Global Standardization Activities

Report on ITU-T SG2 Standardization of Telecommunication Numbering

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Abstract

The Working Party (WP) 1 of the International Telecommunication Union Telecommunication Standardization Sector (ITU-T) Study Group 2 has been engaged in the allocation and management of international telecommunication numbering, naming, addressing, and identification resources. Due to the recent migration to Internet Protocol networks and the rapid development and globalization of Internet-of-Things services and over-the-top services, the issues have been diversified. Since the problems of fraud by spoofing by telecommunication number misuse have increased, it has become an urgent topic for discussion. In the WP2, they discuss the issues concerning network management.

This article mainly reports on the telecommunication numbering and identifications studied in WP1, subjected by the World Telecommunication Standardization Assembly Resolutions.

Keywords: telecommunication numbering, IoT numbering, number spoofing

1. WTSA Resolutions on telecommunication numbering and identification

World Telecommunication Standardization Assembly (WTSA) is the primary meeting of the International Telecommunication Union Telecommunication Standardization Sector (ITU-T), and its output, WTSA Resolutions, give direction of the activities of ITU-T. Resolution 2 defines the responsibilities and obligations of each Study Group (SG) and the other Resolutions are materialized further and mapped to the studies in each SG. The following are the WTSA Resolutions relevant to telecommunication numbering and identifications discussed in SG2 Working Party (WP) 1 [1].

Extraction of WTSA Resolutions relevant to telecommunication numbering and identifications

- Resolution 20: Procedures for allocation and management of international telecommunication numbering, naming, addressing, and identification resources
- Resolution 29: Alternative calling procedures on international telecommunication networks
- Resolution 49: ENUM*
- Resolution 60: Responding to the challenges concerning the evolution of the identification/numbering system and its convergence with Internet Protocol (IP)-based systems/networks
- Resolution 61: Countering and combating misappropriation and misuse of international telecommunication numbering resources
- Resolution 64: IP address allocation and facilitating the transition to and deployment of IPv6
- Resolution 65: Calling party number delivery, calling line identification, and origin identification information
- Resolution 70: Telecommunication/information and communication technology accessibility for persons with disabilities
- Resolution 88: International mobile roaming
- Resolution 91: Enhancing access to an electronic repository of information on numbering plans

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* ENUM: E.164 Number Mapping; the framework of mapping of IP address and telecommunication number.
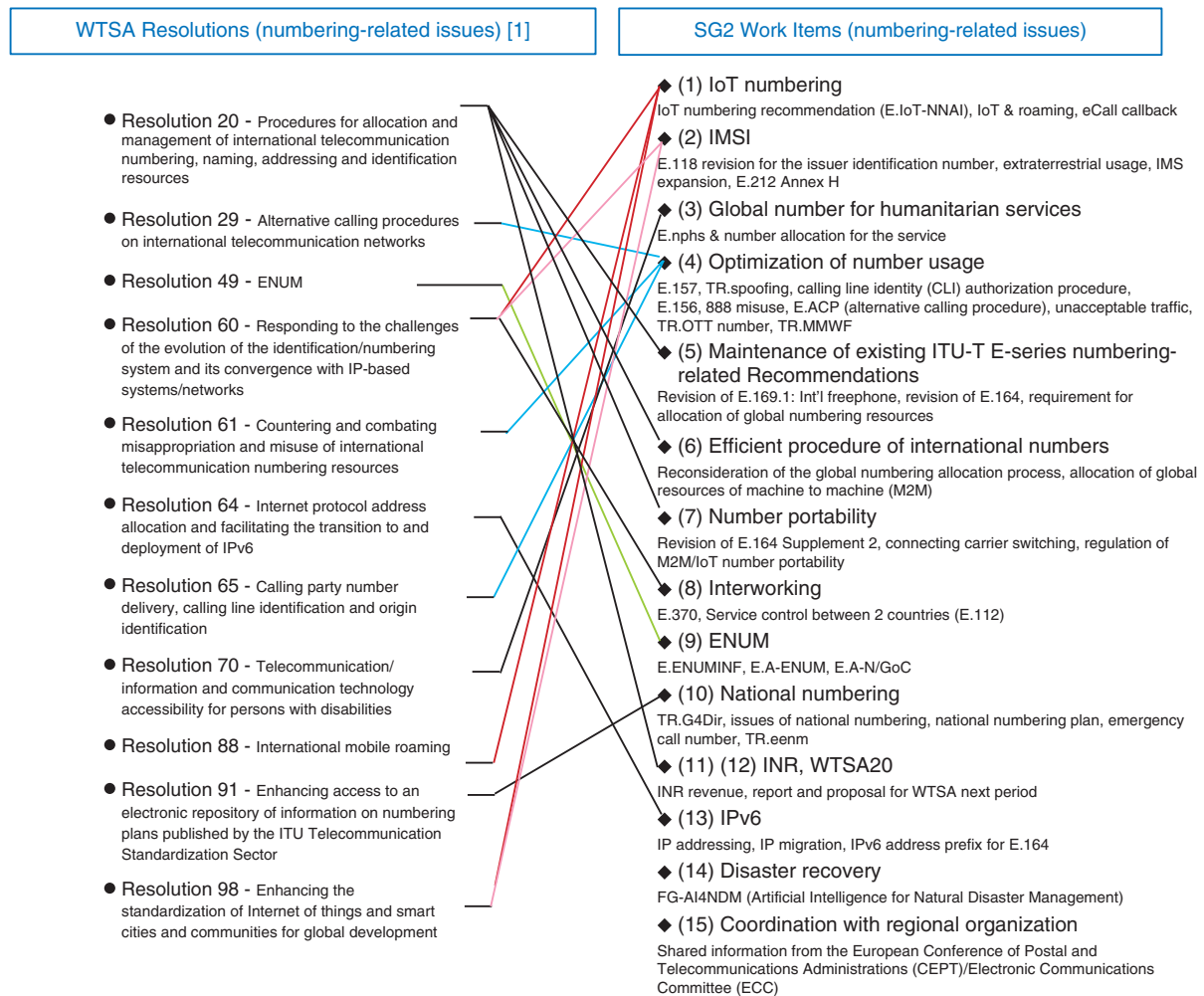
Fig. 1. Mapping of SG2 studies and WTSA Resolutions.

published by the ITU-T
• Resolution 98: Enhancing the standardization of Internet of Things (IoT) and smart cities and communities for global development

2. Issues under study in SG2 WP1

Issues with telecommunication numbers and identifications under study in ITU-T SG2 WP1 are diversifying and categorized into items (1) to (15) listed in the next subsection. **Figure 1** shows the subdivision of these individual issues and their relation to the WTSA Resolutions. The issues concerning (1) the allocation of international numbers for IoT and (4) the status of optimizing the use of numbers that are actively discussed are introduced in Section 3. Section 4 presents a list of the recommendations, includ-

ing some drafts, based on the studies of the issues.

Categorization of the studies in SG2

(1) Allocation of IoT international numbers, (2) Allocation of international mobile subscriber identity (IMSI) for mobile subscriber identification, (3) Global number for humanitarian services, (4) Optimization of number usage, (5) Maintenance of existing ITU-T E-series numbering-related Recommendations, (6) Efficient procedure of international numbers, (7) Number portability, (8) International interworking, (9) ENUM, (10) Issues with national numbering, (11) Revenue from International Numbering Resources (INR), (12) Input to WTSA20, (13) IPv6, (14) Disaster recovery, (15) Coordination with regional organization.
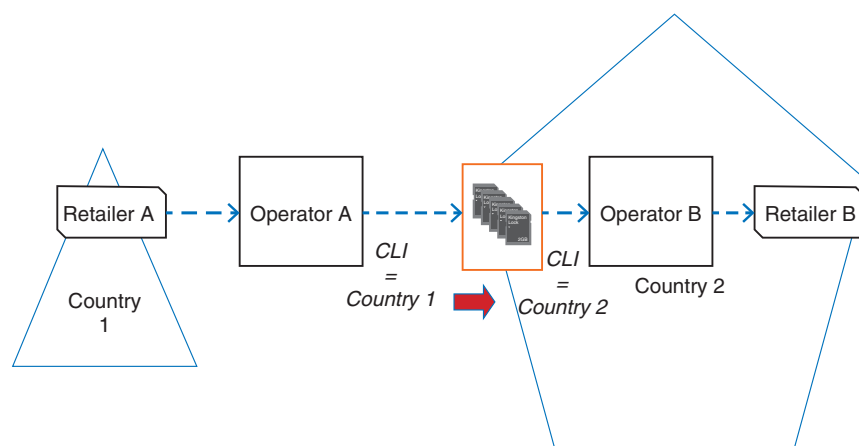
Note: Example of falsification of international call charges
The calling number (CLI): Country 1 is replaced with Country 2 by SIM box etc. between the origination country (Country 1) and termination country (Country 2).

Fig. 2. Example of number spoofing during an international call (referred from TR.spoofing).

3. Active issues

Even though the issues are diversifying due to the recent migration to IP networks and the rapid development and globalization of IoT and over-the-top (OTT) services, the items actively discussed most for standardization are the studies on the proper use of telecommunication numbers. The issues with IoT numbering have also been high priority for discussion. The status of the two studies are introduced on the basis of the results from the 9th meeting held from May 31 to June 11, 2021.

3.1 Optimization of number usage

The items being actively discussed most for standardization are the studies on the proper use of telecommunication numbers.

3.1.1 Approval of the revised recommendation (E.157): International calling party number delivery

Since the background has enhanced to include the services on the Internet and OTT, which are beyond the current basis of public switched telephone networks and public land mobile networks, the discussion regarding the revised E.157: International calling party number delivery in the meeting has diversified due to the opinions regarding scope, level of details, degree of obligation, etc. The editor of the UK then elaborated to coordinate the group and brought the solution with agreement to edit the recommenda-tion, i.e., removing the section of preventing individual cases of spoofing to the separate technical report based on the general principles.

3.1.2 Consent of TR.spoofing

As mentioned in 3.1.1, countering spoofing is a new item separated from E.157 describing the methods of preventing individual cases of spoofing. It covers the mechanism of number spoofing caused by SIM (subscriber identification module) boxes etc., internationally carried out by OTT operators, and STIR/SHAKEN (Secure Telephony Identity Revisited/Signature-based Handling of Asserted Information Using Tokens), which is being introduced in the United States as a countermeasure against number spoofing, including comparison with blockchain technology etc. **Figure 2** shows an example of number spoofing in international communications.

3.1.3 Discussion on creation of technical report on Wangiri

Sudan proposed a new Work Item to create a technical report on methodologies to mitigate Wangiri fraud (i.e., a callback scam). The proposal was approved to create a new Work Item of TR.MMWF (methodologies to mitigate Wangiri fraud). Interactive voice response facility, using artificial intelligence technology, number blocking, and sharing of blacklists are being introduced for the technological method to mitigate Wangiri and number administration.

3.1.4 Discussion on OTT

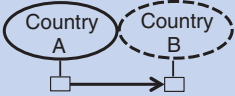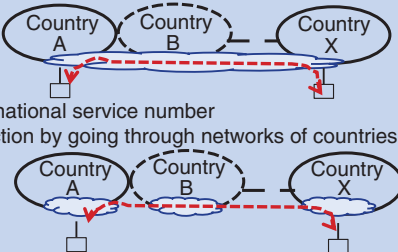As a fraudulent case associated with the use of

	Geographic number	Non-geographic number
Allocation	ITU to National Regulatory	Directly from ITU to service providers
Structure	Country code + national number (Ex. Japan 81+ national number)	1. International network number (ex. 883 (international network number) + subscriber number) 2. International service number ➡The direction to apply for IoT numbering (ex. 878 (UPT number) + subscriber number)
Network structure & routing image	 • For temporary international roaming • Permanent use in other countries is out of scope (extra-terrestrial use)	1. International network number Connection with a network through countries 2. International service number Connection by going through networks of countries

Fig. 3. International numbers for IoT services.

E.164 numbers for OTT services that are deployed on the Internet, the UAE proposed to start studying countermeasures for cases in which mobile numbers and fixed numbers are used to authenticate and launch apps such as WhatsApp. It was agreed to contact the OTT application provider through the ITU Telecommunication Standardization Bureau (TSB) regarding this issue. In addition, the United States proposed to encourage WhatsApp to participate in future discussions on this matter.

3.2 Standardization of allocation of IoT international numbers

3.2.1 Background of studies on IoT numbering recommendation: E.IoT-NNAI (naming numbering addressing and identifiers)

This issue started with the UK editor as one of the major issues for this study period for the study to assign appropriate international numbers in response to the rapid increase in global IoT services.

Initially, the eCall service, which is standardizing emergency calls within Europe, is specified as a use case, and it was decided to be used as part of the international service number (E.164-number for global services) applied to universal personal telecommunication (UPT) services. It is regarded that the 878 number allocated for the global mobility services as

UPT services will be appropriate usage for IoT since the usage of the number is currently still low. However, the roaming of the existing national mobile number (E.164-number for geographic areas) and international network numbers (E.164-number for networks), such as 883, have been applied for currently deployed eCall and other various global IoT services, while the studies of IoT numbers continue. Such difference in number usage also needs discussion. **Figure 3** illustrates the IoT international numbers.

3.2.2 Draft recommendation of E.IoT-NNAI at the 9th meeting

At the 9th meeting, the following contributions were input, and the discussion will continue on the basis of the draft reflecting the inputs.

- NTT proposed Annex-A in the draft recommendation describing the number portability of IoT services. The proposal was agreed, and the studies of carrier switching of service providers will start with this draft for the next meeting.
- Malta proposed to include that the IoT number 878 should not be used for existing voice and short messaging services in the E.IoT-NNAI Recommendation, and it was decided to proceed with further studies.
- Russia proposed a list of issues such as definition

Table 1.   ITU-T SG2 Recommendations and relevant WTSA Resolutions.

Recommendation number	Recommendation title	Relevant WTSA Resolutions
E.112	Arrangements to be made for controlling the telephone services between two countries	Resolution 60
E.118	The international telecommunications charge card	Resolution 60, 98
E.157	International calling party number delivery	Resolution 29, 61, 65
E.164.1	Criteria and procedures for the reservation, assignment, and reclamation of E.164 country codes and associated identification codes	Resolution 20
E.370	Service principles when public circuit-switched international telecommunication networks interwork with IP-based networks	Resolution 60
TR.disab	Specification of an international numbering resource for use in the provisioning of services for persons with disabilities and persons with specific needs	Resolution 70
E.nphs	Application of E.164 numbering plan for humanitarian services	Resolution 70
E.dit	Deemed impermissible traffic	Resolution 29, 61, 65
E.IOT-NNAI	IoT naming numbering addressing and identifiers	Resolution 60, 98
E.164 Sup.2	Number portability	Resolution 20
TR.EENM	Guidelines for effective and efficient national numbering resources administration	Resolution 91
TR.Spoofing	Countering spoofing	Resolution 29, 61, 65
TR.MMWF	Methodologies to mitigate Wangiri fraud	Resolution 61
TR.OTTnum	Current use of E.164 numbers as identifiers for OTTs	Resolution 61, 65
E.ACP	Alternative calling procedures	Resolution 29
E.ENUMINF	Differentiating between ENUM and infrastructure ENUM	Resolution 49
TR ERIN	Guidance for the Director TSB as stated in Resolution 91 (Hammamet 2016) "Enhancing access to an electronic repository of information on numbering plans published by the ITU Telecommunication Standardization Sector"	Resolution 91
TR.INCCBS	Implementation of network colour codes in the border sites	Resolution 61
TR.DOTT	Definitions for telecom and telecom interconnection	Resolution 60
E.A-ENUM	Principles and procedures for the administration of E.164 country codes for registration into the domain name system	Resolution 49
E.A-N/GoC	Administrative procedures for ENUM for E.164 country codes and associated identification codes (ICs) for networks and group identification codes (GICs) for groups of countries	Resolution 49

of terms, regulation of each field of IoT numberings, number portability, and global/domestic role of number management, and it was decided to proceed with further examination.

4.   Recommendation of the output of the studies

Table 1 lists the recommendations that will be the output of the examination of various issues introduced in Section 2. The WTSA Resolutions associated with each recommendation are also listed.

5.   Conclusion

Along with the development of telecommunication

services and changes in network formats, the roles of numbers and identifiers are changing, and SG2 has a variety of activities from short-term issues that require immediate response to medium- to long-term issues. While observing these trends, we will continue to engage actively in activities such as standardization activities related to numbers and identifiers with discussions at the TTC (Telecommunication Technology Committee) Numbering Planning Expert Committee in Japan.

Reference

[1]   WTSA Resolutions of ITU-T, https://www.itu.int/pub/T-RES

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He joined NTT Advanced Technology Corporation in 2001 after he had engaged in the research and development of voice and data switching systems at research section, business section, and international business section in NTT. Since then he has been engaged in the investigation and standardization of telecommunication numbers and related technologies by attending ITU-T SG2, Internet Engineering Task Force, European Telecommunications Standards Institute (ETSI), Third Generation Partnership Project (3GPP), and CEPT ECC Working Group Numbering and Networks, and by visiting number NRAs (national regulatory authorities) in the US and European countries every year.