ISSN 0915-3160

平成二十九年七月十日発行（年四回一、四、七、十月の十日発行）通巻百十五号 New Breeze

New Breeze

Quarterly of The ITU Association of Japan

No. 3
Vol. 29 July 2017
Summer

Special Feature

The Future of Cellular Networks
Latest Trends in Remote SIM Provisioning Technology

Report

49th Celebration of World Telecommunication and Information Society Day (WTISD)

New Breeze ISSN 0915-3160
Quarterly of The ITU Association of Japan
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https://www.ituaj.jp/?page_id=310

Publisher: Michiaki Ogasawara

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Letters to *New Breeze*

New Breeze welcomes readers' opinions. Please send comments with your name, address, and nationality by e-mail, fax, or post to the editor.

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Subscription forms are available on the ITU-AJ website:
http://www.ituaj.jp/english/subscription_form.pdf

Subscription Fee:

Single issue:	¥1,500
Annual subscription (4 issues):	¥6,000

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About ITU-AJ

The ITU Association of Japan (ITU-AJ) was founded on September 1, 1971, to coordinate Japanese activities in the telecommunication and broadcasting sectors with international activities. Today, the principle activities of the ITU-AJ are to cooperate in various activities of international organizations such as the ITU and to disseminate information about them. The Association also aims to help developing countries by supporting technical assistance, as well as by taking part in general international cooperation, mainly through the Asia-Pacific Telecommunity (APT), so as to contribute to the advance of the telecommunications and broadcasting throughout the world.

Latest Trends in Remote SIM Provisioning Technology

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1. Introduction

Subscriber Identity Module (SIM) cards inserted in various telecommunication devices such as smartphones contain identification information including that necessary for identifying the mobile network operator (MNO) providing the service as well as information necessary for decryption, and thus play a crucial role in the provision of services by the MNO. They serve as certificates and their importance for an MNO can be compared to that of passports for a country's citizens. In recent years, certain technology that enables the rewriting of SIM card information via wireless network has been commercialized and is now gradually becoming popular in machine-to-machine (M2M) and consumer-oriented markets. This article introduces the latest trends in such Remote SIM Provisioning (RSP) technology.

It should be noted that this technology may often generally be called Embedded SIM (eSIM) in media such as newspapers or magazines because the rewriting takes place while the SIM card is embedded in the device (i.e. the card cannot be detached). However, the definition adopted by the GSM Association (GSMA) which is responsible for its standardization, is officially worded "Remote SIM Provisioning (RSP)" and so the title of this article adopts this wording.

2. History of RSP technology standardization

Attention was first drawn to RSP technology when the content of a patent applied for by a North American smartphone manufacturer was revealed in 2010. This patent relates to the scenario where an equipment manufacturer itself plays the role of a Mobile Virtual Network Operator (MVNO) by switching the MNO service in the terminal, thereby providing optimum service that meets each user's requirements and usage conditions depending on the location of the user (country and/or area). Alongside the publication of the patent, this smartphone manufacturer submitted a proposal to the European Telecommunication Standards Institute (ETSI) to standardize the substance of this patent. Originally, ETSI was involved in standardizing the shape (form factor) of soldered-type SIMs, but the proposal to standardize a technology to rewrite the SIM from a remote place - a technology not conceived by any MNO previously - came as a shock to the mobile communication industry both in the US and Europe, although, in the end, the technology that was standardized was not quite the same as the manufacturer had imagined at the outset.

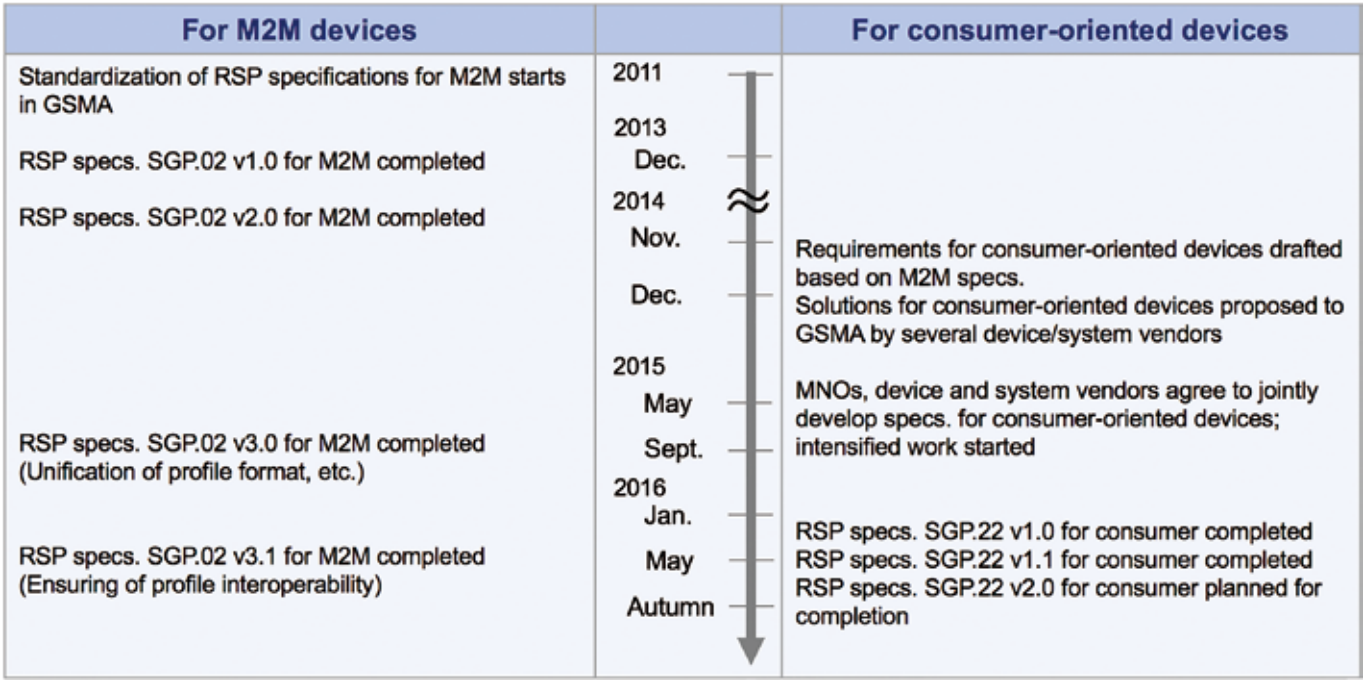
In response to this development, a working group to discuss the feasibility of the technology and its operating rules was set up in GSMA, an industry body composed of MNOs and the relevant system vendors, under the leadership of major US and European MNOs. In the initial stage, discussions focused on issues relating to the broad perspective, such as the future of the mobile communication industry when this technology is widely deployed. However, as demands from the car industry grew and the complicated nature of the mechanism and the system when it is applied to the smartphones was understood, it was agreed among the member companies that they should first deal with the M2M specifications for embedded equipment, and then deal with specifications for consumer-oriented devices. There were voices in favor of the standardization work for RSP technology being carried out by ETSI - European body in charge of standardizing form factors - because the GSMA which is the industry body focused on studying operation guidelines such as roaming and their solutions, is not a standards development body. Taking this into account, collaboration between GSMA and ETSI was initially sought but in the end the GSMA carried out the work by itself. The working group started out in 2011 as a small one with around ten companies that were mainly MNOs and SIM vendors. However, the recent wide proliferation of smartphones and tablets has resulted in the number increasing to around 100 including major MNOs worldwide and device/system vendors. The group currently continues to work on expanding the functions of RSP technology and in effect is creating a large business ecosystem.

3. RSP standard specifications

The word "SIM" refers to a function in a cellular network and the hardware is called "Universal IC Card (UICC)." UICCs are categorized according to size and shape, and in ordinary smartphones or feature phones, removable SIM cards such as mini-SIMs (2 Form Factor: 2FF), micro-SIMs (3FF) or nano-SIMs (4FF) are used. There is also another type of SIM called Machine-to-Machine Form Factor (MFF) where the SIM is soldered directly onto the circuit board inside the equipment (5mm x 6mm). It is called an Embedded UICC (eUICC) because it is embedded on a board and cannot be removed. However, RSP specifications developed by GSMA cover all types of SIM cards including removable SIM cards as targets for remote rewriting. Thus the application categories affected by RSP technology now covers a wide area, ranging from M2M equipment to consumer-oriented devices.

RSP-related specifications established by the GSMA can be categorized as follows: (1) requirement specifications describing requirements by MNOs (architecture); (2) technical specifications

Figure 1: Standardization history of GSMA RSP technology



necessary to meet such requirements; and (3) testing specifications verifying whether the implemented hardware and software comply with the standards.

As a result there is a set of these three types of specifications for both M2M and consumer-oriented devices. Figure 1 shows a timeline of the milestones in the standardization of RSP technology.

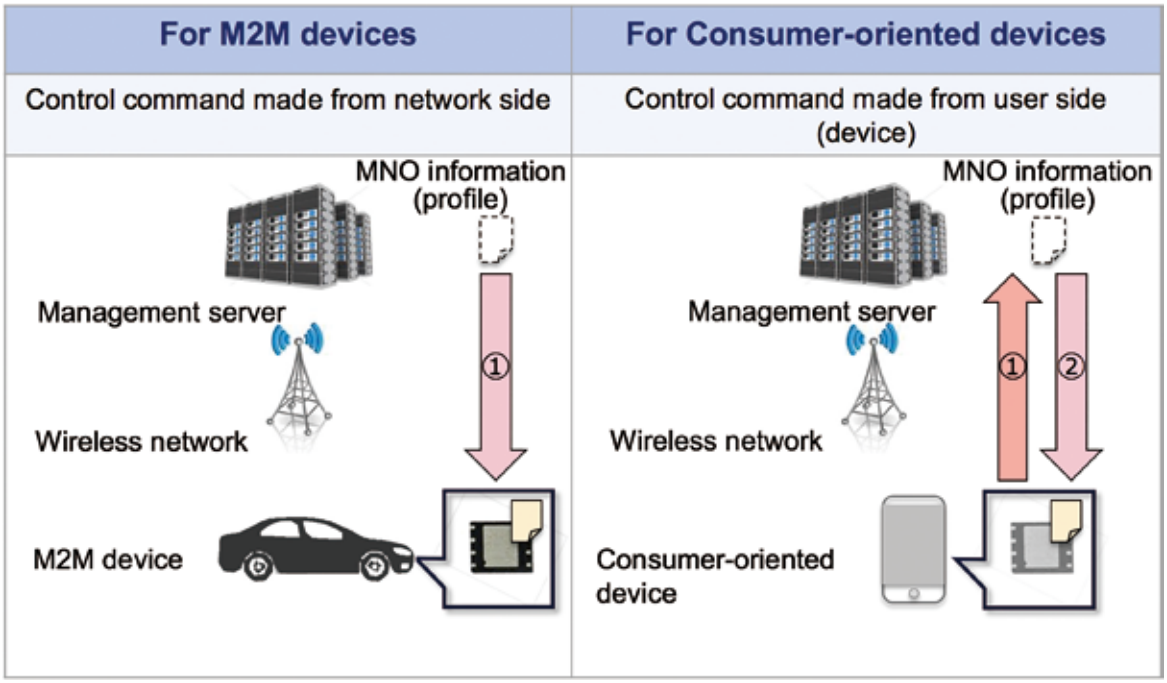
As described earlier, the standardization of specifications for M2M device started first and GSMA SGP.01 (requirement specifications) and SGP.02 (technical specifications) were published in December 2013, enabling the implementation of commercial products to begin. SGP.02 continued to be updated and currently, as of May 2016, SGP.02 version 3.1 is the latest version. Alongside the updating of the technical specifications, standardization of test specifications also moved forward and version 3.1 of GSMA SGP.11 was published in May 2016. I was involved in formulating the specifications from January 2014 to May 2016 as the chairperson of a sub-working group in charge of these test specifications.

After the first version of the RSP specifications for M2M devices was completed, discussions relating to customer oriented devices started in around March following the Mobile World Congress (MWC) 2014, with analysis of the differences between M2M and consumer-oriented devices, e.g. what would be missing if M2M specifications were to be applied to consumer-oriented devices and what other aspects needed to be standardized. These discussions were in full swing in May 2014, and the applications of RSP to smartphones and tablets were studied considering usage scenarios such as connecting new subscribers, changing subscriptions or replacing devices under the same subscription. Based on the technical specifications that reflected the results of these discussions, some demonstrations complying with pre-standards were made by certain companies during MWC2015. GSMA also issued a press release announcing its intention to accelerate RSP standardization and listing the names of the supporting companies. From the summer of that year, studies of the specifications started began with the holding of a five-day-meeting every other week, and versions 1.0 of SGP.21 (requirement specifications) and SGP.22 (technical specifications), which are for consumer-oriented devices, were released in January 2016. As for SGP.22, a revised version (version 1.1) was published in June. SGP.21 (requirement specifications) was also updated to version 2.0 in August 2016. SGP.22 (technical specifications) is also expected to be further revised (to version 2.0) in the autumn of 2016. The differences between version 1.0 and version 2.0 will be described later in this article.

4. Differences between RSP technologies for M2M and consumer-oriented devices

The outcome that an MNO profile is rewritten using RSP technology is the same for both M2M and consumer-oriented devices. However, there are differences in the specifications due to the fundamental differences in the use cases. The biggest difference depends on whether the rewriting is made from the network side (MNO) or from the device side (user). Figure 2 illustrates this difference simply.

Figure 2: Differences between RSP technologies for M2M and for consumer-oriented devices

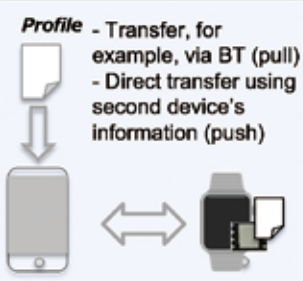
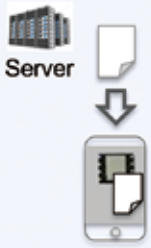
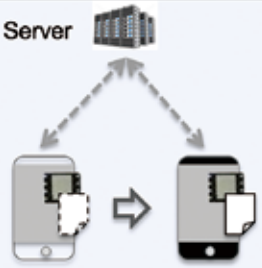


In the case of M2M services, there are usually service providers between the MNO and the users, making the relationship between the MNO and the service provider equivalent to that in the case of business-to-business (B2B). For instance, in the case of embedding SIM in a car or a smart-meter together with the communication function, a multi-year contract is usually signed between the MNO and the service provider. If, upon termination of a five-year contract, the service provider opts to switch MNO, it would be a huge and practically impossible task to rewrite manually all the SIM cards fitted in the hundreds of thousands or even millions of devices in the field. If it is possible to remotely rewrite the MNO profile using RSP technology, this would dramatically simplify the work. In this case, it is envisaged that the request to rewrite the contract information is sent simultaneously (or within approximately the same period of time) from the network and that it is not the user devices making requests individually. Therefore, in the case of specifications for M2M devices, a mechanism enabling the command from the network side to switch contracts is indispensable. On the other hand, in the case of consumer-oriented services, the relationship between the MNO and the end-user is basically a business-to-consumer (B2C) –type one, where modifying or adding contracts with the MNO is initiated by the user. Therefore, it is envisaged in this case that the request for a new contract or modification comes from the device side.

The procedures of downloading and installing information between the server (that maintains the MNO profile as an electronic file) and the eUICC (mounted on the device) are the same in both cases. However, due to the different use cases, the functional blocks necessary for implementation using M2M RSP technology and consumer-oriented RSP technology are different. In the GSMA Standardization Work Group, there are future plans to develop and standardize an integrated architecture for the two technologies.

Updating RSP specifications for M2M used to mainly consist of expanding functions and ensuring interoperability. However, in the case of versions 1.0 and 2.0 of consumer-oriented RSP specifications, the use case itself has changed. Figure 3 describes the differences between the two versions simply. Version 1.0 specifications assume a case where a user, already in possession of a smartphone and a subscription, is initiating contract application procedures for his/her newly purchased device by connecting it to his/her smartphone via Bluetooth and thereby to the MNO. Version 2.0 specifications have been created to enable, by using RSP technology, the writing of a variety of contracts such as registration of new contracts, switching of MNOs by replacing of SIM card, and changing devices under the same contract. Note that these formalities are currently possible if the customer uses a removable SIM. By implementing version 2.0 specifications, it will be possible to realize the contract procedures and utilization modes that are currently in common use with SIM lock-free terminals. However, the technical specifications and operating rules for features such as remote control functions for customer care and delegation of control functions for business usage have not been decided yet, and further discussions and revisions of specifications are expected to follow.

Figure 3: Differences between versions of RSP technology for consumer-oriented devices

	Version 1.0 specifications	Version 2.0 specifications		
	Contract for 2nd device	New contract	Contract modification within same device	Contract modification and device replacement
Use cases:				
Comparison with status quo:	---	Equivalent to inserting SIM card when making new contract	• Modification of more than one service for same operator • Switching operator	Equivalent to inserting SIM card into different device
Ver. 2.0 specs.:	---	Support mandatory	Support mandatory	Support optional (contained in Annex)
Remarks:		Applicable to SIM lock under current 3GPP standards	Automatic switching not allowed	Future study

5. Non-standard technology similar to RSP

Here I would like to deviate slightly from the main theme of this article - introduction of RSP technology – and take a look at similar technologies, which are not standardized. As of August 2016, I am aware of five companies - Simgo (Israel), Cellbuddy (Israel), iQsim (France), TAISYS (Taiwan) and GLOCALNET (China) – which offer technologies that enable remote rewriting of SIM information or enable the utilization of a local MNO network in a foreign country by using SIM information contained in a remote server. Although the details of each technology will not be covered here, there is quite a large demand for such services from the business sector especially from global companies whose members are traveling worldwide. Such technologies are welcomed by some MNOs desiring a niche market and there is definitely a market for such services. Each of these companies calls its technology "Virtual SIM" and there are also other technical terms being used, such as 'Software SIM' (also called 'Soft SIM') to describe such technologies. However, there is a clear distinction between these technologies and the other categories of SIM technology. Namely, in RSP technology and the Virtual SIM technology standardized by GMSA, the security domain that contains the MNO profile is basically isolated at the hardware level (i.e. segregated in the memory area); technologies that do not have such a segregated area for the profile information but contain it in the same memory area with other applications are called Soft SIM. Although software technologies that enable the protection of certain pieces of information are making progress, there are still worries from security point of view about deploying Soft SIM in commercial products because of fears regarding security. However, if it were to be possible to realize the same level of security in authentication functions without the need of setting up a special hardware security domain, such technologies might find wide application in industrial and consumer-oriented equipment. Accordingly the future development of such features in software technologies is anticipated in the not too distant future.

6. Commercialization of RSP technology for M2M

The demand for RSP technologies in M2M business fields is high among manufacturers that run global businesses. In particular, demand from the automobile industry has been conspicuous since the early days for two reasons. The first one is based on logistical considerations as shown in Figure 4. Currently, in order to install a mobile device in a car at the time of manufacturing, the manufacturer has to either install a specific SIM card for a specific MNO depending on where the car will be shipped, or to install the SIM card upon arrival of the car in the country where it is to be sold. RSP technology was greatly touted as a means of eliminating such time consuming requirements. The automobile manufacturers made it clear that they wanted to simplify their manufacturing processes by introducing RSP technology. This would enable them to manufacture cars to a single set of specifications. Accordingly, a newly manufactured car arriving in country A would have its SIM card written with the profile for the local MNO (MNO-A,) which would be different from the profile for the SIM card in a car arriving in country B.

Such a demand is not unique to the car industry but common to all global manufacturers who provide cellular connectivity as one of their services. Especially, right now in Europe, there are high expectations regarding RSP technology in order to meet the "eCall" (automobile emergency calling system) which will become mandatory for all newly sold cars after 2018. With this emergency calling system, when a car is involved in an accident, communication equipment mounted on the car will, on the driver's behalf, automatically report the location and the travelling direction, thereby making it possible for the police and ambulance to rush to the scene. The characteristics of the shielding for such car mounted communication equipment are strictly regulated in order to protect it from the impact of crashes, especially flames, and it will be practically impossible to carry out disassembly or reassembly work at dealers in the country it is imported to. The technology issues mentioned above like rewriting, etc. will be solved if the MNO profile can be written using RSP technology without disassembling the communication equipment.

The second reason the car industry is obsessed with the merits of RSP technology is not connected with the need to reduce costs by simplifying the logistics as explained above, but the industry's desire to establish a long-lasting relationship with its customers using their products. Up to now, when a car owner sells his/her car, which has been equipped with communication systems, the services involving its car-mounted communication devices will cease, and there was little possibility that the next

Figure 4: Basic global application of RSP technology by global car manufacturer

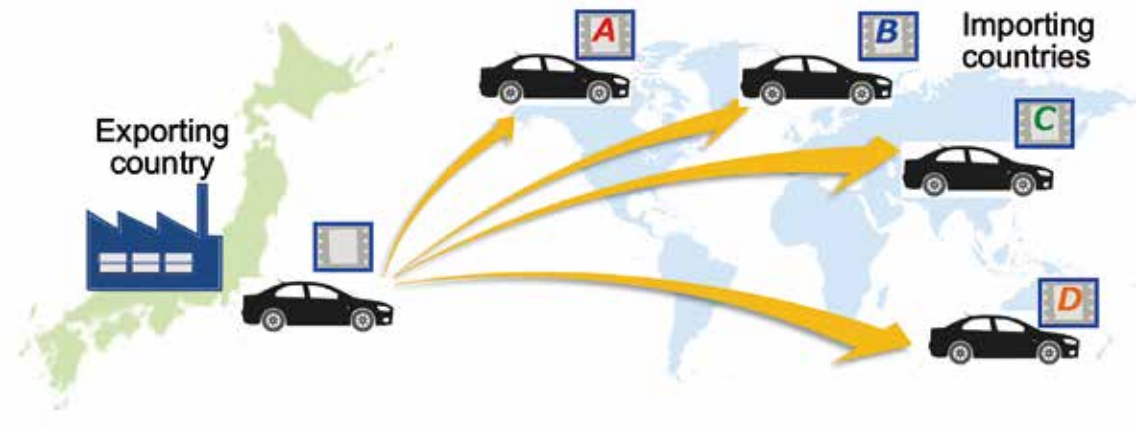


Figure 5: Basic global application of RSP technology in global and continental second-hand car market

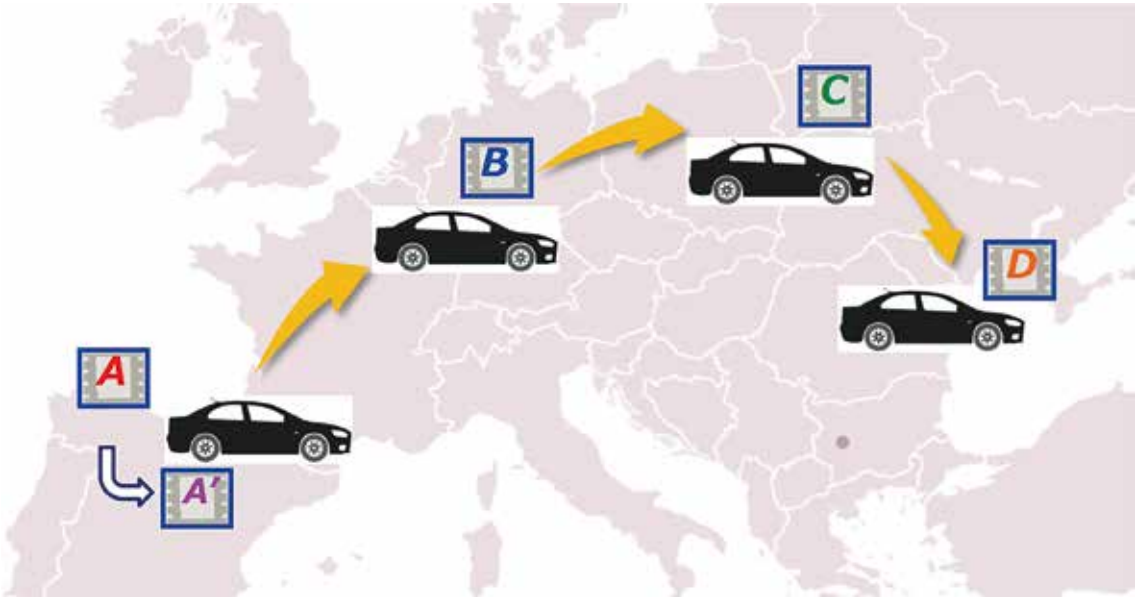


Table 1: Announcements containing references to RSP technology by major car makers (based on their corporate press releases)

Car Manufacturer	Reference to RSP technology	Year
Aston Martin	Demonstration of provision of racing-car-mounted device at IoT event (Silicon Valley) in corporation with Spirent, and usage plan in World Endurance Championship 2016	2016
General Motors	Announcement of intent to adopt GSMA RSP technology in car mounted devices for OnStar (connected service) starting 2015	2015
Jaguar Land Rover	Statement 'Adoption of RSP technology to car mounted devices will simplify car manufacturing' and display of actual vehicle at GSMA booth in Mobile World Congress 2016	2016
Renault Nissan	Statement 'It is a scheme very beneficial for global automobile manufacturer, and will introduce it into every car in future'	2016
Scania	Presentations made at several events aimed at improving customer value through separation of service and manufacturing	2016
Audi/Volkwagen	Announcement of intent to provide connected service in Europe by mounting eUICC and using RSP technology	2016
Daimler	Announcement of intent to mount eUICC on Mercedes Benz E-class	2016
BMW	Announcement of intent to mount eUICC on all newly sold cars in USA	2015

user will disassemble the communication device from the car to replace the mounted SIM card and then start using a new communication service with a different MNO. However, if the car-mounted communication devices conform to RSP specifications, it will be possible to conclude a new contract whereby service providing MNO is switched in the same country, as shown in Figure 5. Furthermore, if the car is sold in another country as a secondhand car, it will be possible to conclude a new contract with a local MNO that can provide services to this car model. In such a way, relationship between the manufacturer and the secondhand car owners and even the subsequent owners can last for the life-span of the car. Under this scheme, it will also be possible for a car owner driving from country to country to switch the MNO as he/she arrives in a new country. From now on, it is foreseen that the percentage of cars equipped with car communications equipment will increase as the connected-car services and automated driving become more widespread, thus making RSP technology even more common. According to a press release issued by GSMA in February 2016 for the automotive sector, several automobile manufacturers together with 22 of the world's major MNOs have agreed to implement RSP technology conforming to GSMA specifications. Although each automobile manufacturer has its own name for its services and it is rare that the term 'RSP' or 'eSIM' is used, RSP technology is starting to be used extensively by European automobile manufacturers for cars with communications capability. For reference purposes, Table 1 contains a list of press releases issued by automobile manufacturers in various conferences together with some of their comments.

7. Background to promotion of consumer-oriented RSP technology

Being involved in the standardization of RSP technology, I am often asked by people in and outside of Japan "why does a mobile communication operator promote standardization of RSP technology which can make it very easy for customers to switch to another operator?" or "what kind of monetization scheme do MNOs envisage using this mechanism?" In order to answer these questions, I will briefly describe the mobile communication environment and MNO strategies in Europe which are quite different from those in Japan.

In introducing RSP technology, European MNOs develop their business strategies in terms of three segments: (1) SIM lock-free terminal market, (2) service to incoming foreign visitors, and (3) benefits to travelers traveling outside their home country (or benefits to MNO's subscribers traveling abroad).

(1) SIM lock-free terminal market

In the European market, about 50 % of the smartphones sold are said to be SIM lock-free, even in the shops of MNOs. In addition, depending on the regulations in each country, SIM-lock can be released after 90 days in many countries and it is therefore estimated that about 70% of the smartphones circulating

in Europe are SIM lock-free. This fact has a lot to do with the geographical and cultural background of Europe. In Europe, many countries share common borders and many people commute between countries or go shopping over the border. Naturally, they also wish to pay the lowest possible communication charges even when they are on the other side of a border. There are also many people who leave their country for winter and summer vacations overseas that total several weeks of the year. For these people, purchasing a SIM lock-free smartphone to avoid paying expensive roaming charges makes economic sense even if the terminal cost may be a bit more expensive. Accordingly, in the future, it is expected that the percentage of SIM lock-free terminals will increase in the light of the growing number of wearable devices, different home-oriented devices and diversification of sales channels. As such, users themselves are becoming accustomed to switching MNOs as they wish, and MNOs, while allowing free selection by users, are seeing that SIM lock-free terminals, not yet tied to any MNO, will become a new opportunity to increase their customer numbers. These are the motivations behind the promotion of RSP technology development.

(2) Foreign visitors

Table 2 shows the countries, extracted from such statistics, which accept foreign visitors outnumbering 50% of each country's population, in descending order, together with their population. As can be seen in this table, of the 45 countries that make up Europe, 16 countries, corresponding to more than 30% of them, accept a large number of foreign visitors, as tourists or business travelers, which is equivalent to more than half of their populations. Eleven countries from Austria, in first place, down to the Czech Republic in 11th place, have a total number of foreign visitors that actually outnumbers their own population (Visitor/Population ratio>100 %). In fact, all European countries except Croatia, Ireland and UK are signatories of the Schengen Treaty which means there are not even passport checks at their border. This means that if border crossing by land is included, far more people are actually moving between these countries. Germany whose ratio is only around 40 % and is therefore not listed in the Table has around 33 million foreign visitors. In Europe, there is of course a ranking of MNOs competing in terms of incremental number of subscriptions. While these MNOs are currently competing in saturated domestic markets for new subscriptions that number only tens to hundreds of thousands, these large number of foreign visitors open up a potential market of millions of subscriptions a month.

When seen from the perspective of offering services to potential numbers of customers that are as big as the population of a country, and also taking into account the limitations on SIM marketing channels as well as abolition of roaming charges in EU starting June 2017, RSP technology enabling service implementation via wireless networks without having to establish the logistics for selling SIM cards is definitely one of the most prospective service marketing channels. Therefore, MNOs see the need to be prepared for RSP technology.

Table 2: Countries with Visitors/Population ratio exceeding 50%

Country	Population (in 1,000)	Foreign visitors (in 1,000)	Visitors/ Population (%)	Remark
Austria	8,510	25,290	297.2	
Croatia	4,240	11,780	277.8	Not a signatory to Schengen Treaty
Greece	10,990	22,030	200.5	
Ireland	4,610	8,260	179.2	Not a signatory to Schengen Treaty
Denmark	5,620	8,560	152.3	
Spain	46,460	65,000	139.9	
France	63,920	83,700	130.9	
Hungary	9,880	12,140	122.9	
Switzerland	8,140	9,160	112.5	
Sweden	9,750	10,750	110.3	
Czech Republic	10,510	10,620	101.0	
Portugal	10,390	9,320	89.7	
The Netherlands	16,860	13,930	82.6	
Italy	59,960	48,580	81.0	
Belgium	11,200	8,040	71.8	
UK	64,510	32,610	50.6	Not a signatory to Schengen Treaty

According to statistical data, there were about 20 million foreign visitors in Japan in 2015 and this figure corresponds to about 16 % of its population. The Japanese government is also promoting system reforms with the view of establishing a framework that can accommodate 40 million foreign visitors by the Tokyo Olympics in 2020. Most foreign visitors come to Japan for sightseeing and since it is thought that they are also looking for cheap communication tariffs, it is natural that the demands of temporary foreign visitors will become more and more important even in Japan.

(3) Travelers traveling outside their home country (or benefits to MNO's subscribers traveling abroad)

Statistics say that 65% of Europeans travel abroad more than once a year including the travel related to commuting and shopping mentioned earlier (10% in case of Asia). When these people travel abroad they search for cheap local services with their SIM lock-free terminals in hand. Such demand for communication services will increase as more and more people travel abroad. It is not yet known how quickly RSP-capable terminals will proliferate in the future. However, if one considers the case where a customer is given the opportunity to choose between an MNO that enables getting cheap communication tariff when traveling abroad and an MNO that does not, it is obvious that the former will be chosen, and therefore it is natural that an MNO should feel the need to offer benefits to its customers by adopting RSP technology and aligning itself with global and standardized systems.

Although the environment in which European MNOs operate is quite different from that in Japan, it must be said that Japanese operators and device manufacturers now need to study use cases in the Japanese market taking into account how global terminals conforming to RSP technology will evolve in the near future.

8. Commercialization of customer-oriented RSP technology

As described above, the requirement specifications as well as the technical specifications were issued in January 2016 and immediately after MWC2016, in which there were demonstrations by major European MNOs and SIM vendors, commercial services conforming to version 1.0 specifications started. At MWC2016, the provision of a service for version 1.0-based smartwatch was demonstrated in a panel session (Photo 1); this was immediately followed by the RSP service for

Photo 1: Panel discussion on consumer-oriented RSP technology at MWC2016

Presenters from left:
Vodafone (UK), Telefonica (Spain), Orange (France), KDDI (Japan),Deutsche Telekom AG (Germany), AT&T (US)

Photo 2: Demonstration by Telia (Sweden) of how to set up smartwatch

smartwatches by Vodafone Germany on March 11, 2016, and now major MNOs such as O2 (UK), Telia (Norway, Estonia), Swisscom (Switzerland), Orange (France), T-Mobile (Germany) and Telecom Italia Mobile (Italy) have also started selling products and providing RSP services. Moreover, in early September, a next generation smartwatch was announced by a Korean manufacturer at IFA 2016 held in Germany, and in this product too, GSMA-based RSP technology is used.

Readers may be surprised to learn that products and services conforming to SGP.21/22 version 1.0 standards were commercially introduced within two months of their release. However, those MNOs providing services and the vendors selling products were deeply involved in the standardization work from the beginning and promoted development and implementation in parallel with their standardization work. It is still unclear whether smartwatches will sell well in the future but it is anticipated that their usefulness will improve with the advent of RSP-capable products, for example, smartphones and tablets conforming to version 2.0 specifications expected to be issued in the autumn of 2016. It is expected that these products in combination with the new services provided by MNOs will further increase the proliferation as a result of the synergy between the two trends.

9. Challenges facing introduction of RSP technology in smartphones

Technical challenges involved in the introduction of RSP technology have already been identified, but the challenges relating to regulatory issues in each country still need more study. Currently, in many countries, including Japan, personal authentication, by the presentation of certain personal identity documents issued by public authorities, is necessary as a crime prevention measure when purchasing a SIM card that is capable of voice communication. In the case of the smartwatch mentioned above, voice communication will be made possible after concluding the contract using RSP technology. However, this is permitted because user identification has already been made via a smartphone that already has a user contract. Furthermore, North American manufacturers currently provide services to their tablet customers using similar schemes to that of RSP technology. These schemes enable their customers to freely select service providers of their choice in many countries around the world when they are traveling but they are permitted to do this because they are offered pre-paid type data-only communication. There is not yet a clear answer to the question about whether a user having a SIM lock-free terminal conforming to RSP technology should be allowed to subscribe to voice communication using RSP technology outside his/her home and/or at places he/she visits. In the case of the roaming services available to users abroad, they can make use of both voice and data communication as usual, provided the communication charges are acceptable. This is because in this case, there is the 'roaming agreement' between the MNO that issued the SIM card in the subscriber's country and the MNO in the foreign country. The simple explanation is that there is an agreement between the two MNOs so that the foreign MNO places confidence in a SIM card user who has been authenticated by his/her home MNO, and there is the assumption that there is an automatic mechanism to check the SIM issuing MNO regarding the authenticity of the user. Signing a voice communication contract in such a way would not bring about any technical problems but it is necessary to take into account the contractual procedures requiring compliance with the regulations in both countries. Meanwhile, voice communication is actually becoming easier nowadays with Voice over IP technology combined with certain application software

increasing in number, and being offered by service providers. Therefore, in view of the increasing bandwidth for cellular services and proliferation of the Wi-Fi environment, those users who are satisfied with the use of IP voice service over data communication when abroad may not be so interested in RSP technology.

10. New business areas targeted by RSP technology

It is not just conventional MNO business where RSP technology can be applied. If the current logistics supporting the distribution of SIM cards - for example, the delivery system starting from card manufacturing to finishing with promotion and sales activities in dealer shops - can be eliminated by the use of RSP technology, it may bring about various changes just like what happened in the Compact Disc (CD) market which originally had to be bought in shops but were replaced by downloadable music files. There are countless scenarios where merits can be gained from the elimination of the logistics of SIM cards which would make manual mounting/removing of SIM cards unnecessary. For instance, the merits to be gained in the management of Internet of Things (IoT) devices that are expected to increase so dramatically in the future, are immeasurable. Almost every MNO can see the advantages of mounting SIM cards remotely and simultaneously by the million or even billion. In addition, for an MVNO which sells SIM cards issued by the hosting MNO through an independent sales channel, the merits of RSP technology are comparatively large and there are quite a number of MVNOs who have already announced the implementation plan of RSP services. In reality, it would require certain investment in order to introduce RSP technology and therefore it is not so easy to judge from profitability viewpoint. However, it would surely enable simplification of distribution flow. Not only the simplification of current business styles, but new services with innovative ideas are expected to be created by combining new technologies with RSP technology.

11. Conclusion

This article has offered an outline of the RSP technology specified by GSMA and its status regarding commercialization which has been led by the USA and Europe. It is foreseen that the commercialization of this technology, supported by MNOs and device/system manufacturers, will become more and more widespread. The RSP mechanism is not only determined by purely technical and implementational factors but is also influenced by regulatory issues relating to user contracts in each country. Furthermore, there are possibilities that new services not even conceived at present, will emerge with new devices and systems as new ideas appear. RSP technology is placed on the border between technology and business, involving difficult and delicate matters. In the end, the most important thing is that the Japanese mobile-phone users as well as foreign visitors coming to Japan can make use of communication services safely, securely and comfortably. In order to achieve this goal, it is important to review global standards, regulations in each country and implementation technology from a wide angle. It is also important not only to widen the range of RSP compatible devices but also to create and provide attractive and useful services for users.

Cover Art

Shokoku meisho hyakkei, Gion sairei
(Gion Festival in Kyoto, from the series a hundred view of famous places in various provinces)

Utagawa Hiroshige Ⅱ (1826-1869)
Collection of the Art Research Center (ARC), Ritsumeikan University
Object number: arcUP2016

49th Celebration of World Telecommunication and Information Society Day (WTISD)

The ITU Association of Japan

On May 17th, 2017, the ITU Association of Japan(ITU-AJ) held 49th celebration event of WTISD. In the ceremony, ITU-AJ presented "Accomplishment Awards" to those having distinguished achievements for international standardization and international cooperation in the fields of telecommunications/ICT and broadcasting.

This year, among "Accomplishment Award" winners, Ministry of Internal Affairs and Communications (MIC) presented the honorable MIC Minister's Award to Dr. Takeshi Mizuike, KDDI, for his remarkable contributions during his longstanding career, while "ITU-AJ Special Achievement Award" was given to Mr. Fernando Bittencourt, SET-Brazil. Moreover, "ITU-AJ Encouragement Awards" were presented to those with expectation to future contributions.

Achievements of each winner are shown in the following URL.

https://www.ituaj.jp/wp-content/uploads/2014/05/20170517program.pdf

New Breeze featuring award winners, coming soon!

List of the Award Winners on 17 May 2017

MIC Minister's Award

Takeshi Mizuike (KDDI)

ITU-AJ Special Achievement Award

Fernando Bittencourt (SET)

ITU-AJ Accomplishment Awards

Sadayuki Abeta (NTT DOCOMO)
Noriyuki Araki (NTT)
Joji Urano (NTV)
Takashi Egawa (NEC)
Youki Kadobayashi (NAIST / NICT)
Yuichi Kihata (ARIB)
Junji Kumada (CDI)
Riyoko Kojima (KDDI-F)
Masaomi Sumita (NTT DOCOMO / TTC)
Hiroki Taira (NTT-East retired)
Kenzo Takahashi (UEC)
Tomohiko Takahashi (KDDI)
Kousuke Dobashi (BHN)
Hiroshi Nakai (BHN)
Kazuhide Nakajima (NTT)
Takaharu Nakamura (Fujitsu)
Mamoru Hirayama (JTEC)
Ved Prasad Kafle (NICT)
Kazunori Matsuo (KDDI / TTC)
International Submarine Cable Project Team (NEC)

ITU-AJ Encouragement Awards

Mamoru Ishii (NICT)
Yumi Ueda (NICT)
Anil Umesh (NTT DOCOMO)
Memiko Otsuki (NTT DOCOMO)
Yuichi Kusakabe (NHK)
Yoichi Suzuki (NHK)
Kazuhiro Takaya (NTT)
Kazuaki Takeda (NTT DOCOMO)
Kengo Tsuda (NHK)
Hisao Nakakita (NHK-I)
Yoshihiro Nakayama (KDDI-F)
Yoshikazu Narikiyo (NHK)
Yoshitaka Hakamada (NHK)
Katsumasa Hirose (NHK)
Takaaki Matsushima (KDDI / NICT)
Amane Miura (NICT)
Dai Yamakami (NTT-East)
Kazuhisa Yamagishi (NTT)
NEC Corporation Transportation and City Infrastructure Division (NEC)
NICT Resilient ICT Standardization Team (NICT)

Ceremony at Keio Plaza Hotel, Tokyo

MIC Minister's Award winner Mr. Mizuike

ITU-AJ Special Achievement Award winner Mr. Bittencourt

Award winner and Honorable guests

Honorable Guest ; Mr. Akama, State Minister, MIC

Honorable Guest ; Mr. Aiboshi, Vice-Minister, MOFA

Anniversary Lecturer ; Prof. Matsuo, Tokyo Univ.

JICA Knowledge Co-Creation Program Improving ICT Policy Promotion Skills Utilizing Standards

— overcome challenges by deployment of ICT infrastructure corresponding to the situation —

International Cooperation Department
The ITU Association of Japan

During the fortnight from January 19 to February 3, 2017, The ITU Association of Japan (ITU-AJ) held a group training event on behalf of the Japan International Cooperation Agency (JICA). The purpose of this event was to promote international cooperation in the resolution of social issues such as ICT infrastructure improvements in each participant's home country, and to familiarize engineers with the latest ICT measures. As a starting point for international standardization, we conducted theoretical and experimental training on how to improve communication infrastructure more effectively and efficiently.

Thanks to the cooperation of the Ministry of Internal Affairs and Communications since 2012, this is the fifth time we have been able to hold this event. This year, it was attended by thirteen trainees from seven different countries — Colombia, Ecuador, Indonesia, Laos, Malaysia, Myanmar and Papua New Guinea.

The training consisted of an opening lecture on communication policy and standardization policy in Japan, followed by lectures and presentations on standardization trends at the ITU, problem analysis methods (PCM), inception reports, the activities of Japan's standardization organizations, the standardization activities of related companies and groups, and individual reports, as well as visits to related facilities.

There were two lectures on communication policy and standardization policy in Japan: *Telecommunications Policy in Japan* (Ministry of Internal Affairs and Communications) and *Standardization of ICT in Japan* (Ministry of Internal Affairs and Communications).

There were also two lectures on Japan's standardization organizations: *Towards Global Standardization in TTC* (Telecommunication Technology Committee), and *Standardization of Radio Systems* (ARIB: Association of Radio Industries and Businesses). Regarding standardization trends at the ITU, there was a lecture on Standardization on *ICT fields and ITU-T* (TTC).

As activities of organizations that reflect standardization in actual systems, there were lectures on *Certification System for Telecommunications Equipment in Japan* (TELEC: Telecom Engineering Center), *Overview of HATS* (HATS Conference), and *Activities for Interoperability Tests and Standardizations of Optical Access Systems* (HATS Conference).

When the lecture on communication policy and standardization policy in Japan was finished, there was a lecture on an analysis method called project cycle management (PCM), at which we extracted the issues relating to standardization in each of the trainees' countries, and held group discussions to share the knowledge level among the trainees. This PCM lecture was also delivered just before the announcement of each of the individual reports by the trainees, and in the group discussions we gave each trainee the opportunity to draw up problem-solving methods for the standardization of ICT in their own countries, and/or summarize the state of progress in standardization activities in their own countries.

Photo 1: Courtesy visit in MIC

Photo 2: Observation in TELEC

Photo 3: Observation in Smart House (KAIT)

Photo 4: Tour in Meiji Shrine

For standardization activities such as related business groups, there were lectures on *KDDI's Strategy for Development of ICT Service & Technology* (KDDI), *Current Status on Standardization of Future Network* (NTT), and *Global Standardization of Mobile Communication Systems* (NTT DOCOMO).

For the visits to related facilities, we arranged visits to TELEC's standard certification facility for telecommunication equipment, the NICT Exhibition Hall, Fujitsu Technology Hall, NHK's Broadcast Center, NEC's Innovation World showroom and the HEMS Interoperability Test Center at Kanagawa Institute of Technology (Smart House). At each of these facilities, the trainees were able to observe the development and standardization of new technologies at each company/organization, and deepen their understanding by getting involved in the latest technology and standardization efforts of each company.

At TELEC, the trainees gained an understanding of the importance of standard certification by attending a lecture on *Certification System for Telecommunications Equipment in Japan* and viewing standard certification facilities for telecommunications equipment. At the National Institute of Information and Communications Technology (NICT), the trainees were shown an overview of NICT's various activities, and saw a lecture on *Research and Development on ICT and Standardization Activities in NICT*. At the Fujitsu Technology Hall, the trainees observed Fujitsu's latest technology and saw a lecture on *Fujitsu's Activities of International Standardization*.

At the HEMS Interoperability Test Center at the Kanagawa Institute of Technology, the trainees were shown an actual smart house, which reconfirmed the importance of standardization in diverse home appliances, and saw a lecture on *Current Status of Smart Houses*.

At the NHK Broadcast Center, the trainees were shown around the Technical Operation Center and saw demonstrations of Hybridcast technology and a prototype 8K broadcasting system. They also saw lectures on *Setup of Digital Terrestrial Television Broadcasting Network, The Roles and Convergence of Broadcasting and Communications*, and *The Outline of NHK Digital Content Service*. At the NEC Innovation World showroom, the trainees were shown NEC's latest technology and saw a lecture on *Wireless Broadband Access*.

As in last year's event, we also arranged some Japanese cultural visits. During the early stages of the event, the trainees visited the Tokyo Tower, and at the end of the training, we arranged English-speaking volunteer guides for a visit to the Meiji Shrine.

On the final day, each trainee presented an Individual Report. These reports included a discussion of the current state and future prospects of standardization in each trainee's home country, summarized using the PCM method or the like, and led to lively discussions on the progress of ICT standardization in each country.

Although this training course was highly rated by the trainees, ITU-AJ hopes to develop this event into a more satisfying experience by gathering the opinions and requirements of trainees based on their evaluations of the lectures, text materials and site visits, and analyzing these findings to clarify where improvements can be made to the course implementation from next year.

= A Serial Introduction Part 4= Winners of ITU-AJ Encouragement Awards 2016

In May every year, The ITU Association of Japan (ITU-AJ) proudly presents ITU-AJ Encouragement Awards to people who have made outstanding contributions in the field of international standardization and have helped in the ongoing development of ICT.
These Awards are also an embodiment of our sincere desire to encourage further contributions from these individuals in the future.
If you happen to run into these winners at another meeting in the future, please say hello to them.
But first, as part of the introductory series of Award Winners, allow us to introduce some of those remarkable winners.

DiBEG Task Force for New ISDB-T Countries

Digital Broadcasting Experts Group
Association of Radio Industries and Businesses
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Fields of activity: Digital Terrestrial Television Broadcasting

ISDB-T digital terrestrial television broadcasting: support for global outreach and standard setting

ISDB-T, the terrestrial television broadcasting scheme developed by Japan, has been standardized as ITU-R Recommendation BT.1306 System C. As of the end of 2016, 19 countries including Japan and Brazil have committed to adopt this terrestrial digital television broadcasting (ISDB-T) scheme upon which this standard is based. In starting up terrestrial digital television broadcasting in these countries that have decided to adopt ISDB-T, it is critically important that the ISDB-T broadcasting system and operational guidelines are formulated in way that is attuned to the circumstances and conditions of the respective countries where the system will be adopted.

The DiBEG (Digital Broadcasting Experts Group), set up under the auspices of the ARIB (Association of the Radio Industries and Businesses) Promotion Strategy Committee, is charged with assisting Botswana, the Philippines, Sri Lanka, and the Maldives make the transition to ISDB-T broadcasting, while the Task Force for New ISDB-T Countries is responsible for expediting the cut-over to ISDB-T broadcast by Asian and African nations.

Digitital terrestrial broadcasting has significant advantages—enhanced utilization of frequncies that supports more channels, support for HDTV services, and more—and countries around the world are now in the process of abandoning analog terrestrial services for digital terrestrial TV broadcasting. To facilitate the transition to digital, we offer a ISDB-T broadcasting system that accommodates the local conditions of each country including the language of the country, analog televion broadcasting standards, alocation of frequencies, and other local conditions.

The accommodating ISDB-T broadcasting system that can be adapted to the conditions in different countries is based on ITU-R recommendations and Brazil's ISDB-T broadcasting system (the ABNT standard). This is because Brazil's existing ISDB-T system maintains commonality with Japan's broadcasting system and is also capable to adopting new video and audio encoding systems. Regarding the data broadcasting coding system, a scheme based on Japan's ARIB standard which is nearing practical deployment has been proposed.

For receiver specification guidelines and an EWBS (Emergency Warning Broadcast System), reference to technical harmonization documents drafted by the ISDB-T International Forum has been proposed.

DiBEG remains committed to widespread adoption of ISDB-T and to provide technological assistance to respective countries in the years ahead.

Tomoaki Kanazawa

Nippon Telegraph and Telephone East Corporation
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Fields of activity: Global Business Development

Telephone Network Project in Hanoi City with Vietnam Posts and Telecommunications Group

I am honored to receive the prestigious ITU-AJ Encouragement Award, and would like to thank everyone involved.

My first international project, based on a business cooperation contract (BCC) between Vietnam Posts and Telecommunications and NTT Vietnam, sent me for a six-year term to Vietnam from 1997 to 2003 to work on the Telephone Network in Hanoi City. Today Vietnam is a thriving country and a popular tourist destination, but it wasn't that so long ago that Hanoi was still a city of unfulfilled future potential.

I was part of the first implementation team to arrive in Hanoi, and we found that there were still many unresolved issues not covered by the contract. Just getting up and ready to launch the project—grasping the situation, setting out new operating procedures and processes, and so on—took far longer and took much more energy and effort than we could have imagined.

I can recall at the very beginning our Vietnamese partners saying "We can't give you information about the telecommunication facilities that you requested." Obviously, this information was essential in order to formulate a capital investment plan, so the project ground to a halt until the information could be compiled. I still have combined bittersweet and good memories of that time.

We certainly did not agree about everything, but I am so thankful

we had the good fortune of a counterpart who was always honest and forthright: "Excellent proposal, but it goes against our established policy so we can't go along with it." This signaled that we had a tough hurdle to get over, but at the same time, we were really glad to get a candid, straightforward opinion.

The project ran for 15 years to completion, and having gone over with the initial project team, I still feel quite emotional about the experience. I keep in touch with my counterpart, and I know him well enough to be invited over to his place when I visit Vietnam.

Vietnam has continued on the road to development, and as chance would have it, after an absence of 13 years, I have been called back to work on another Vietnam-related project. Receiving this award is most encouraging. I will do my best to accomplish my new mission, while cherishing the opportunity to work with people and make new international friends.

Kenji Sagayama

Eagle World Development Co Ltd
Kenjijp2000@ewdjp.com www.ewdjp.com
Fields of activity: ISDB-T digital TV standard promotion & migration

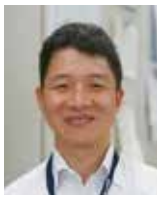
New Dawn in Botswana

In the summer of 2014, I took a late night flight from Hong Kong via Johannesburg, South Africa, and arrived in Gaborone, the capital of Botswana a little after 7:00 in the morning. With a land area some 1.8 times the size of Japan, and a population just under 2 million, I was impressed by the expansive territory of Botswana. Diamonds are the country's most important source of revenue, and nearly 30% of gross national income is spent on education.

Alone among the SADC nations of South Africa, Botswana foregoes financial aid and strives for economic independence. Botswana is also unique in having chosen the Japanese ISDB-T standard, motivated by a desire to break away from the media and content domination of South Africa, whereas all the other SADC countries opted for the European DVB-T2 standard. The Japanese standard has a channel bandwidth of 6 MHz, so Botswana's receivers had to be upgraded to Europe's 8 MHz (PAL) to align with the rest of the continent. Unfortunately, modified receivers had not been developed, even by NHK Science & Technical Research Laboratories, as late as 2012-13. From our perspective as a smaller firm, the prospects of Botswana adopting the ISDB-T standard looked rather uncertain. And even if they adopted the standard, the prospect of ramping up to mass produce 8 MHz receivers in just 2-3 years time might jeopardize our own profitability. But one thing is clear; you can't conduct onsite demonstrations and field trials to assess a standard without receivers. But then, just six months later, we were mass producing 8 MHz mobile phones (supporting One Seg TV) and 8 MHz-compliant set-top boxes (STB) for delivery to the Ministry of Internal Affairs and Communications (MIC), and ready to support the ISDB-T standard in Africa. With technical support from Access Corporation, we unveiled an STB featuring BML (datacasting) in 2015 tailored for the Botswana market. Botswana now plans to complete its transition to digital broadcasting later this year.

Nobuyuki Sato

Japan Broadcasting Corporation (NHK)
satou.n-fw@nhk.or.jp http://www.nhk.or.jp/corporateinfo/
Fields of activity: Television



Looking back on technical assistance for the introduction of ISDB-T in Uruguay

I have been back in Japan now for three years since completion of my work to promote and disseminate ISDB-T in Uruguay. The mission was to provide technical support to help Uruguay in converting over to ISDB-T, Japan's digital television system. This was soon after Japan had successfully switched over from analog to digital TV, and I was quite pleased to have been involved in a succession of these conversions. I arrived in Uruguay eager to follow up on this track record by helping that country navigate the changeover from analog to digital.

But when I got to Uruguay, I discovered that the law mandating the changeover had been pushed through by a small group of bureaucrats and broadcasters, it called for rapid conversion to digital within a very short timeframe, and did not address many key issues relating to channels, maintenance polices, and a host of other critical details. This left me wondering whether we would be able to get the project off the ground at all, let alone carry the digital changeover through to completion. Being in a different culture, not speaking Spanish, and not having another Japanese colleague with whom I could confer, I was very apprehensive but nevertheless forged ahead in trying to resolve the mountain of obstacles that laid ahead. But as time went on, the language barrier seemed less formidable, we began to make really significant, steady progress in dealing with the most intractable issues. The channel plan, measurement techniques, and other basic requirements needed to implement digital broadcasting gradually fell into place, and we made a major leap toward in implementing digital broadcasting.

At first I imagined that my whole two-year mission in Uruguay was going to be one long nightmare dealing with one intractable problem after another, but such was not the case. Looking back on the experience, I have nothing but fond memories of my time in Uruguay. I am currently back at my previous job hard at work on next-generation SHV (8K) television technology. Japan's ISDB-T initiative is well on the way to becoming a world standard, and I eagerly anticipate the day I can go back to Uruguay as a true amigo to serve in a similar technical support capacity.

Junji Matsuoka

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Fields of activity: TV Program Production Engineering

ISDB-T standard promotional activities in Southern Africa

I am extremely honored to receive the ITU-AJ Encouragement Award.

For nearly a year beginning in July 2012, I served in the Republic of Angola as a technical cooperation expert for the Japan International Cooperation Agency (JICA). I was engaged in a wide range of activities intended to encourage adoption of the ISDB-T standard in South African countries. ISDB-T is a digital terrestrial television standard developed in Japan that has been widely adopted in Latin America and across Asia. At the time I was serving in Angola, the deadline of analog television switch-off was approaching, which was specified by ITU International Agreement (GE-06) as June 2015. Most South African countries (other than the Republic of South Africa) had not determined the standard for digital terrestrial television, so the Japanese Government and other concerned organizations sought to persuade these countries to adopt Japan's ISDB-T standard.

During my service, I was based at the Angolan national broadcasting station, and promoted the advantages of ISDB-T to various South African countries by providing technical guidance for digital broadcasting, conducting demonstrations of ISDB-T test broadcasting, and presenting ISDB-T at international conferences. Due to these continuous efforts, the Republic of Botswana officially adopted ISDB-T as the first African country to do so in February 2013.

Extensive parts of Africa are still suffering from the lack of medical attention, food supply, water and electrical infrastructure which are essential for a sustainable life. When I first arrived in Africa, I questioned what role television could possibly have in such a low life standard. But by spending time with many local people, it became apparent that this question was unnecessary. Any place where people gather such as restaurants, barbershops, hospitals, and other public places, you will find a television set surrounded by a huge crowd of viewers, especially for soccer matches with fans rooting for their favorite teams. For these people, television offers great happiness and joy to their daily lives.

When broadcasting technology develops, it is critically important that the quality of programming also evolves. Since program production is my field of expertise, I am confident that the improvement of program production will continue to bolster and expand the television industry of Africa.

Shigehiko Yasumura

Fujitsu Limited
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Fields of activity: ICT solutions for education and healthcare

Modest beginnings but persistence pays off

Based on an APT program approach, Fujitsu Limited began work on ICT projects in the medical field in the Lao People's Democratic Republic in 2009, in collaboration with JTEC. JTEC had worked on a ICT Master Plan in the medical sector the previous year. This was the first time we participated in this type of international collaboration, and we learned a great deal through on-the-job involvement.

One critical task was to recruit an effective project manager who could follow through with complete system implementation in an unfamiliar overseas environment. Recruiting capable managers for Japanese international cooperation projects is a major challenge, even when seeking to recruit outside Japan.

In 2012, we visited the Republic of the Union of Myanmar (Burma) as part of a mission arranged by JTEC. At workshops, we observed keen interest regarding advanced ICT technology, and received requests to provide human resource development support to train personnel and bring them up to international standards.

After a period of "No Action Talk Only" imposed by "NATO," we were finally able to secure permission to establish Fujitsu ICT Laboratory at the University of Information Technology (UIT). At the same time, we opened a Fujitsu Yangon Branch that will collaborate with the UIT to enhance practical ICT education covering basic software development and system engineering. This last November, instructors held a system development workshop at the laboratory, and 20 students working in teams developed a hotel reservation system. They learned the importance of communication among team members to complete the task. Needless to say, this is an important lesson, and we hope these students will work with us in the future in Myanmar.

This relationship with UIT provided an opportunity to pursue an APT pilot project together with the KDDI Foundation to build an open-source software cloud platform and network for sharing computer resources and educational materials with the other computer-oriented universities in remote areas of Myanmar.

To ensure sustainability and maintenance of advanced technology, we are attempting to transfer technology to local engineers through on-the-job training in the pilot project. It may take a while for the technology to take hold and become well-established in society and the economy. We are committed to extend cooperation to ITU and APT member countries to move forward to achieve sustainable development goals.

(Note) JTEC: Japan Telecommunications Engineering and Consulting Service
APT: Asia-Pacific Telecommunity.

"Changing APT to Move Forward"

— Nomination for APT Deputy Secretary General —

In the coming decades, the Asia-Pacific region is a center of growth in many aspects and APT is in a position to consolidate regional voices, promote ICT development and facilitate capacity building in order to establish the "Digital Society" in this region. In addition to the existing activities, there are many potential functions and roles the APT can play for the future including practical coordination for effective policy and regulation based on analysis and discussion among members. Mr. Kondo has demonstrated his ability to make the APT move forward in his first term. He will do more in the second term. Here, the Government of Japan nominates him for the post of Deputy Secretary General of APT and would like to seek your support for him.

CURRICULUM VITAE

Name

Mr. Masanori KONDO

Present Title

Deputy Secretary General, APT

Date of Birth

January 7, 1967

Education

1990 • Keio University (BS in Economics)

1993 • The London School of Economics and Political Science (MSc in Economics)

PROFESSIONAL CAREER

2015 •	Deputy Secretary General, APT
2014 •	Assistant Director General, International Affairs, MIC
2013 •	Senior Director, International Cooperation Affairs, MIC
2011 •	Senior Director, International Economic Affairs Division, MIC
2010 •	Senior Advisor, International Policy Division, MIC
2008 •	Director, International Affairs Office, Postal Policy Division, MIC
2005 •	Director of the Research Department, Institute for Information and Communications Policy, MIC
2001 •	Deputy Director, International Organizations Office, International Policy Division, MIC
1996 •	First Secretary, Embassy of Japan in the Hashemite Kingdom of Jordan
1990 •	Joined the Ministry of Posts and Telecommunications (currently, MIC)

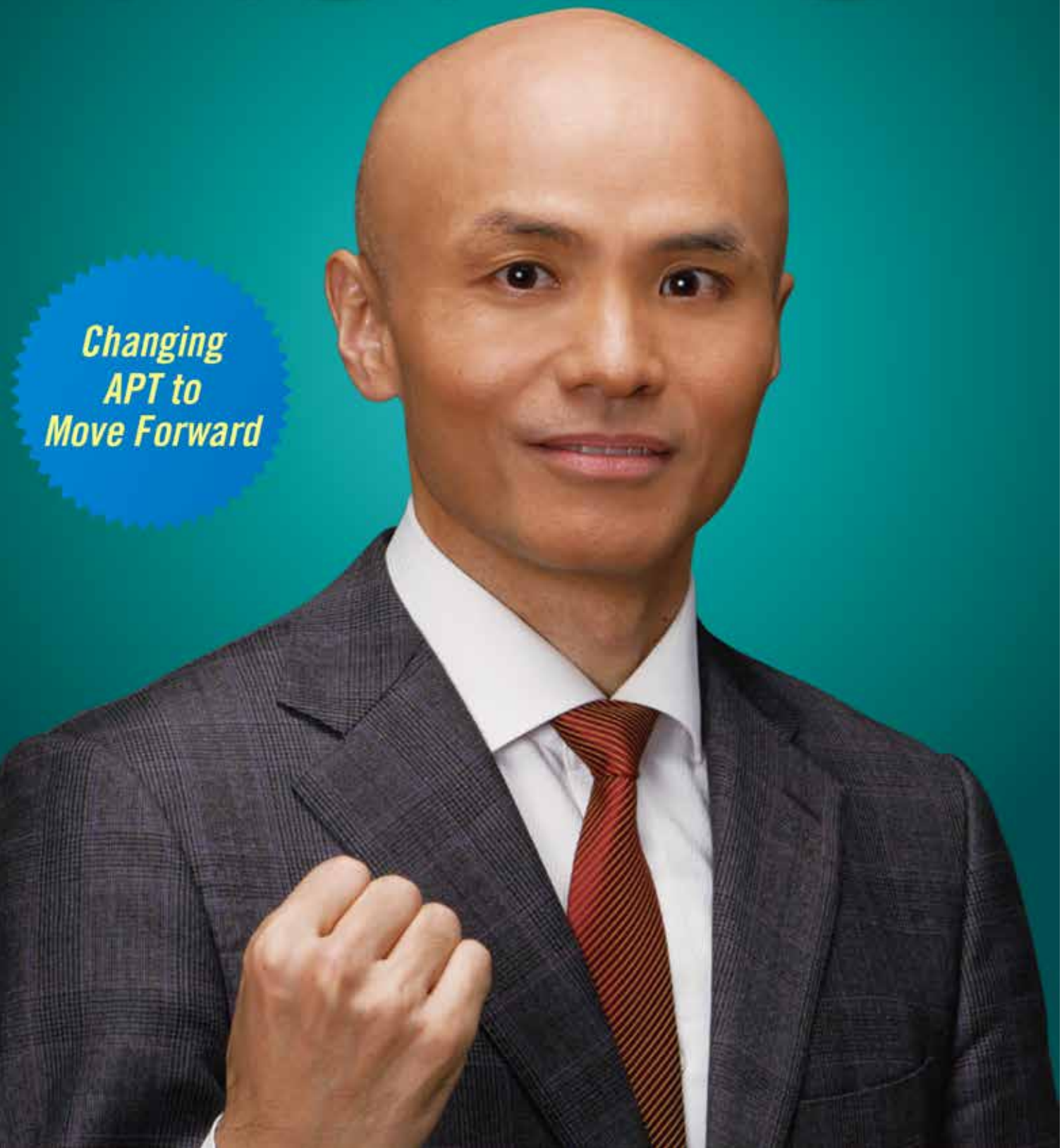
ACADEMIC CAREER

2013 •	Lecturer, Keio University, Japan
2006-2007 •	Visiting Scholar, Rikkyo University, Japan
2006-2007 •	Visiting Scholar, Obirin University, Japan
2005 •	Lecturer, Waseda University, Japan
2004-2005 •	Associate, Harvard University (Weatherhead Center), U.S.A

Candidate for the Post of Deputy Secretary General

Masanori KONDO

Changing APT to Move Forward



New Breeze
平成二十九年七月十日発行（年四回一、四、七、十月の十日発行）第二十九巻第三号（通巻百十五号）

定価　一冊　一、六二〇円（本体価格　一、五〇〇円、消費税　一二〇円）　年間購読料　六、四八〇円（本体価格　六、〇〇〇円、消費税　四八〇円）