**Session 4: Numbering, addressing and identification**

Moderator: Mr Philip Rushton (Chairman, ITU-T SG2, DCMS, United Kingdom)

**Executive summary of Session 4**

This session addressed the issue of numbering, addressing and identification via providing status of relevant topics in SG2, SG11 and SG17 and highlights of important issues including NNAI for IoT, future of numbering and identification, countering and combating NNAI misuse, future requirements of the governance of directly assigned NNAI resources by TSB, anti-fraud management, distributed ENUM model for IMS and the protocol used in the model, strong authentication in “Trust over IP” decentralized identity based on Distributed Ledgers and 5G Identity Trust Frameworks. Strategies were proposed, in particular collaboration/cooperation/in liaison with other SGs, SDOs and organizations.

NNAI is the core element of the network, which is addressed from various aspects linked with each other. NNAI issue is a very fundamental issue and need to be considered at early stage.

Sharing of knowledge of 5G/Slicing/Machine Learning would be the basis for further understanding their NNAI requirements. There was no conclusion as to whether new NNAI was required, although the hard part of any new scheme is not to specify it, but to implement it. Additional requirements of 5G for the use of this distributed ENUM model were sought and it was said that this model will still need for VoLTE/ViLTE interconnection.

In looking at other uses of identifiers, are the two (E.164 and E.212) already specified identifiers sufficient and if they are not, should ITU-T SG2 be considering other identifiers in terms of the general principles that such identifiers should seek to satisfy, whether there is a cost recovery element for the TSB, and the extent to which any future identifier is new, and therefore independent of existing NNAI schemes.

 Is SG11’s model sufficient for future interconnection arrangement. NNAI perhaps is not the most future looking topic. But the management and secure use of NNAI is where ITU can taking a leading role and go forward. Closer collaboration and cooperation on issues of Numbering, naming, addressing and identification for IoT, 5G, network slicing and other technology trends; ENUM, caller ID spoofing, and identity management are encouraged.

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**Summary of Session 1 presentations and discussion**

1. **Numbering, addressing and identification** - **Mr Philip Rushton** (UK), Chairman, ITU-T SG2.

The issues raised in the presentation from activities occurring in SG2 reflect topics that are current and immediate in discussions by various regulators and associated bodies that are impacted by NNAI.

SG2 has been discussing the relevance of known NNAI in relation to IoT from several aspects. The first aspect is the work on draft recommendation E.NNAI-IoT that seeks to not only understand the relationship of regulated identifiers, both directly and indirectly assigned by ITU, to proprietary identifiers associated with devices but also to consider the relationship of such requirements to existing identifiers. ITU-T SG2 has seen an increased demand in the assignment of global, directly assigned, resources for such use. This demand has provided the use cases for the development of E.NNAI-IoT “Internet of Things Naming Numbering Addressing and Identifiers” as the request to ITU-T SG20 for use cases of SG20 remains unanswered. Going forward, the use of global resources will be considered as a general authorisation regime rather than a licencing regime and further collaboration with other SDOs including SG20 will be pursued. There is also a draft technical report on overview of IoT scheme under development in SG2

SG2 has agreed new work items on OTTs, and has sought to understand what is meant by impermissible traffic. SG2 has agreed to new uses of global resources, specifically E.212 for by other SDOs. These enhancements reflect the requirements of industry members, and have been reflected in the questions and has required liaisons with other SGs (11, 13, 16, 17 and 20), SDOs and organizations (ISO, IETF and GSMA).

Also countering and combatting NNAI misuse remains a very active and relevant issue in ITU-T SG2. Progress is being made on relevant ITU-T recommendations (ITU-T E.156 and E.157, on reports of misuse and calling party delivery respectively) as well as reflecting unilateral actions taken by member states including Uganda, US and UK. A new work item has been created on spoofing that is allied to this activity. As part of the actions to support this activity, the strategy recognises the different responsibilities between directly assigned and indirectly assigned resources. Furthermore, there is a need to continue to work with other organisations that are operational in delivering telecoms, as well as identifying a direct method of communication between responsible national entities that administer resources that are thought being misused. Allied to this issue is the need to raise awareness of the existence and structure of the operational bulletin.

Looking at the future requirements of the governance of directly used NNAI resources addresses specific elements associated with mobility, namely IMSI and IIN. In looking at other uses of identifiers, are these two already specified identifiers sufficient and if they are not should ITU-T SG2 be considering other identifiers in terms of the general principles that such identifiers should seek to satisfy, whether there is a cost recovery element for the TSB, and the extent to which any future identifier is new, and therefore independent of existing NNAI schemes.

One issue that has been well discussed in SG2 is telecom finance and anti-fraud management. This is an issue that remains a hot topic that runs into millions of what ever currency and has a need to be addressed by operational management and the use made of NNAI. Work continues to discuss with other SGs and SDOs and law organisations. Definition of what is telecom fraud remains an active topic to review the E.156 supplements that exist as well as the outreach alluded to above.

It was mentioned that the parameters of 5G are much broader which makes it even harder to identify objects in 5G. It was also pointed out sharing of knowledge of 5G/Slicing/Machine Learning would be the basis for further understanding their NNAI requirements. The hard part for a new scheme is not to specify it, but to implement it. NNAI issue is a very fundamental issue and need to be considered at early stage. The importance of collaboration and cooperation with Study Groups, SDOs and organizations were emphasized and proposed to be raised to TSAG and TSAG Chairman also recognized this is an extremely important issue and planned to address this discussion in the SGLA in his opening remark for the coming TSAG issue.

1. **Emerging trends and issues in identity management** - **Ms Miho Naganuma** (NEC, Japan), Vice Chair, ITU-T SG17.

The presentation provided summary of mandates of SG17, activities of Q10/7 and JCA-IdM. SG17’s focus is on foundational work on identity management, including basic framework and architecture, taxonomy and terminologies, and risk based authentication adopted globally. Joint coordination activities (JCA-IdM) and collaboration work with SDOs are on-going. The presentation introduced Q10/7 emerging trends including strong authentication in “Trust over IP” decentralized identity based on Distributed Ledgers and 5G Identity Trust Frameworks. It was said that 5G Identity solutions enhance trust in peer to peer decentralized identity network interactions resulting in more secure identity based services. It is proposed to expand IDM terms and definitions to include emerging technologies, focus on NO password use cases and implementation and work on Interoperable Decentralized identity management system. The presentation was concluded by recognizing that it is an exciting time for identity management and ITU has the ability to capitalize on maturing technologies for solving security issues that has plagued traditional identity management systems.

During discussion, it was clarified that as to numbering and identification, SG17 is more focus on security aspect while SG2 is more on a scheme itself. The importance of cooperation and collaboration issue was emphasized again.

1. **Distributed ENUM networking for interconnection** - **Ms Xiaojie Zhu** (China Telecom, China), Vice Chair, ITU-T SG2.

The presentation “Distributed ENUM networking for interconnection” describes the background and status of the SG11 activities related to interconnection of the VoLTE-based networks, particularly ENUM issues.

Due to complexity of the hierarchical ENUM architecture defined by GSMA, the implementation of the current ENUM approach is very limited. However, in the “all over IP” era, when operators interconnect with each other using IP-based networks, there is a need of mapping between E.164 and URI. In this regard, SG11 considered flat distributed ENUM’s model which might be easily implemented on the operators’ level.

Since 2017, SG11 has been developing a new ENUM model to be used for IMS-based networks. This presentation highlights the key functional elements of the new model, signaling requirements for its implementation and new protocols. The standardization is supposed to be completed in July 2020.

Currently, SG11 continues close collaboration with SG2 and SG13 on this particular issue and invites all interested stakeholders to join the discussion in order to improve the proposed solution which can speed up the implementation of VoLTE/ViLTE interconnection. Also, SG11 encourages all ITU Members to deploy VoLTE/ViLTE interconnection using distributed ENUM system. In addition, SG11 continues collaborating with GSMA to promote the deployment of VoLTE/ViLTE interconnection.

Despite the current SG11 research on this issue, SG11 encourages all SGs and all ITU members to consider whether there is a need to specify some additional requirements with regard to implementation of ENUM distributed solutions for VoLTE interconnection. The comments of the SGLA are welcome.

During the discussion, it was clarified that the security issue existing in the ENUM hierarchical structure is referring to operators’ customer data exposure to third parties. It was noted that SG2’s work on Number Portability involves use of ENUM-like mechanism. SG2 will consider the latest version of draft Q.DEN\_IMS in its future meetings and liaise with SG11 as necessary. Additional requirements of 5G for the use of this distributed ENUM model were sought and it was said that this model will still need for VoLTE/ViLTE interconnection.