

# State of Initiatives for 5G Mobile Communications Systems in Japan

—White paper, promotional organization, and international workshop—

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## 1. Introduction

Recently, mobile traffic has been increasing rapidly due to the spread of smartphones, tablets and other devices in daily life and business, and the expansion of services using mobile broadband. Further increases in traffic are also expected, with increasing new demand from smart meters and other M2M communication.

Also, as mobile broadband develops, demand from society is increasing, with demand for even more communication, and for more advanced functions and higher performance in the mobile communications environment expected.

Preparation to introduce the IMT-advanced, 4th-generation mobile communications systems is currently under way, and it is expected to handle future mobile communications requirements, in quantity and quality, and also contribute to further development of mobile services.

To build a mobile communications system to meet these kinds of demands, study of a 5th generation mobile communications system (“5G mobile”) with a target of 2020 and beyond has begun in Japan and internationally in the past year or two.

There is much activity internationally, with International Telecommunications Union (ITU) conducting studies and Forums and other promotional organizations being established one-after-another in various countries.

Study is intensifying in Japan as well, covering the work at ITU-R and various countries, and the “2020 and Beyond AdHoc” Committee (20B AH) was established in September 2013 to facilitate cooperation with other countries, under the Advanced Wireless Communications Study Committee of the Association of Radio Industries and Businesses (ARIB).

A very important issue in implementing 5G mobile is to plan communication and cooperation among people in a wide range of fields, not only those related to information and communications. To promote this, the Fifth Generation Mobile Communications Promotion Forum (5GMF) was established in September, 2014. The Fifth Generation Mobile Communications Systems International Workshop 2014 (5GWS) was also held in October 2014 to commemorate establishment of the 5GMF. ARIB and The Telecommunication Technology Committee

(TTC) serve as the secretariat.

This article reports on initiatives for 5G mobile in Japan, including the organization of study within 20B AH and outcomes from 20B AH: publication of a white paper, establishment of the 5GMF promotional organization, and the 5GWS event. This article was written by a member of 20B AH and 5GMF secretariat.

## 2. 20B AH and White Paper

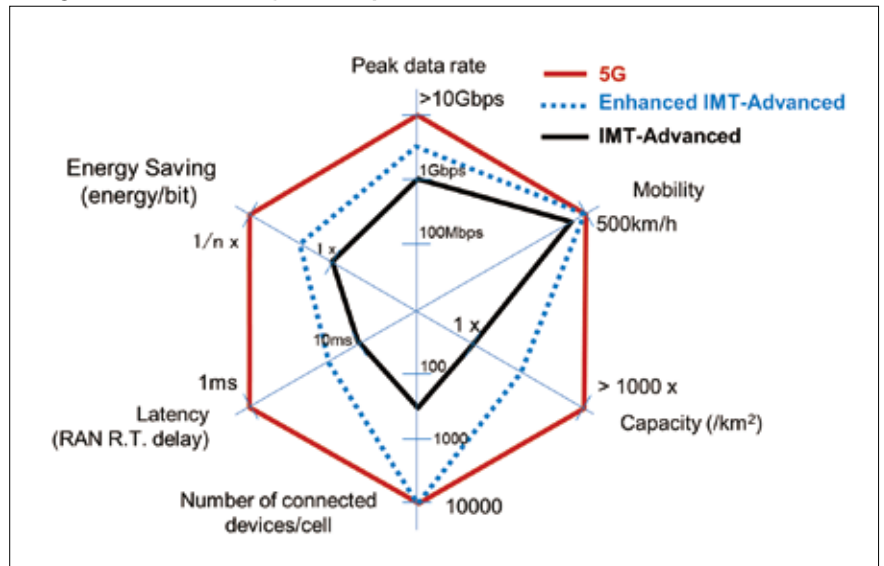
The leader of 20B AH is Mr. Takehiro Nakamura (NTT DOCOMO), and deputy-leaders are Mr. Akira Matsunaga (KDDI) and Mr. Takaharu Nakamura (Fujitsu). There are 32 participants (as of Sept. 30, 2014). One of the outcomes of its activities is the production and publication of a white paper in English.

### 2.1 Organization of Study in the 20B AH

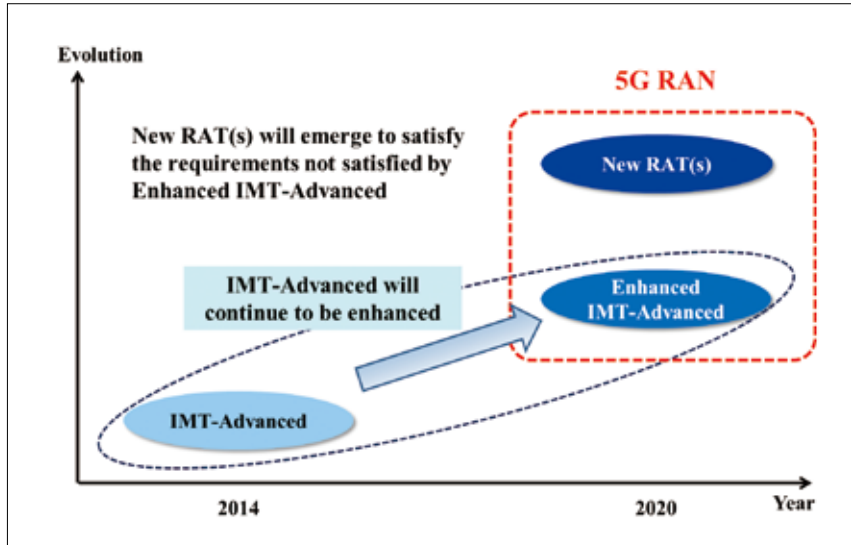
Two Working Groups (WG) were established to conduct study, as follows.

- 1) Service and System Concept WG (WG-SC)  
Studies terrestrial mobile communications service and system concepts for 2020 and beyond, not limited to IMT. Mr. Akira Matsunaga (KDDI) acting as chairperson.
- 2) System Architecture & Radio Access Technology WG (WG-TECH)

■ Figure 1: Maximum system capabilities of 5G RAN



■ **Figure 2: Road to 5G Mobile**



Surveys and studies expected technology trends, in light of the study being done by the WG-SC, regarding candidates for technologies that will need to be applied when building terrestrial mobile communications systems for 2020 and beyond. Mr. Takaharu Nakamura (Fujitsu) acting as chairperson.

**2.2 White Paper Content**

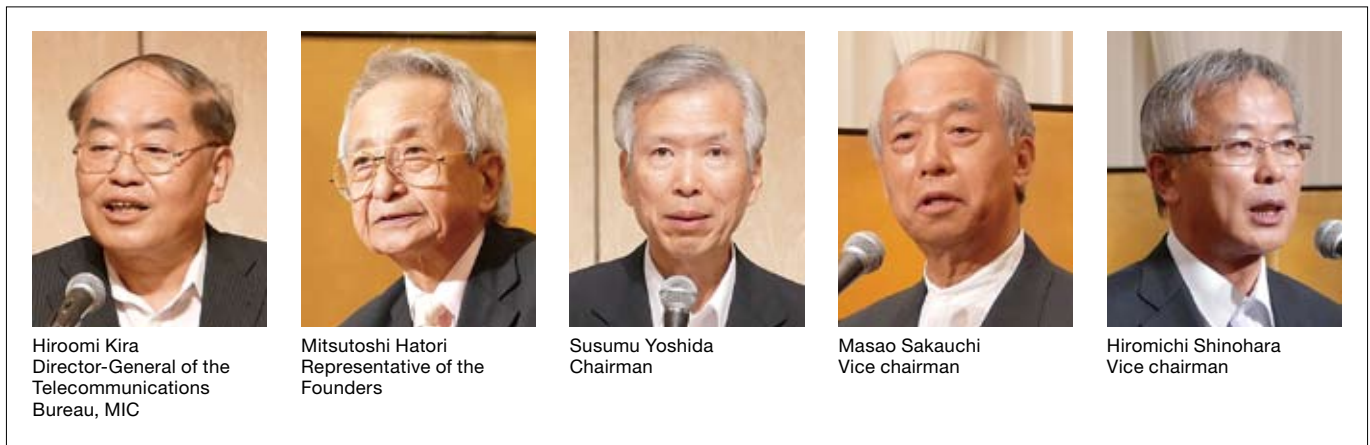
The “Mobile Communications Systems for 2020 and beyond” white paper summarizes study results related to system concepts and technology trends for mobile communications systems in 2020 and beyond.

In terms of system concepts, it incorporates results regarding market and user trends, traffic trends, costs, frequency spectra, usage scenarios, requirements and characteristics of mobile communications systems in 2020 and beyond. In terms of technology trends, it incorporates results regarding wireless access and networking technologies that could be used for mobile communications systems in 2020 and beyond.

This white paper has been published on the ARIB web site and can be downloaded at the following URL:

<http://www.arib.or.jp/ADWICS/2020bah-E.pdf>

■ **Photo 1: Guest and key persons at 5GMF**



Hiroomi Kira  
Director-General of the  
Telecommunications  
Bureau, MIC

Mitsutoshi Hatori  
Representative of the  
Founders

Susumu Yoshida  
Chairman

Masao Sakauchi  
Vice chairman

Hiromichi Shinohara  
Vice chairman

Figure 1 shows the maximum system capabilities required of the 5G Radio Access Network (5G RAN), indicating major performance improvements in capacity, communication speed, number of connected devices, and latency. Figure 2 shows the road to 5G, including implementation of complementary interworking among Enhanced IMT-Advanced and new radio access technologies (New RAT). Both figures are excerpts from the white paper.

**2.3 Future Activities**

Study of services and technologies for 5G mobile has been taken over by technical committees established in 5GMF.

20B AH will function as point-of-contact for exchange of information related to 5G mobile, between 5GMF and the Advanced

Wireless communications Study Committee.

**3. Establishing the 5G Mobile Communications Promotion Forum**

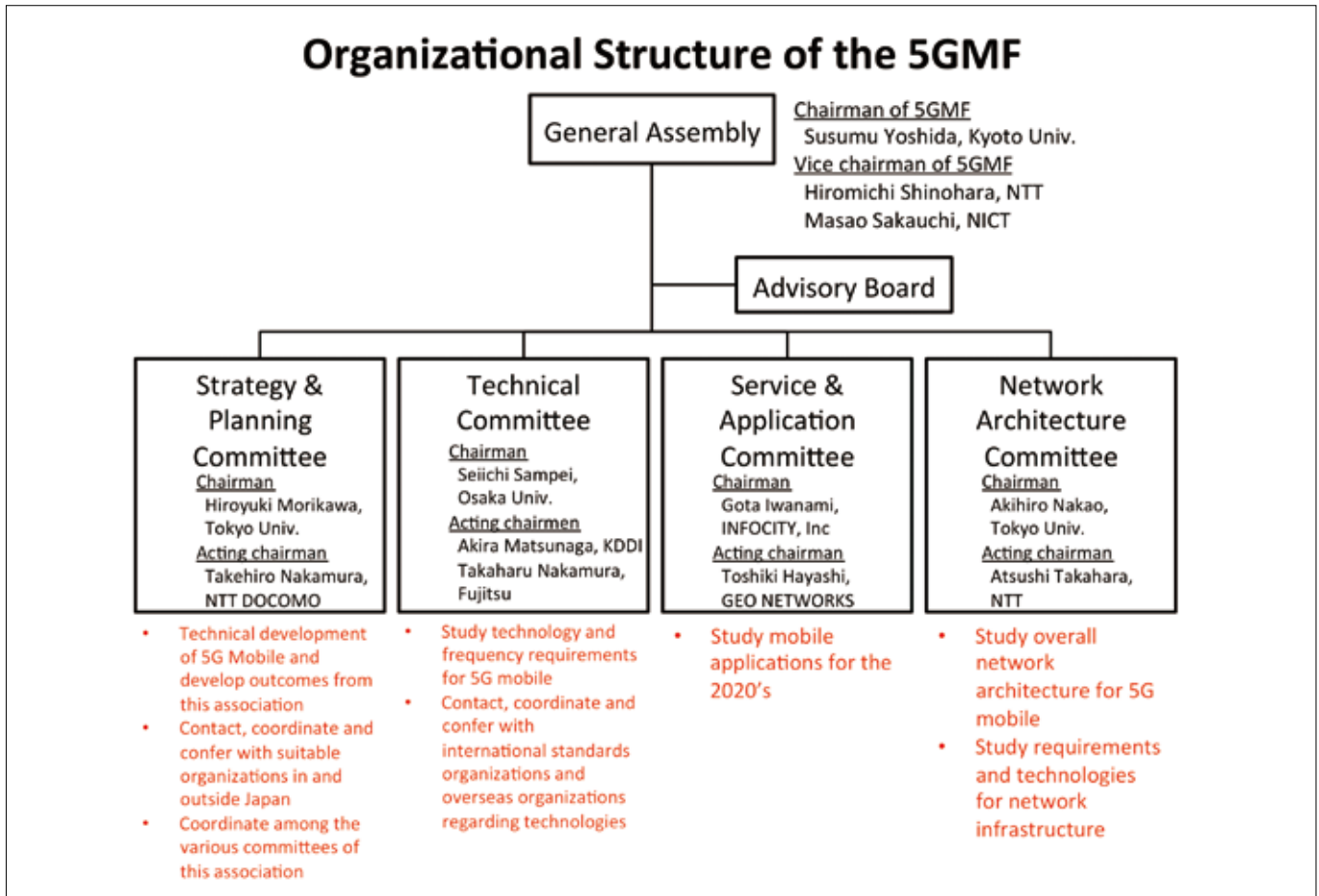
The Radio Policy Vision Council organized by the Ministry of Internal Affairs and Communications (MIC) gives the roadmap for 5G mobile, including establishing a promotion organization within 2014, to strongly promote collaborative initiatives among industry, academia and government, under “Medium-term Arrangement” (July 2014).

With this background, ARIB in collaboration with the Telecommunications Technology Committee (TTC), established preparation office to prepare for establishing the 5GMF.

**3.1 Founding General Assembly**

On September 30, 2014, the founding general assembly of the 5th Generation Mobile Promotion Forum was held at the Meiji Kinen Kan in Moto-akasaka, Minato-ku, Tokyo. A total of 125 people participated, from 42 companies including telecommunications operators and wireless communication device manufacturers, as well as universities and other research facilities and the Ministry of Internal Affairs and Communications (MIC).

■ Figure 3: 5GMF Promotion organization



It began with a greeting from special guest Hiroomi Kira, Director-General of the MIC Telecommunications Bureau.

Then, representing the promoters of the 5GMF, Mitsutoshi Hatori, Professor Emeritus from University of Tokyo, explained the significance of the event, the resolutions establishing the 5GMF were adopted, and the Articles of Association were approved.

Next, the officers were elected, with Susumu Yoshida, specially-appointed professor emeritus at Kyoto University, as chairperson, and co-vice-chairs, Masao Sakauchi, President of NICT, and Hiromichi Shinohara, Senior Executive VP of NTT.

The principles for establishing the committees were adopted and the chairpersons were designated. The promotion organization of the 5GMF and the main roles of each committee are shown in Figure 3.

Also, the business plan and income and expenditure budget for FY2014 were adopted and advisors were delegated.

Membership, as of January 6, 2015, included 13 experienced academic individual members, 52 ordinary members, and three special members (from MIC, ARIB, and TTC), totaling 68 members.

### 3.2 Founding Celebration Ceremony

After the founding general assembly, a founding anniversary ceremony was held, also at the Meiji Kinen Kan, with approximately 160 people attending, with an opening by Mr. Hatori, representative of the founders, and a report on the

establishment of the 5GMF.

There was a congratulatory greeting from State Minister for Internal Affairs and Communications, Kousaburo Nishime, followed by a greeting from Chairman Yoshida. In the reception, the various committee leaders spoke about their aspirations, and there was enthusiastic talk about the new user scenarios that will come with 5G mobile among the many attendees.

■ Photo 2: State Minister for Internal Affairs and Communications, Nishime giving a greeting



## 4. 5G Mobile Communications International Workshop

### 4.1 Date, Time, and Location

- 1) Date and time: October 8, 2014 (Wed.), 14:00-17:30
- 2) Location: Makuhari Messe, Chiba, Japan

### 4.2 Objectives

During CEATEC JAPAN 2014, and prompted by the establishment of the 5GMF, the “International Workshop on 5G Mobile Communications Systems-2014” (“5GWS”) was held, oriented to the viewing public, with the goal of developing the public understanding of international trends and future prospects for 5G mobile.

### 4.3 Workshop Overview

5GWS was held jointly by the MIC and ITU, bringing together representatives of organizations studying 5G mobile from Japan, Europe, China, and Korea, as well as international standardization organizations working on wireless communications. It included presentations and panel discussions on prospects for 5G mobile concepts, services and technologies.

It began with a greeting from Parliamentary Vice-Minister for Internal Affairs and Communications, Gaku Hasegawa, representing the sponsor, and from the Chief of the Study Groups Department, Radiocommunication Bureau of the ITU-R, Colin Langtry, representing the co-sponsor.

Then a keynote speech was given by Chairman of the 5GWS Organizing Committee and Chairman of the 5GMF, Susumu Yoshida, regarding the significance of the workshop and hopes and initiatives of the 5GMF for 5G mobile.

Five people gave presentations on the state of study in various countries, proposed services, contributions to wireless technologies and other topics.

This was followed by a panel discussion, with

the presenters as panelists and Mr. Waichi Sekiguchi, editorial writer for Nikkei Inc., as moderator. Participants exchanged views from a range of perspectives regarding the implementation of 5G mobile, expansion into various Asian countries by enterprises from Europe, China, Korea, and Japan, activities of American companies like Apple and Google, and potential new business models.

The event was attended by more than 500 people—with standing room only—and ended as a great success. Table 1 shows the list of presenters.

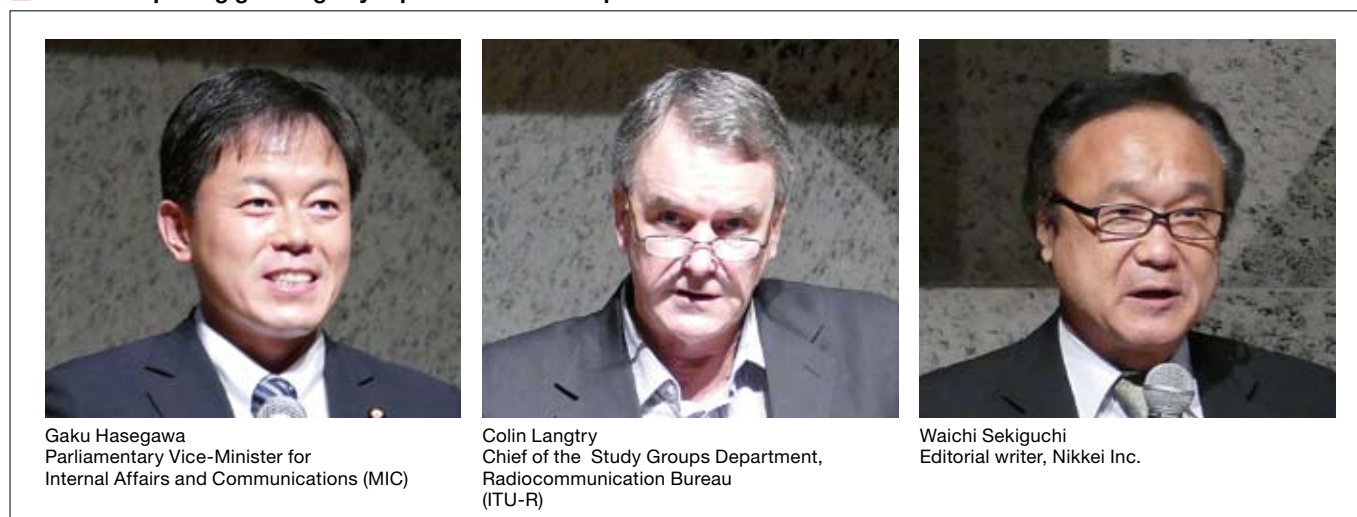
## 5. Conclusion

This article has reported on the state of 5G mobile in Japan. The contributions of Japan to 5G mobile in the future, centered on the 5GMF, are much anticipated, including research on the details in the white paper, cooperative efforts with overseas organizations, and international standardization.

■ Table 1: List of presenters

Presentation	
Keynote Speaker	Dr. Susumu Yoshida (Professor Emeritus of Kyoto University) Chairman of 5G Workshop-2014 Organizing Committee
Speaker 1	Dr. Hakan Ohlsen (Ericsson) Vice Chairman, ITU-R Working Party 5D
Speaker 2	Dr. Werner Mohr (Nokia) Chair of the Board of The 5G Infrastructure Association, 5G Public-Private Partnership (5G PPP)
Speaker 3	Ms. Zhiqin Wang (CATR) Vice Chairman, IMT-2020 (5G) Promotion Association, China
Speaker 4	Prof. Youngnam Han (KAIST) Chairman of Steering Committee, 5G Forum, Korea
Speaker 5	Mr. Takehiro Nakamura (NTT DOCOMO) Leader, ARIB 2020 and Beyond Ad Hoc, Japan
Panel Discussion	
Moderator	- Mr. Waichi Sekiguchi (Editorial writer, Nikkei Inc.)
Panelist	- Dr. Hakan Ohlsen - Dr. Werner Mohr - Ms. Zhiqin Wang - Prof. Youngnam Han - Mr. Takehiro Nakamura

■ Photo 3: Opening greetings by representatives and panel discussion moderator



Gaku Hasegawa  
Parliamentary Vice-Minister for  
Internal Affairs and Communications (MIC)

Colin Langtry  
Chief of the Study Groups Department,  
Radiocommunication Bureau  
(ITU-R)

Waichi Sekiguchi  
Editorial writer, Nikkei Inc.