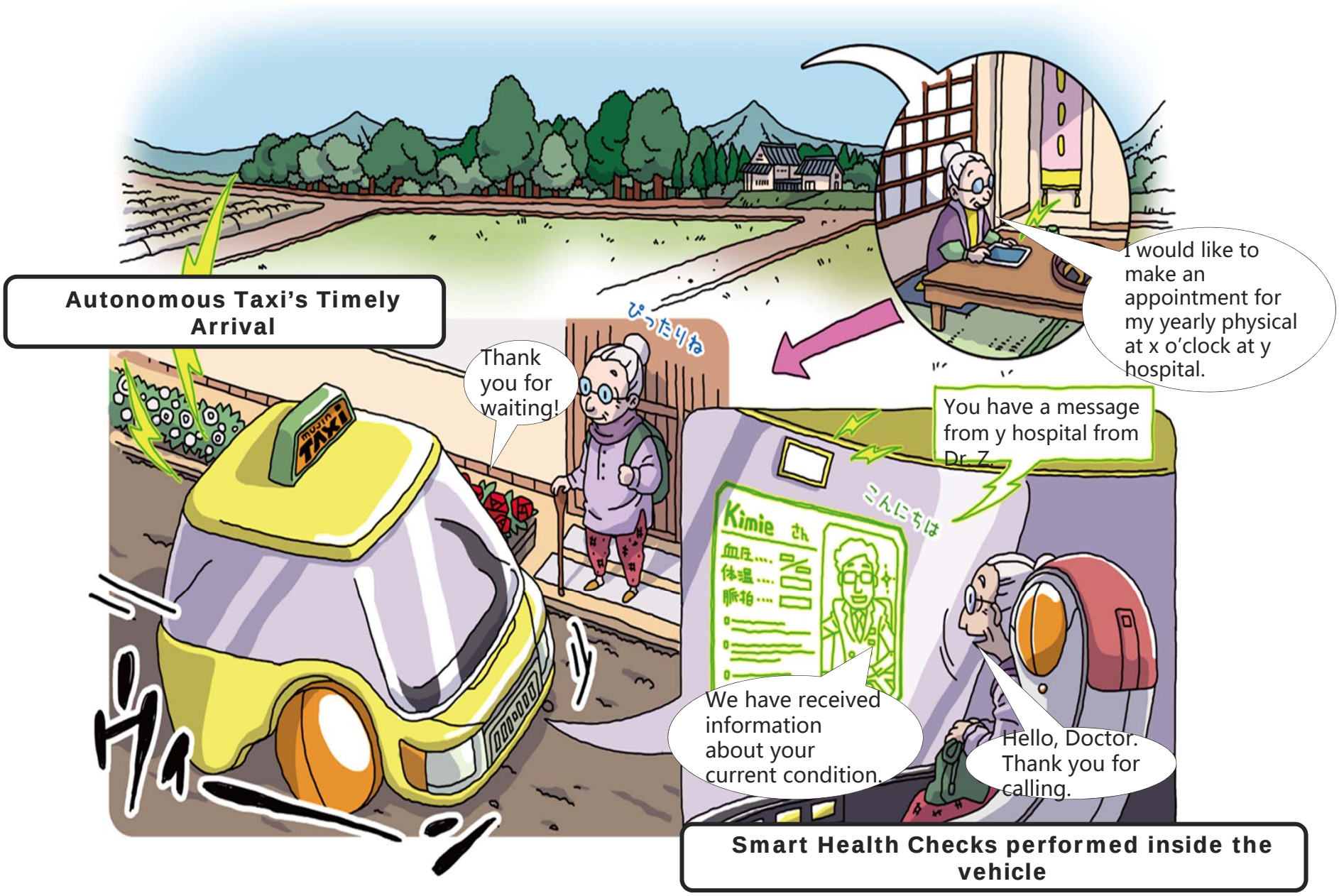
Changing How We Shop（The IoT Supermarket）



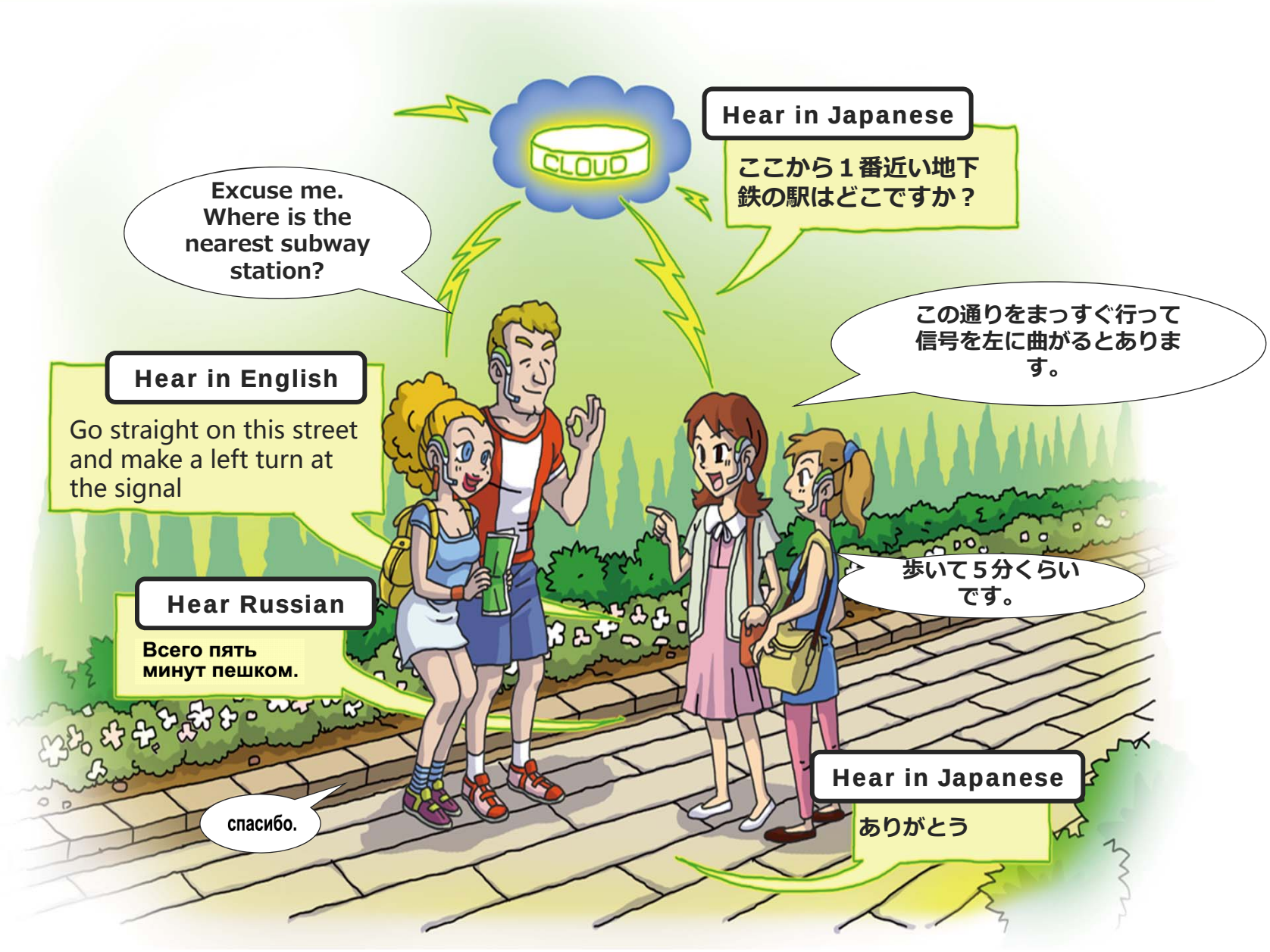
Changing Responses to Disasters



Changes in Rural Lifestyles



Changes in Getting Around Town



Changing the Way We Do Work