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| **Keywords:** | SGLA; study group; focus group; leadership; assembly; structure; collaboration; 5G; ML; |
| **Abstract:** | This TD provides the summary record of the Study Group Leadership Assembly, convened by the TSB Director in Budapest, 9-10 September 2019. |
| **Action:** | TSAG is invited to consider this document. |

# Executive summary

The second Study Group Leadership Assembly took place alongside ITU Telecom World in Budapest, 9-10 September 2019.

It brought together more than 50 participants, including Chairmen, Vice-Chairmen, Working Party leaders and Rapporteurs of TSAG and the eleven ITU-T study groups and eight focus groups, to discuss technical matters of growing strategic relevance to ITU standardization, and to identify opportunities for collaboration.

Topics considered by the assembly included the standardization needs of AI-enabled multimedia systems for health and vehicles; 5G systems and their enablers, including transport networks, network slicing, fixed-mobile convergence; the use of machine learning to manage and orchestrate networks and provision network resources and deliver data-driven networking and services; numbering, naming, addressing and identification requirements and resource assignment; and security, privacy and trust.

A year ahead of the next World Telecommunication Standardization Assembly (WTSA-20), participants reiterated the need to strengthen collaboration and cooperation among all ITU-T activities, and to share information and results more regularly and effectively. Participants also stressed the crucial role of TSAG and its rapporteur groups in assessing to what extent the current study group structure and existing mechanisms for internal and external collaboration can meet the needs of the sector.

Areas identified for closer collaboration, and for the standardization sector to take a lead in, included:

* Use of AI and machine learning for networks and services;
* Network slicing (e.g., diversity of network slices, their management and operation, identification and security requirements);
* Network functions and capabilities at the boundary of data plane, control plane and management plane (orchestration);
* A framework to benchmark AI algorithms with respect to their performance and robustness;
* Applications enabled by AI systems in health and in autonomous and assisted driving;
* Numbering, naming, addressing and identification for IoT, 5G, network slicing and for other technology trends;
* Identity management, ENUM, caller ID spoofing, and mitigation of other SS7 vulnerabilities;
* Security, privacy and trust for networks and network functions in the 5G era;
* Cybersecurity threat intelligence;
* Energy efficiency aspects and climate change; and
* Architecture considerations and methodologies, including orchestration of various functions.

The five thematic sessions of the Study Group Leadership Assembly are summarized in Annex in more detail.

Agenda, presentation material and list of participants can be found at <https://itu.int/en/ITU-T/studygroups/2017-2020/Pages/sgla.aspx>.

Annex A – Summary of presentations and discussions[[1]](#footnote-1)

## A.1 Session 1: Multimedia coding, systems and applications – “AI-enabled multimedia systems for health and vehicles”​

Moderator: Noah Luo, Chairman, ITU-T Study Group 16; Huawei, China  
ITU/TSB Lead: Stefano Polidori

Executive summary

This session covered emerging topics related to standardization of multimedia systems and applications, especially the application of artificial intelligence (AI) to enhance healthcare and transportation, and increase road safety.

The session was moderated by Mr Noah Luo, Chairman of ITU-T Study Group 16 (SG16), and witnessed presentations delivered by experts from the ITU-T Focus Groups on AI for Health (FG-AI4H) and Vehicular Multimedia (FG-VM). In addition, new proposals emerging from the AI for Good Global Summit to define a minimal acceptable performance threshold for AI systems deployed on our roads were presented and discussed.

It was highlighted that, over the past decade, SG16 has expanded its horizons to respond to the needs of various industries. Emerging topics, including studies on AI to support autonomous driving and healthcare applications were discussed. The discussion highlighted that a standardized framework to benchmark AI algorithms would be essential in the field of health and autonomous driving to ensure the performance, robustness and generalizability of these algorithms. Panellists, audience and moderator also stressed the need for collaboration, not only among ITU-T study groups, but also among ITU-T and other standardization organizations to advance the discussion on the topics discussed.

### A.1.1 Challenges in Vehicle Domain Service for automated driving and connected vehicles - Mr Kaname Tokita (Honda), Vice-chair of FG-VM, as well as Convener of ISO TC22/SC31/WG8.

In the next generation of vehicle-to-vehicle (V2V) services, vehicles need to communicate with other vehicles bi-directionally, as opposed to unidirectional server client communication. Therefore, a flexible network topology will be required. In this context, the Vehicle Domain Service (VDS), which is an application of the vehicle gateways supporting automated driving and connected vehicles, enables a ‘master vehicle’ to communicate with surrounding vehicles.

Realizing VDS implies dealing with challenging requirements, such as a flexible and secure network topology with acceptable performance. To achieve this, a secure, scalable, speedy lightweight protocol implementation is being explored by SG16.

Another challenge is vehicle identification. To address this, various SDOs are discussing approaches, including the use of vehicle IDs vs. service accounts. These discussions include considerations of a vehicle testing and certification process and the ID/account management.

It was mentioned that SG16 is considering the establishment of a joint project team with ISO involving Q27/16 and ISO TC22/SC31/WG8 to collaborate on the VDS standardization. The discussions following the presentation highlighted the importance for ITU-T to further collaborate internally (e.g., with SG17 on security and SGs 2 and 20 on identification) and externally with ISO TC22, SAE International, and other parties.

### A.1.2 AI systems in autonomous and assisted driving (AI4AD) - Mr Bryn Balcombe (Roborace), Autonomous Drivers Alliance (ADA)

AI can play a significant role to reduce road deaths and injuries (SDG 3.6), whilst also encouraging safe, affordable, accessible and sustainable transport systems (SDG 11.2). However, the widespread, socially acceptable, deployment of AI systems on our roads is dependent upon technology achieving public trust.

The #AIforGood community recognized the need to perform pre-standardization efforts in this field within an international platform; including governments, non-governmental organizations, policy makers, SDOs, industry forums and consortia, companies, academic institutions, research institutions and other relevant organizations.

This platform, e.g., an ITU-T Focus Group, could study services and applications enabled by AI systems in autonomous and assisted driving, in close relationship with existing work on vehicle communications in SG16 and leveraging ITU’s longstanding partnership with UNECE’s working parties on road safety and vehicle regulations.

To realise AI’s potential to reduce the 1.3 million annual road deaths, it is also important to define a minimal acceptable performance threshold for AI systems deployed on our roads. In addition, a continuous monitoring of the AI system in the vehicle would be needed in order to ensure safety of the travellers during their entire journey, as corruption of data could jeopardize the functioning of the AI system. This is a new topic and a new approach may be needed, which may require answering a set of new questions, including how much autonomy we should leave to the AI? How to ensure the privacy of the data used by the AI? etc.

The leadership assembly recognized the need of an international platform on **“AI for Autonomous & Assisted Driving (AI4AD)”** and encouraged SG16 to explore opportunities in coordination with other ITU-T Study Groups that may have relevant work in this field. At the same time the need to work with external organizations is also to be analysed and identified.

### A.1.3 AI and Machine learning for health - Mr Marc Lecoultre (MLlab.AI, CH), Chair of WG on Data and AI solution ​handling, FG-AI4H; Considerations on the Focus Group on AI for Health (FG-AI4H): From the perspective of countries participating – Ms Shan XU (CAICT, CHN), Vice-Chair of FG-AI4H

The above two presentations provided an overview on studies related to AI for health. The Focus Group on AI for Health (FG-AI4H) was established by SG16 in July 2018, in collaboration with the World Health Organization. It is working towards building a standardized benchmark framework for AI for health algorithms. This standardized benchmark is fundamental in the health field to ensure the performance, robustness and generalizability of the algorithms.

One of the objectives of the FG-AI4H, is to evaluate the benchmarking process and to allow regulatory bodies and other stakeholders to evaluate different kind of solutions in the most objective way possible. Examples of application domains are: early detection, diagnosis, and risk identification, treatment decision support.

A major limitation to date remains the availability of data and the ability to aggregate datasets from different sources. Harmonization or standardization of data used for the learning phase of AI models would be a significant achievement.

As the healthcare field covers a multifaceted complex array of topics, ranging from medical specialities and regulatory aspects to complex technical issues, the focus group requires to keep in place a focused organizational structure in order to reach actionable deliverables. Currently, the group is composed of 13 vertical topic groups and five horizontal working groups.

The Focus Group was invited to harmonize the differing perspectives of participating countries, which sometimes have varying prioritization and expectations, through the constituent topics of the focus group.

Concerns related to confidentiality and data protection were raised in the discussion. In response, advances of technologies can help meet this challenge and mitigate the threats. One example based on mathematical theoretic developments known as homomorphic encryption was mentioned to have great potential for protecting user data in the context of benchmarking, if enabling standards and libraries are developed.

## A.2 Session 2: IMT-2020/5G systems – “Transport, slicing, FMC”

Moderator: Bilel Jamoussi, Chief, ITU-T Study Groups Department   
ITU/TSB Lead: Hiroshi Ota

General

Three presentations related to IMT-2020/5G systems were given. Each presentation was followed by active discussions on wide area of technical as well as non-technical issues. This report summarizes presentations and discussions.

### A.2.1 Transport SDN to support 5G (Scott Mansfield, SG13 Vice Chair)

After introducing Transport Network Building Blocks (SG13 and SG15), transport SDN and related ecosystem, this presentation showed that a foundation should be built through continued coordination within the 5G ecosystem.

Questions asked for discussion:

• What is new about the idea of Network Slicing, and how will it enable efficient build-out of networks to support ubiquitous 5G?

• What is the most important technological advancement needed to realize the promise of frictionless communication?

• What will be the regulatory impact of AI controlling the routing of traffic in global networks?

• What would be the optimal structural/procedural arrangement to continue studies on 5G in ITU-T, or are the current Questions in SGs 13 and 15 sufficient, pending their possible revision?

Discussion

Since the standards on transport networks involve several SGs (SG2, SG11, SG12, SG13 and SG15), importance of coordination and clear division of responsibilities among these groups were emphasized. TSAG should be used to solve this issue before WTSA-20. Technical discussion is important, but discussion on ITU-T structure is also important.

Impact of slicing on numbering/identification was asked, but need for identifying a slice should be clarified first.

Current division of SG13 and SG15 seems appropriate. However, appropriateness of SG13/SG15 work division in the era of SDN was asked since most of the network functions will be realized by software. Applicability of slicing, which is realized by software, to transport was also asked. Clarification of slicing related to functions of transport layer is necessary. Issues related to single/multi controllers and issues on single/multi layers should also be clarified.

Need for consideration of security was indicated. The meeting noted.

JCA-IMT2020 is working well connecting many related groups and promoting collaboration among these groups.

### A.2.2 Emerging Challenges and New Research Directions: A Perspective from Network 2030 (Richard Li, Chairman, FG-NET2030)

This presentation indicated the importance and lack of enough attention to wireline data communication networks, which should be integrated with “Space Internet”. It also showed emerging applications and new requirements (High precision in services, Holographic media, ManyNets Infrastructure, Moving beyond best effort and Advanced Access Technology). It indicated that now it is exactly the time to start off a new wave of innovations with a new data plane for wireline data communication networks and SG13 should start on data plane followed by SG11 on control plane.

Questions asked for discussion:

• Future user planes or data planes including its underlying technologies and solutions

• New, and better to be unified, architectures of ManyNets and Digital Twins, especially for convergence of terrestrial and satellite networks across the earth, sky and ocean

• Future Control Plane for Signaling and Control in Support of Future Data Planes

• Futuristic Media and Application-Aware Networking Technologies and Solutions

Discussion

Both wireless physical layer and TCP retransmit packets when packets are lost, which leads to waste of bandwidth. It is not good for IoT. VC (virtual circuit) switching, which was developed in ATM era, was suggested as an alternative, but it does not scale.

Current work division between data plane, control plane and management plane is fine. However, there will be more overlapping in future. In addition, new capabilities over networks should also be considered. Introducing “intelligence” into network is an example. This type of “new thinking” is important, in particular, for new applications.

Not all wireline networks are left behind. While the IP/MPLS network is left behind, optical networks and layer-two TSN are not. ITU-T SG15, IEEE 802.1 and IEEE 802.3 are actively developing standards on wireline, e.g., on OTN (Optical Transport Network) and TSN (Time Sensitive Network).

Considering “nano networks” was suggested. More clarification is necessary on this issue.

Importance of consideration of security was indicated. It is under consideration, but it is still very early stage.

Since future network includes many issues, which cannot be solved at once, importance of step by step approach was emphasized.

### A.2.3 Arising Issues on Migration to IMT-2020 (Engr Charles Chike Asadu, University of Nigeria, presented by Elliot Kabalo, Q5/13 co-Rapporteur)

This presentation showed objectives and use cases of IMT-2020 as well as the position of FGML5G on development of IMT 2020. It emphasized the importance of participation of developing countries in evolution of new technologies. It also touched radio frequency issues.

Questions asked for discussion:

• How many countries have approved spectrum for the trial of 5G services, particularly in developing countries

• What are the indices to determine implementation policies, projects and programmes aimed at facilitating digital revolution and inclusion in developing countries

• should operators leverage on the already existing operating license and use their current network resources to operate the 5G services, or a new license regime provided afresh for operation of 5G services

• How is the view of GSMA and GSA on the economic implication of 5G corroborated by any other body, SDO or ITU.

• Can the FGML5G hold one of its meetings in Africa.

• What is the status of 5G service radiation content

Discussion

It was indicated that ITU-T SG5 is working on 5G service radiation issue (EMF).

It was asked what ITU can do on regulatory issues, which are national matters. One way could be to collaborate with each country through ITU-D.

Regardless of whether in-scope or not, licensing issues are important.

To hold a meeting of FG-ML5G in Africa, which facilitates further integration of Africa into this technical area, should be considered by the FG.

## A.3 Session 3: IMT-2020/5G systems - “Machine learning, management and orchestration, operational issues”

Moderator: Leo Lehmann, Chairman, ITU-T Study Group 2; BAKOM, Switzerland  
ITU/TSB Lead: Tatiana Kurakova

Introduction

As highlighted in the opening remarks by the TSB Director, the convergence is the future of telecommunications. Its inclusion into the overall industrial infrastructure, namely by contributing with the high development of horizontal standards to support all and each vertical, is a strategic goal of such convergence. Convergence is where the computing technologies influence the development of the telecommunications and vice a versa. Session 3 elaborates more on this area.

### A.3.1 Data processing and management in future networks (Gyu Myoung Lee, KAIST, Korea (Rep. of))

A vision of converging technologies including AI, IoT, edge computing and blockchain, is fuelled by the availability of copious amounts of data, which can serve as the basis for improved decision-making and overall enhanced performance. This has brought about the idea of data-driven artificial intelligence of things (AIoT). Starting from the driving force of linking AI with Data, the AIoT paradigm has moved forward based on the concept of distributed intelligence with cloud computing being considered an apt choice for controlling the connected things and the data, and promoting collaborative problem-solving based on a decision-making hierarchy. Adopting a similar train of thought as AIoT from the perspective of data sharing, the concept of “internet of blockchains” also envisions the launch of individual and interoperable chains that can enable programmers to innovate and allow for quick value transfers and seamless scalability.

Seeing convergence of computing and telecommunication technologies, the goal is to develop the Trusted Decentralized Data Driven Networking capable to offer Services supported by the Hyper-Connected Distributed Intelligence.

Noting the importance of data protection and privacy preservation, a trusted decentralized data and AI driven infrastructure is sought.

FG ML5G and FG NET2030 results should be use to the maximum efficiency. In addition, a new group on Data and AI-driven networks could also be considered by SG13 along with a new Question under ITU-T SG20 on DPM and AI applications. One of the key questions raised was in relation to decision-making and data management, as more work could be needed to differentiate it from stream of artificial intelligence. The dimension of ethics would also be relevant to the studied within the realm of data management as elaborated on by the deliverables of the Focus Group on Data Processing and Management.

A new direction is towards data-driven networks that is a new approach to support data driven applications.

Contributions driven approach is not much efficient in bringing the new ideas. What are the ways to drive innovations?

Data is becoming a new fuel nowadays. We need to collect, store, share, analyse, process it and make most use of it to adjust network operation. How to support increasing data driven applications? Data driven networks. Another new paradigm is the convergence where computing and networking are integrated in one innetworking computing complemented by the intelligence that comes on top of that.

### A.3.2 Considerations for standardization of 5G intelligent operation and management (Yanchuan Wang, China Telecom, China)

Telecom network is evolving towards softening, virtualizing, and opening, how to do operations and management (O&M) of the new and legacy network jointly is keeping the big topic to operators and SG2, especially when 5G comes.

The promise of effective deployment of 5G networks needs to be complemented with intelligent planning along with providing lifecycle management of slice and end-to-end service quality assurance through multi-layer and multi-domain based on cloud, SDN and NFV networking.

In the past, network management system (or be called OSS) was seen as only auxiliary support to network operation, now it has been experiencing the transformation from vertical, closed architecture to cloud-based horizontal and open architecture, and it becomes the core of ‘smart operation’ for telecom operators. How to be more intelligent with AI and big data is now a hot topic in OSS.

ITU may fill in a caveat to lead AI-combined Telecom Operation & Management (AITOM) work to bring together the previous studies convened by now by FG ML5G and SG13 on unified architecture for ML as applied to 5G, TMF on AI service management architecture and maturity assessment model, ETSI with the collection of diverse use cases and 3GPP on Network-level AI applications. All this contribute to the overall enhanced 5G operation and management unique future standard. The AITOM standardization may include scenarios, use cases, architecture, capabilities, processes, information model, data collection and real-time processing etc.

### A.3.3 Orchestration aspects: ML for 5G (Vishnu Ram, Consultant, India)

ITU recently published the high-level architecture framework for machine learning in future networks including 5G. This include MLFO (Machine learning function orchestrator). MLFO complements the NFVO (network function virtualization orchestrator) and the SO (service orchestrators) by managing machine learning functionality in operator network. While this gives a foundation for ML in future networks, further study is needed to develop and exploit the larger concept of orchestrating ML across different standards.

The aim of future standards should be to achieve “invisible intelligence” which does not hinder the user-experience in the network nor the manageability of networks. However, there are significant challenges which ML orchestration has to address before it can achieve this: deriving data from heterogeneous sources, managing policy and security are some of those.

During the discussion, it was highlighted that flexible standards are needed to understand and implement the vision for orchestration of intelligence. A distributed approach (many groups work according to each with focussed expertise), with organic development of solutions (with guidance from each other and FG ML5G) for intelligence orchestration is the need of the hour. Such a collaborative study may not only make networks more intelligent but also gives ITU the opportunity to lead the development of intelligent standards across SDOs.

### A.3.4 Future of slicing and ML - Cognitive high-precision slicing (Kiran Makhijani, Futurewei, United States)

By further adding intelligence to its life-cycle creation and maintenance, one gains cognitive and higher precision slicing. Future sees transition from transport to slice-centric user plane. The network architecture is inherently hierarchical and highly abstracted at the network slice orchestrator. Adding intelligence (ML) will bring automation to manage this complexity. As was pointed out in session 2, slices may need to be stitched, where one slice comes from L2 and another from L3 network. One can think of decentralizing the slice management to better orchestrate the traffic engineering in particular delegating decisions down the hierarchy.

By leveraging the knowledge and insights retrieved from the data, it is prudent to employ machine-learning capabilities such as adaptive boosting to perform cognitive network slice management for dynamic resource optimization and orchestration of networks slicing and improving precision of matching traffic patterns to the service offered by the slice.

Slices for different services may need to coexist over common infrastructure in which case they should not interfere with each other. There is another space to apply ML model to forecast if you can add a new slice along with existing slices without interruption for their operation.

On the standardization front, the strategic direction to be adopted by ITU-T should encompass various aspects including (but not limited to)

• defining network slice user plane capabilities for services and applications described in Network 2030

• distributed routing control for better scalability and gateways for multi-protocol stitching.

• leveraging ML framework Y.3172 for network slices.

• embracing hierarchical Machine learning approaches for cognitive network slices.

• abstraction and anonymization of outcomes of data models at lower level

During the discussion, the need to anonymize data (especially when dealing with personal data) was highlighted. In this regard, there is a need for technical solutions for the usage and exchange of data in keeping with regulations (including GDPR).

Conclusion

As highlighted by presentations in session, a consolidated collaborative platform is sought to be a new approach to use our resources in a right way and work together.

## A.4 Session 4: Numbering, addressing and identification​

Moderator: Phil Rushton, Chairman, ITU-T Study Group 2; DCMS, United Kingdom   
ITU/TSB Lead: Jie Zhang

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.

### A.4.1 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.

### A.4.2 Emerging trends and issues in identity management (Miho Naganuma, NEC, Japan, on behalf of Abbie Barbir, Aetna, United States)

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.

### A.4.3 Distributed ENUM networking for interconnection (Xiaojie Zhu, China Telecom, China)

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.

## A.5 Session 5: Security, privacy and trust​

Moderator and ITU/TSB Lead: Xiaoya Yang

Background

Session 5: Security, privacy and trust of the SGLA was held at 14:00-16:00, 10 Sept 2019 to discuss and distinguish the interrelated concepts of ‘security’, ‘privacy’ and ‘trust’, review ongoing activities in ITU-T SGs and discuss future strategic directions of ITU-T standardization on these important areas, especially focused on how to ‘architect’ ITU-T security standardization and cooperate/collaborate internally/externally.

### A.5.1 Cybersecurity trends (Arnaud Taddei, Symantec, United States)

Mr. Arnaud Taddei, WP3/17 Chairman, pointed out that the fundamental difficulty in cybersecurity standardization is that different stakeholders have different understanding, interests and talking confusing languages with cultural misalignment.

5G will bring in billions of virtual machines, containers, players and complex implementation of complicated systems, lead to increased attack surface. Latest protocols to enhance endpoint privacy (e.g., TLS 1.3, QUIC, DNS over HTTPS) brought new challenges to network defence. All such fragmented advances lead to ever-growing security issues that we lack of resource and skills to fight. Cybersecurity becomes a ‘Frankenstein’ – a giant issue we created by ourselves.

He drew cybersecurity as analogue to public health issue. SG17 just started to define Cyber Defence Centers (Security Operation Center, Computer Emergence Response Team, etc.) at ITU (X.framcdc), aka ‘Center for Disease Control and Prevention’ (CDC) in health sector, which have been established since 1940s.

Finally, on ITU-T security standardization, he proposed a fundamental revisit on how we ‘architect’ the interactions between ITU-T SGs and FGs regarding security, and change the current “Security by Design” doctrine into a real integrated end-to-end approach.

Responding to how to move from framework/requirements/architecture to implementable technical solutions, Mr Taddei’s experience is to remind editors that security principles should also apply to ‘adds-on’ security control system and always take into consideration of composition need of this additional security component into the subject’s architecture.

Regarding how ITU-T should organize standardization work of overlapping area like ‘security of subject X’, SG17 beliefs it should be done in a place that could bring together knowledge of both ‘subject X’ and security. SG17 as a center of excellence in ITU-T with security expertise is working in collaboration with many other groups in various subjects and benefits ‘subject X’ experts with security principles and disciplines.

### A.5.2 5G security strategies (Heung Youl Youm, Soonchunhyang University, Korea (Rep. of))

Mr Heung Youl Youm, ITU-T SG17 Chairman, introduced SG17 mandate, current structure and a 5G security overview of threats to unified access, RAN and core network. SG17 organized a workshop on 5G security in March 2018, which called for SG17 to collaborate and coordinate with relevant groups (esp. 3GPP SA3) and participate in JCA on IMT2020. Ever since then SG17 started five 5G security work items in Q6/17.

Regarding ITU-T strategic directions on 5G security, Mr Youm suggested to:

• utilize ITU-T SG17 as a security competence centre,

• establish a JCA-5G security inviting 3GPP and ETSI,

• collocate meeting with other groups,

• develop a 5G security standardization roadmap and identify roles and responsibility of each group.

### A.5.3 SS7 security related issues (Xiaojie Zhu, China Telecom, China)

Ms Xiaojie Zhu, ITU-T SG11 Vice-chairman, talked about security issues in SS7. SG11 has revised SS7 related standards Q.731.3, Q.731.4, Q.731.5 and Q.731.6 in April 2019 and continues to work on:

• ITU-T Q.SR-Trust: Signaling requirements and architecture for interconnection between trustable network entities

• Technical Report ITU-T TR-SS7-DFS: SS7 vulnerabilities and mitigation measures for digital financial services transactions

SG11 is organizing an ITU Workshop on Brainstorming session on SS7 vulnerabilities and the impact on different industries including digital financial services” in Geneva on 22 October 2019 to promote the implementation of revised ITU-T Q.731.3, Q.731.4, Q.731.5 and Q.731.6. Ms Zhu called for more input to promote implementation of revised SS7 protocol standards.

### A.5.4 Trust in data and AI (Gyu Myoung Lee, KAIST, Korea (Rep. of))

Mr Gyu Myoung Lee, WP3/13 co-chair, talked about ITU-T SG13 work on trust in data and AI, clarified that trust is about relationship and more people-centric than security.

SG13 Q16/13 (Knowledge-centric trustworthy networking and services) has developed ITU-T Recommendations on basic principles, overview of trust provisioning in trusted environment in ICT infrastructure, and framework of trust-based media services, and is developing more standards on trust of service provisioning and personal data management.

He also mentioned that IEEE and ISO/IEC are working on trustworthiness of AI, and recognized that SG17 work on security and SG20 work on ‘Security, privacy, trust and identification for IoT and SC&C’ are relevant. Mr. Lee called for more understanding and consideration from all ITU groups on trust, both its technical and non-technical aspects and proposed ITU-T to focus and create a new group for Trust in Data and AI.

### A.5.5 Cybersecurity threat intelligence (Bret Jordan, Chairman of STIX and TAXII subcommittees of OASIS CTI Group)

Bret Jordan, Chairman of both OASIS CTI TC subcommittees STIX and TAXII, pointed out that network security has been traditionally inward focused, based on a fallacy that we can know and/or fix all vulnerabilities. However, inward focus (hygiene) is necessary but inadequate, since security operations, procedures and policies are slow, manual, reactive, understaffed and underfunded.

He introduced OASIS work on STIX (Structured Threat Information Expression), TAXII (Trusted Automated Exchange of Intelligence Information), CACAO (Collaborative Automated Course of Action Operations for Cyber Security) toward automated playbook for cyber defence, and concluded that herd immunity is only possible when we share cybersecurity threat intelligence in an automated machine-to-machine structured format.

Regarding ITU-T work on security standardization, Mr Jordan reiterated the CTO meeting’s call for global coordination across SDOS, and suggested ITU to take a more active role to standardize solutions that enable cyber defense and threat intelligence and playbook sharing.

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1. Prepared by TSB session leads, and reviewed by moderators and presenters. Summary record incorporates comments received from SGLA participants before Monday, 16 September, 9 AM. [↑](#footnote-ref-1)