5G Standardization Activities of Japan

Yuji Nakamura

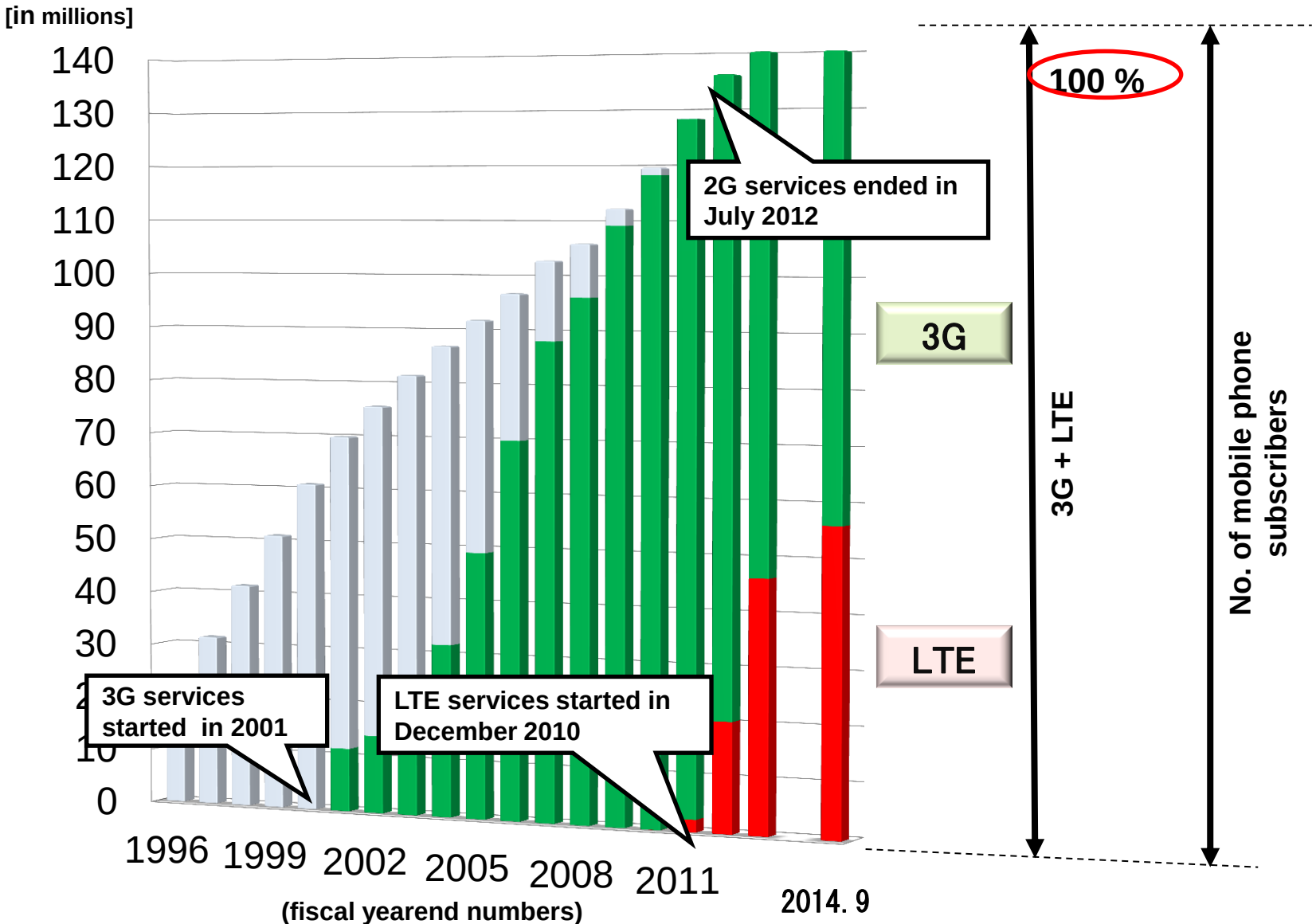
Director of New-Generation Mobile Communications Office,

Radio Dept., Telecommunications Bureau,

Ministry of Internal Affairs and Communications (MIC),

Japan

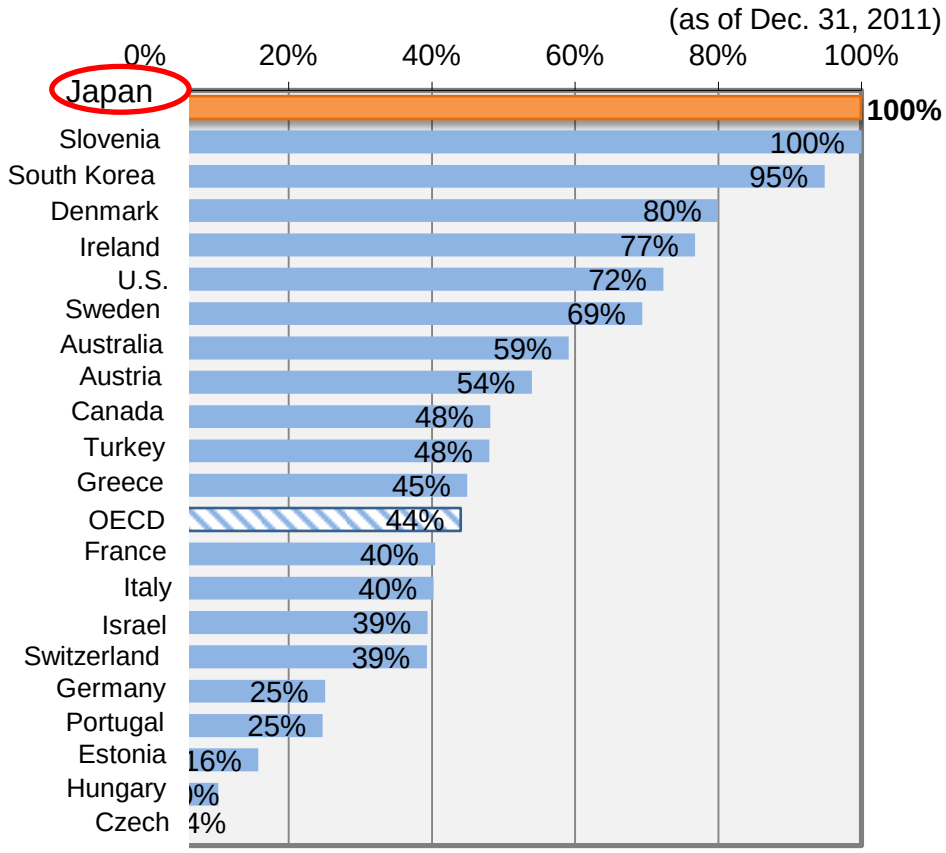
Number of subscribers and migrations in Japan



3G & LTE services in Japan

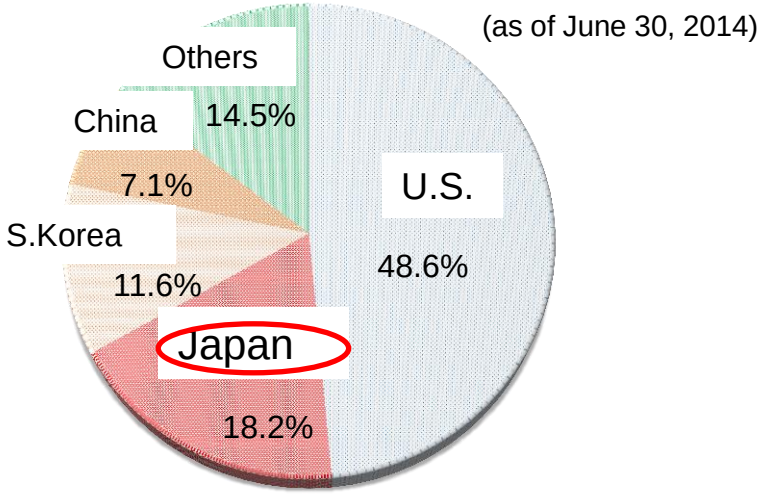
- In Japan, three mobile carriers have invested a total of **15.1 trillion in facilities over 10 years**, resulting in 100-percent population coverage for 3G.
- The present LTE population coverage rate in Japan is **over 90% (March 2014)**
  Reference: 86% in the U.S. (December 2012) , 26% in EU (December 2012).

Ratio of 3G mobile phone subscriptions



Source: OECD Communications White Paper 2013

LTE share



Note 1: Global LTE service subscription as of June 30, 2014
- 280.11 million

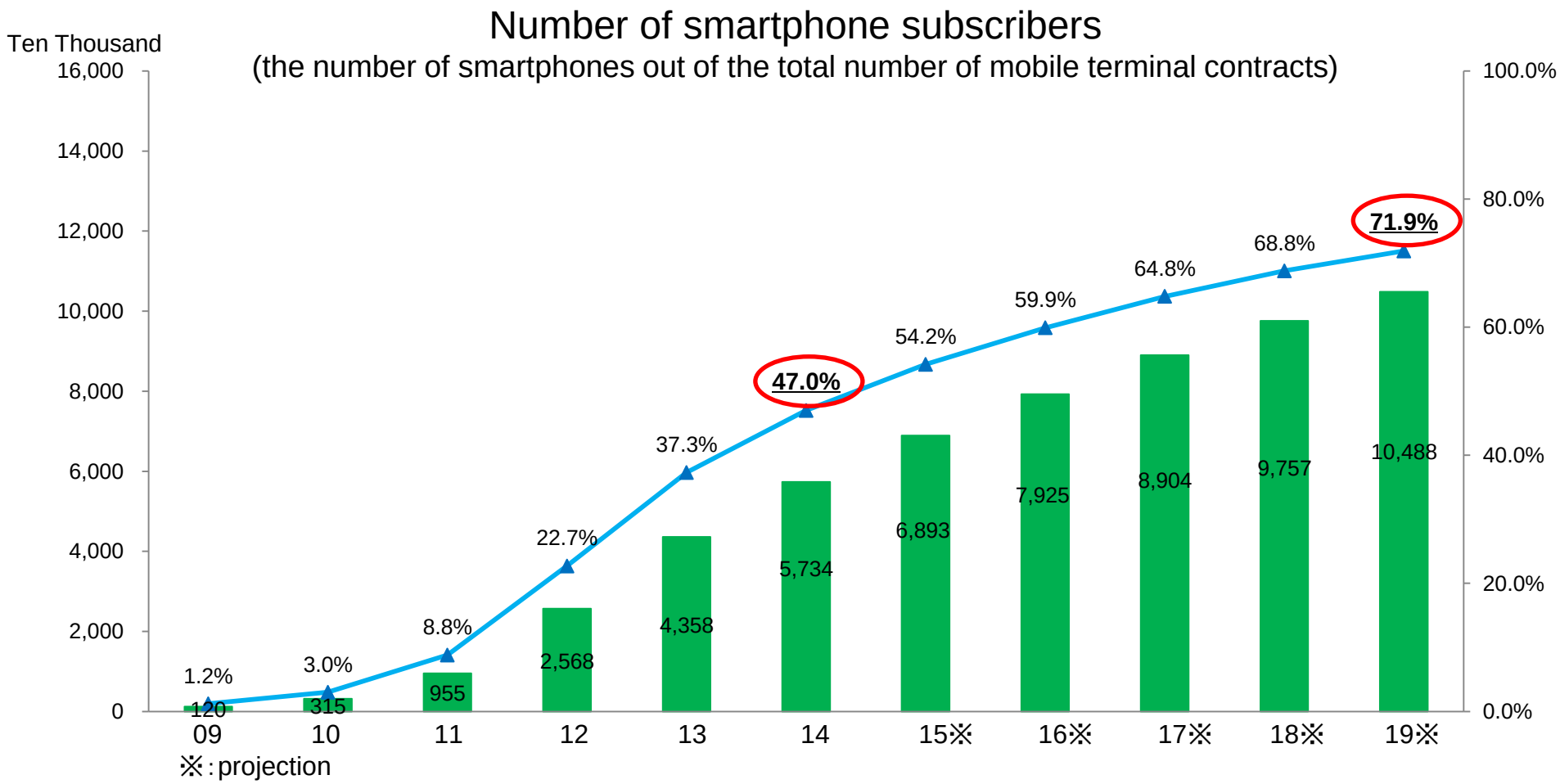
Note 2: Number of subscription in leading countries as of June 30, 2014
- U.S.: 136.02 million
- Japan: 50.89 million
- South Korea: 32.60 million
- China: 19.94 million

Note 3: Other leading countries: Australia, U.K., Germany, France

Sources: Global subscription totals taken from public GSA figures; breakdown of leading countries aside from Japan taken from TeleGeography data; Japan breakdown estimated by MIC based on MIC materials

Number of smartphone subscribers in Japan

- The number of **smart phone subscribes (57.34 million)** as of the end March 2014 is estimated to increase to over **100 million** (**71.9%** of the total mobile terminal contracts).



Projected in October 2014

Requirements for 5G

◆ Requirements of 5G

○ High Data Speed and Ultra Low Latency, comparable to wire connections

○ Multiple Simultaneous Connections in sensor networks

<Key Properties>

✓ Peak Data Rate ≥ 10Gbps
（100 x current LTE rate）
*under certain circumstances could reach 20Gbps

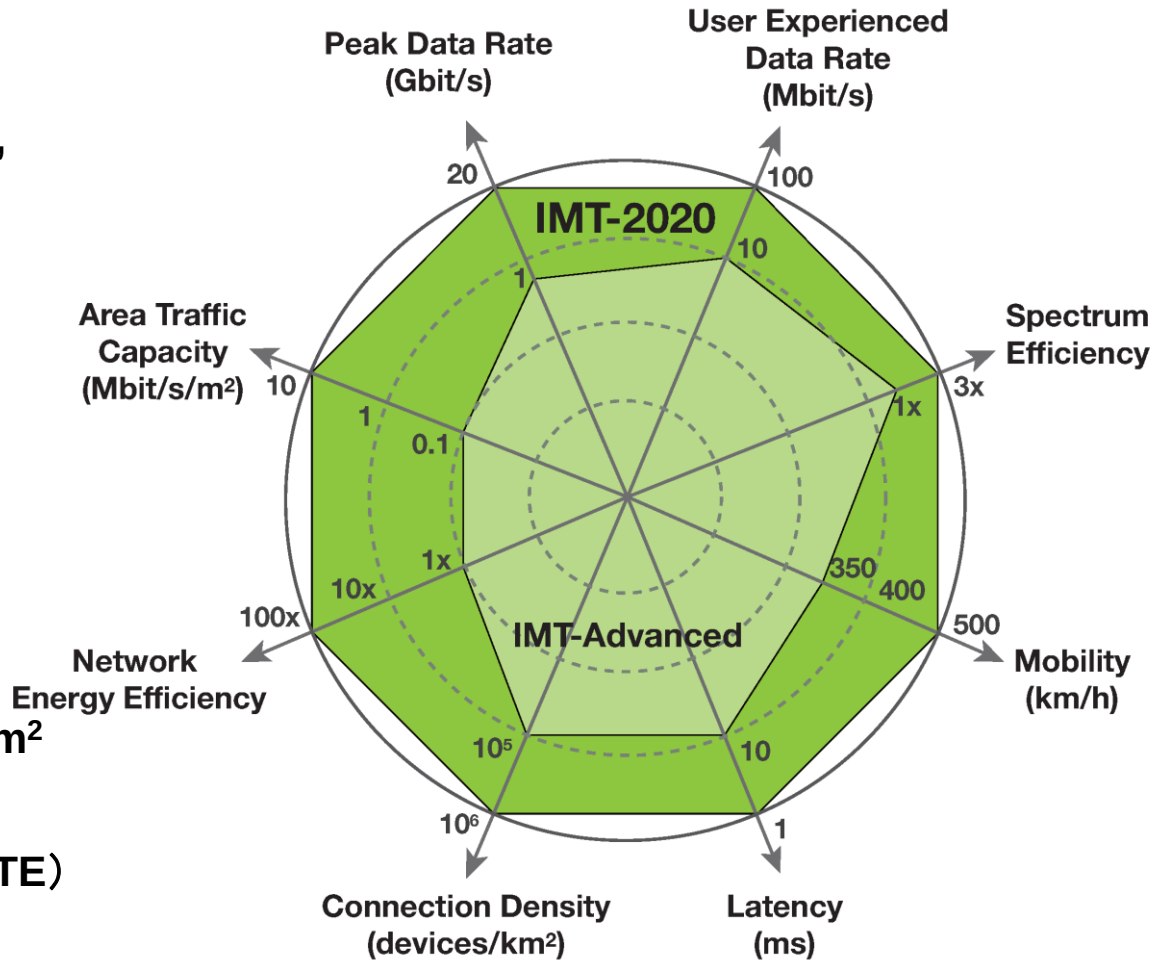
✓ Connection density ≥ 1M connections/ km²
（100 x current LTE）

✓ latency ≤ 1 millisecond（1/10 of current LTE）

✓ System Capacity ≥ 10Mbps/m²
（1,000 x current LTE）

✓ Low power consumption（Energy Efficiency）

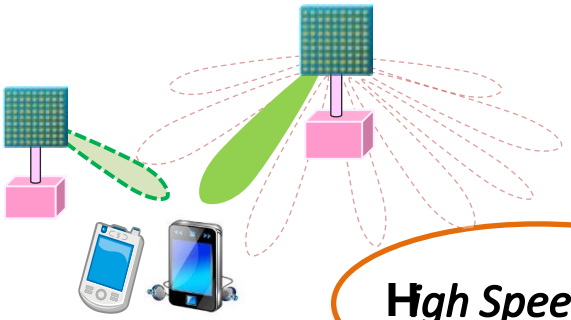
✓ Effective Use of Spectrum Efficiency



Source ITU-R Recommendation M.2083 (IMT.VISION)

The New world towards implementation of 5G

- ✓ 5G will not only feature high speed data transmission through maximizing existing technology but also will require the preparation of a new network for ultra low latency and multiple simultaneous connections
- ✓ 5G will connect everyday objects to the internet, becoming the foundation of the Internet of Things



Ex: Quick transmission of high definition TV (4K/8K)

High Speed Data

Main Properties of 5G

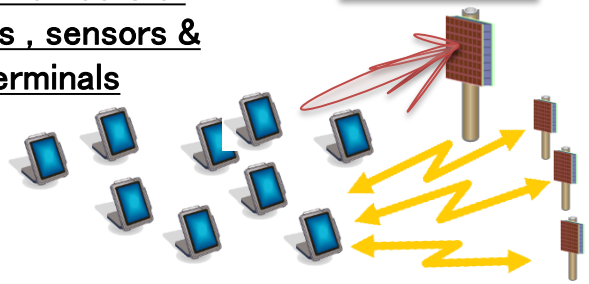
Multiple Simultaneous Connections

Ultra Low Latency

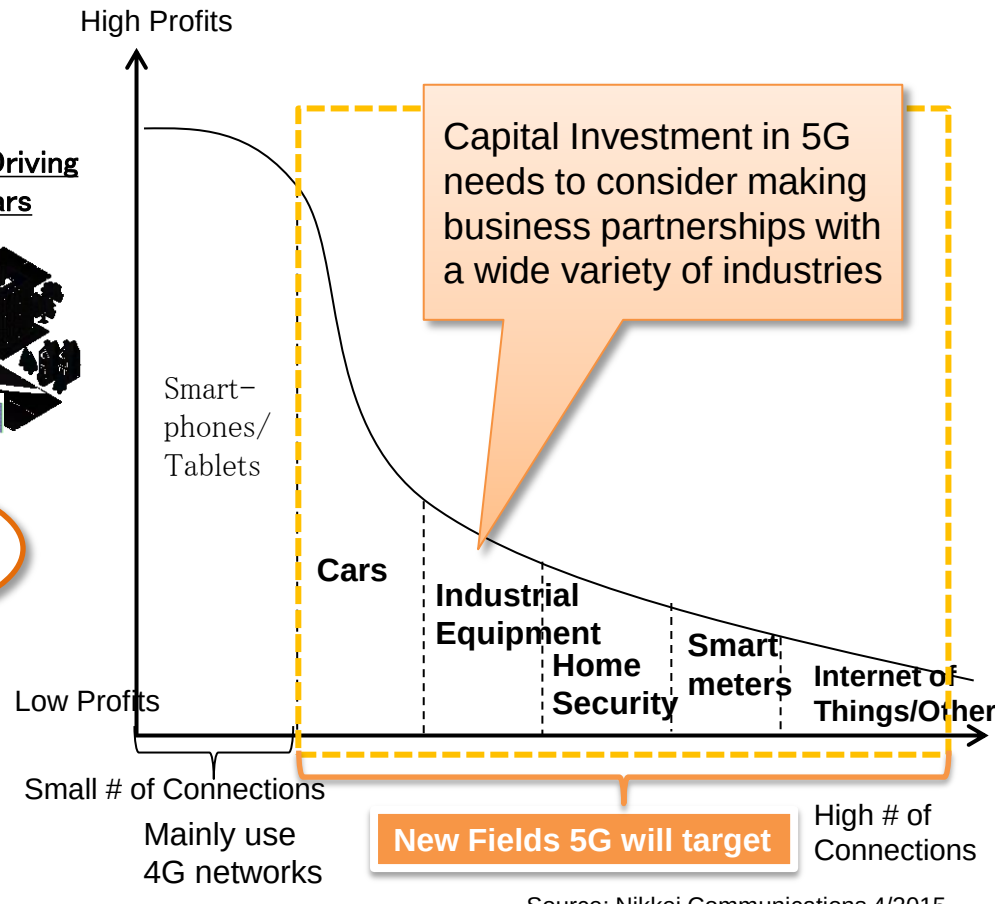
5G Features

Self Driving Cars

Large numbers of devices , sensors & terminals

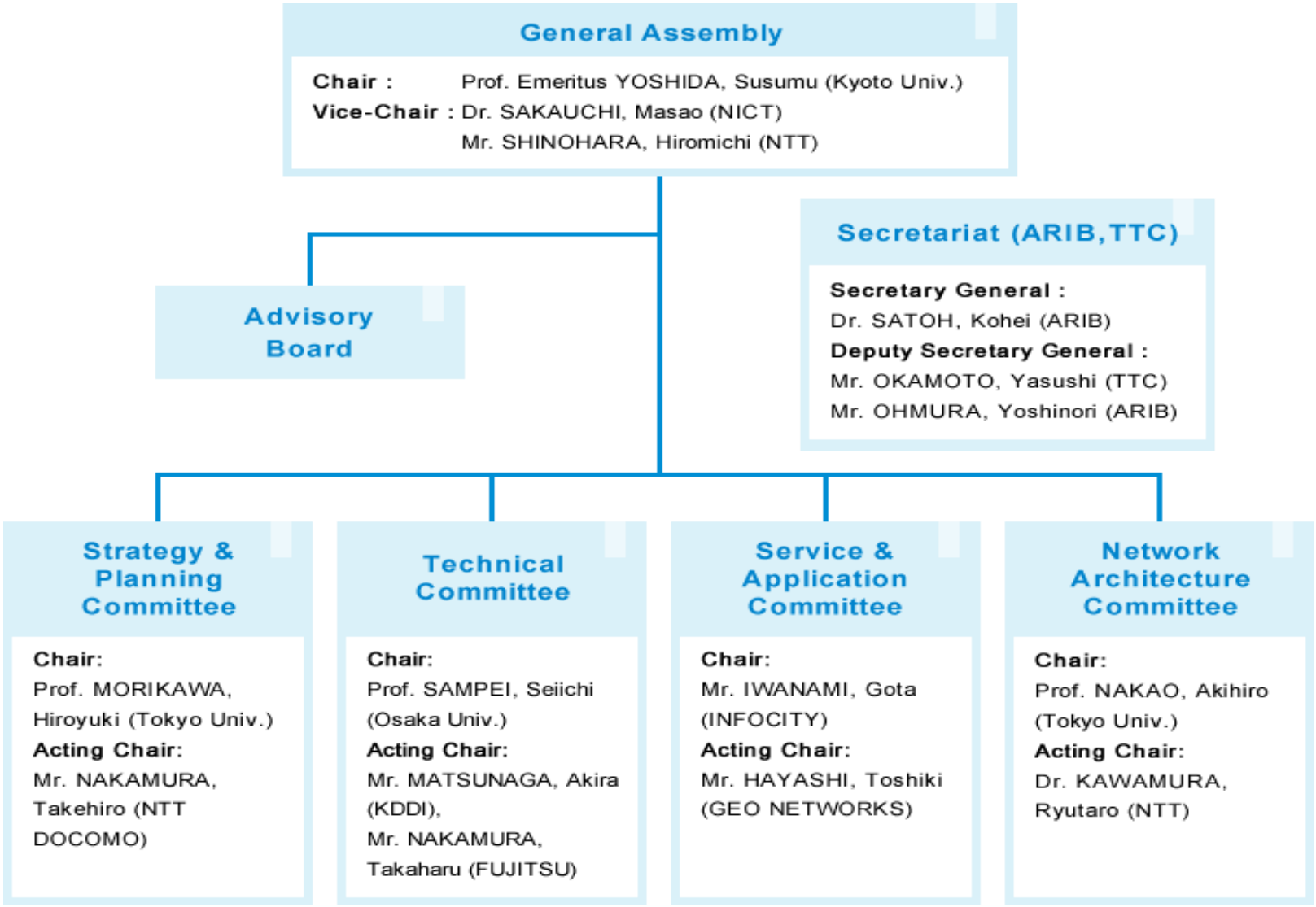


Changes in Profit Structure that 5G Will Bring



Source: Nikkei Communications 4/2015

Organizational Structure of the 5GMF

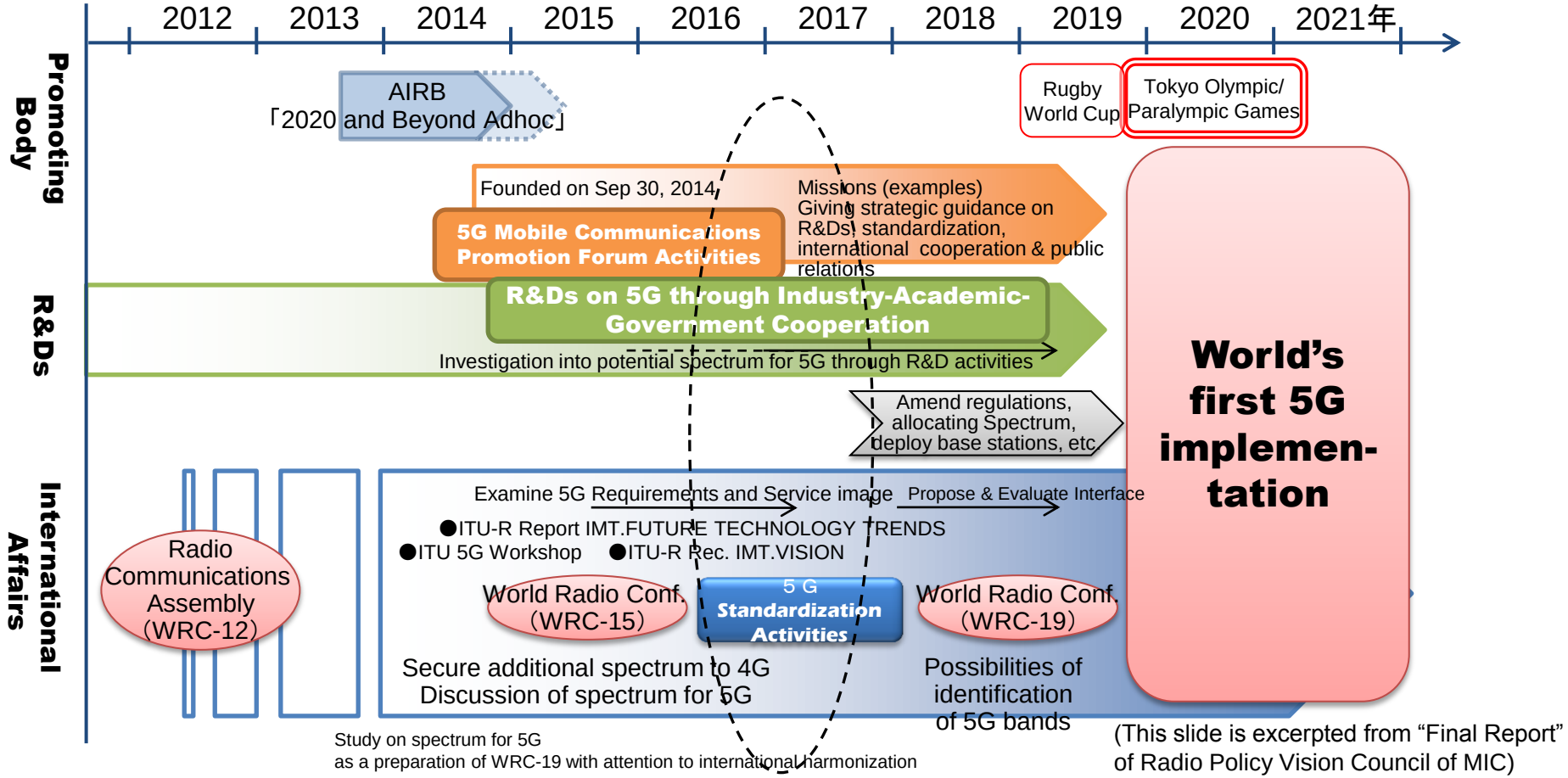


5GMF Members

Members:84 (as of 7 Oct. 2015) Ordinary members:67, Individual members:14,
Special members: 3 (MIC, ARIB, TTC)

Roadmap toward 5G realization for 2020 and beyond

- The below three activities as the main pillars to promote 5G realization for 2020 and beyond
  - ✓Activities by the Fifth Generation Mobile Communications Promotion Forum (5GMF)
  - ✓R&Ds on 5G through industry-academic-government cooperation
  - ✓Promotion of 5G standardization work led at the ITU



(This slide is excerpted from "Final Report" of Radio Policy Vision Council of MIC)

5G mobile Integrated Trial

- ✓ The 5G mobile Integrated Trial to test radio access, networks, and applications for 5G will be started in Japan in FY2017 with the cooperation of industry, academia, and the government.
- ✓ Promote further research and development and standards for 5G through building an open trial environment which stakeholders from global enterprises and universities can participate.

Survey on user needs, studies on applications/services

5G Trial Image

5G commercialization Lower frequency bands

5G commercialization Higher frequency bands

Integrated Trial
services/functions
- radio+network+applications -

5G Applications for new fields

- ○ ITS, Medical, Health, Beauty, Elder Care, Security, Resilience, Signage, Energy, Agriculture, Education
- ○ To support the Tokyo Olympics/Paralympics

Trial (radio+ network)

Detail Studies (Venue, frequency band, budget, participating organizations/ soliciting enterprises, etc.)

Trial environment building

Trial (Radio Access)

Rugby World Cup

Tokyo Olympics Paralympics

FY2015	2016	2017	2018	2019	2020	2021	2022