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| **Abstract:** | This TD provides the communiqués of the past two TSB Director CxO meetings:1. CTO meeting, 9 September 2018, Durban, South Africa.
2. TSB Director’s North-American CTO consultation meeting, 9 May 2018, California, United States.
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**Action**: TSAG RG-StdsStrat is invited to consider this document.

This TD provides the communiqués of the past two TSB Director CxO meetings:

1. The CTO meeting took place 9 September 2018, Durban, South Africa during ITU Telecom World. The published communiqué is attached and is also available at

<https://www.itu.int/en/ITU-T/tsbdir/cto/Documents/CTO_Communique_SA_Final%20%281%29.doc>

1. The TSB Director’s North-American CTO consultation meeting took place 9 May 2018, California, United States. The published communiqué is attached and is also available at

<https://www.itu.int/en/ITU-T/tsbdir/cto/Documents/Communique_CTO_.pdf>

**Attachments: 2**

* CTO meeting, 9 September 2018, Durban, South Africa, Communiqué.
* TSB Director’s North-American CTO consultation meeting, 9 May 2018, California, United States, Communiqué.

**CTO MEETING**

**9 September 2018, Durban, South Africa**

**COMMUNIQUÉ**

Chief Technology Officers (CTOs) met with the senior management of the ITU Telecommunication Standardization Bureau at the tenth annual CTO Meeting in Durban, South Africa, 9 September 2018, held in conjunction with ITU Telecom World, 10-13 September 2018. The meeting brings CTOs together to exchange views on industry needs and related standardization priorities.

**ITU support for global sustainable development**

Opening the CTO meeting, ITU Secretary-General Houlin Zhao noted that ITU advocacy is leading ITU Member States to recognize the fundamental contribution to sustainable development made by information and communication technologies (ICTs).

Secretary-General Zhao made an example of the keynote speech offered by the President of the People’s Republic of China, H.E. Xi Jinping, at the opening ceremony of the 2018 Beijing Summit of the [Forum on China-Africa Cooperation](https://www.focac.org/eng/), a speech which highlighted that China-Africa cooperation will “focus on enhancing cooperation on energy, transport, information, telecommunications and cross-border water resources.”

CTOs reaffirmed the importance of these four pillars of sustainable development, making a comparison to the first and second industrial revolutions. These revolutions were enabled primarily by network effects – more widespread access to water, energy and transport. Digitalization, said CTOs, and especially access to data, will initiate similar network effects in the coming decade, supported by the rollout of IMT-2020 (5G) systems.

Secretary-General Zhao spoke to ITU’s history as a unique public-private partnership, emphasizing that the technical expertise of the private sector is essential to the fulfilment of ITU’s mission as an organization. Secretary-General Zhao highlighted the growing interest – from both industry and government – in ITU’s value as a neutral multilateral platform to enhance the cooperation of network operators, SMEs and over-the-top (OTT) service providers.

**Application security and quantum-safe cryptography**

The increasing importance of OTT services – considering their exchange of sensitive personal data and growing relevance to critical infrastructure such as energy grids and road transport infrastructure – calls for more attention to be devoted to application security, said CTOs. Greater application security, said CTOs, would require standard frameworks for the objective measurement of application security and interpretation of associated results.

Standards for application security could offer a ‘label of trust’, said CTOs, providing end-users with the confidence to trust that their data is being handled appropriately by all application providers, whether large companies or lesser-known providers.

The impending arrival of quantum computing poses significant risks to security. Quantum-safe cryptography is essential to preparations for that arrival, said CTOs. Public key cryptography is a cornerstone of authentication over public networks. Quantum computing is quick to solve integer-factoring and discrete-logarithm problems, problems relied on by almost all public key cryptography.

Recognizing the increasing importance of quantum-safe public key cryptography, CTOs offered support for ITU standards to provide for interoperable quantum-safe communications, in particular the secure distribution of symmetric encryption keys.

CTOs highlighted the value of ITU as a platform to consider end-to-end security, including application security and quantum-safe public key cryptography. CTOs in addition recognized the value of the security studies led by ITU as part of the [Financial Inclusion Global Initiative](https://www.itu.int/en/mediacentre/Pages/2017-PR36.aspx), studies which address application security, infrastructure security, interoperable authentication, and cybersecurity.

**Policy and regulatory support for IMT-2020 (5G)**

CTOs discussed the new ICT use cases expected to emerge in the years following 2020 as 5G systems begin to see large-scale deployment.CTOs explored how policymakers and regulators could support the emergence of an enabling environment for sustainable investment in 5G infrastructure. Emphasis was placed on the need to remove impediments to small-cell deployment, an issue highly relevant to regulators in developing countries.

CTOs called for ITU to study policy and regulatory questions relevant to accommodating 5G use cases and encouraging supporting market growth, innovation, collaboration and ICT infrastructure investment, studies that would consider the increasing importance of OTT services.

CTOs acknowledged the attention afforded to OTT services by ITU’s studies of the economic and policy aspects of international communications.

CTOs noted the [ITU Technical Report on the ‘Economic impact of OTT’](https://www.itu.int/pub/T-TUT-ECOPO-2017) as well as the draft ITU standard addressing the relationship between network operators and providers of OTT services – titled ‘Collaborative framework for OTTs’ – currently undergoing review as part of the ITU-T Traditional Approval Process, the process applied for draft ITU standards with regulatory implications.

CTOs requested that these studies investigate the new technical and business dynamics expected to emerge with the deployment of 5G systems. CTOs encouraged the Director of the ITU Telecommunication Standardization Bureau, Chaesub Lee, to consider means of bringing the issue to the attention of the [ITU Plenipotentiary Conference 2018](https://www.itu.int/web/pp-18/en).

**Network 2030: The waves of innovation keep rolling**

ICTs could in future offer a truly immersive communications experience, an experience that CTOs expect will come to captivate all five human senses. But these highly interactive, high-precision applications will demand extremely low latency and high throughput, potentially calling for significant innovation in protocols, network architectures and the monitoring of performance, QoS and QoE.

The meeting discussed the aims of the new ITU-T Focus Group established in July 2018 to lead an investigation of how the coming decade of ITU standardization could assist the ICT industry as well as vertical industries in achieving their ambitions for ‘Network 2030’.

The group will put forward a vision of Network 2030 capabilities, proposing use cases spanning new media such as holograms, a new generation of augmented and virtual reality applications, and high-precision communications for ‘tactile’ and ‘haptic’ applications.

The output of the Focus Group is expected to have implications for many fields of ITU standardization work – in addition to future networks and cloud – including protocols and test specifications; performance, QoS and QoE; transport, access and home networks; multimedia; and security.

CTOs encouraged ITU to host a workshop to discuss the concepts under study, including next-generation protocols.

**Internet of Things (IoT) and smart cities: A revolution still to fulfil its promise**

Cities of the future aim to be smart, sustainable and safe. 5G and IoT will make key contributions to the realization of these objectives. Data access, said CTOs, will be especially important to the transition to smart cities.

Smart applications should support cities in becoming socially and environmentally sustainable, but, to achieve this, smart applications’ business models must first achieve sustainability. CTOs highlighted the importance of stakeholder collaboration to increase the number of smart city experiments able to transition to widespread commercialization.

CTOs converged around three technical priorities for the development of smart cities, all to be supported by effective stakeholder collaboration:

1. Commercially viable cross-application use cases will be essential to the sustainable development of IoT-enabled smart cities.
2. Industry must enable the exchange of data between IoT platforms as well as privacy protection and compliance with relevant regulations.
3. IoT platforms will increasingly be required to process audio and video streams, calling for edge-cloud and central-cloud processing with high-performance computing capabilities.

Cities face different development challenges. The priorities of their smart city strategies will differ in accordance with their contexts. CTOs summarized the challenge facing standards developers as the need to provide common platforms for diverse forms of innovation, providing enablers fundamental to all applications and services.

CTOs recognized the value of standards collaboration in meeting this challenge, making an example of the increasing collaboration of ITU and oneM2M.

CTOs affirmed their support for the collaboration hosted by the [United for Smart Sustainable Cities (U4SSC) initiative](https://www.itu.int/en/ITU-T/ssc/united/Pages/default.aspx). The top-level design guidelines and frameworks promoted by U4SSC – for example, the U4SSC Key Performance Indicators for Smart Sustainable Cities based on ITU standards – will assist cities in aligning foundational elements of their smart city strategies, said CTOs, in addition giving direction to supporting international standardization.

**Capturing CTO views: Impact on ITU standards strategy**

CTOs debated how ITU-T and other 5G-relevant standards bodies could enhance their collaboration mechanisms to encourage mutual recognition of complementary standards.

Representatives of the Rapporteur Group on ITU-T Standardization Strategy (RG-StdsStrat) – an advisory sub-group of the ITU Telecommunications Standardization Advisory Group (TSAG) – updated CTOs on their efforts to document topics discussed at CTO meetings.

Documenting topics discussed at CTO meetings forms part of the work of RG-StdsStrat to encourage dialogue between industry executives, RG-StdsStrat and standards experts active in ITU-T Study Groups. This dialogue supports ITU-T Study Groups’ efforts to assign priority to standards efforts identified as of growing strategic relevance to ITU membership.

As reported by representatives of RG-StdsStrat, topics discussed at past CTO meetings already part of this dialogue include:

* Realizing the IMT-2020 (5G) vision
* The economic impact of OTT services and related cross-industry collaboration
* VoLTE/ViLTE interconnection and the adoption of ENUM for IMS interconnection
* Intelligence for network automation, augmentation and amplification
* Open APIs enabling third parties to access and build on network capabilities in the interest of developing innovative, reusable services
* Gigabit-speed broadband access services and networks
* Datacentre interconnection for OTT and vertical industries
* Video services, augmented reality and virtual reality
* The accessibility of ICTs to persons with disabilities
* Security, privacy and trust
* Analytics supporting the development of evidence-based, data-driven services

**ITU-T membership update**

Chaesub Lee, the Director of the ITU Telecommunication Standardization Bureau, updated CTOs on the evolution of ITU-T membership.

ITU-T membership has taken a sharp upward trajectory. Eleven organizations joined ITU-T as Sector Members in 2018, alongside 24 new Associates.

New ITU-T members include mobile virtual network operators and enablers (MVNOs and MVNEs), manufacturers of unmanned aerial vehicles, telematics and automotive companies, OTT service providers, energy utilities, and companies specializing in quantum cryptography and quantum communications.

**The participating organizations were:**

**CITC**, Saudi Arabia; **Ericsson**, Sweden; **Huawei**, China; **ID Quantique**, Switzerland; **IEEE Computer Society**; **Mzansisat**, South Africa; **NEC**, Japan; **NICT**, Japan; **Nokia**, Finland; **Rohde & Schwarz**, Germany; **SK Telecom**, Korea; **TTC**, Japan; **Tunisie Telecom**, Tunisia; Chairmen of the **ITU-T Focus Group on Data Processing and Management** and **ITU-T Study Groups 12**, **13** and **16**.

**TSB Director’s North-American CTO consultation meeting**

**9 May 2018, California, United States**

**Communiqué**

High-level ICT industry executives have called for ITU standardization work on security, privacy and trust to devote more attention to the implications of Artificial Intelligence (AI) and Machine Learning (ML), IMT-2020 (5G), and the rise of voice as a dominant human-machine interface. This call has come in parallel with reaffirmation of industry’s support for ITU’s leadership in evolving the transport network in support of 5G.

Chief Technology Officers (CTOs) met with the senior management of the ITU Telecommunication Standardization Bureau at the annual CTO Consultation Meeting in California, United States, 9 May 2018, kindly hosted by Symantec. The meeting provided CTOs with an opportunity to exchange views on industry needs and related standardization priorities.

**Security, privacy and trust in the presence of AI and ML**

CTOs highlighted that AI applications are developed to focus on efficacy and efficiency in constrained environments, without always considering and protecting against the emergence of new security vulnerabilities or other unintended consequences. In describing the risks posed by AI to security, privacy and trust, CTOs pointed to possibilities including threat-detection methods that misclassify malicious threats as benign, automated systems that fail to detect key stimuli, or authentication mechanisms capable of misidentification.

Having the right, diversified data is key to data analytics. However, the volume of available data has grown so large that the number of skilled security analysts pales in comparison – the opportunity to leverage AI and ML in security is clear, suggested CTOs. AI and ML have the potential to scale security systems in such a way that human analysts will become more effective and accurate in their detection of security threats and related decision-making.

If AI and ML are to be part of security defences, industry will then need to explore how these defences could be subverted.

Meeting participants called for ITU-T Study Group 17 to assign priority to its studies of standardization needs relevant to security, privacy, and trust in the presence of AI and ML.

**Shifting to end-to-end security with 5G**

5G systems will incorporate advanced software-defined networking (SDN), network function virtualization (NFV) and cloud computing capabilities, significantly altering network architectures and network management-control. The ICT industry will continue to gain new stakeholders as other industry sectors scale-up their adoption of ICTs.

CTOs expect focus on security to increase as 5G systems take shape, with the transition to 5G presenting an opportunity for digital service providers to act as a gateway to offer security solutions to end users and support a shift towards end-to-end security. CTOs highlighted the importance of an orchestrated, holistic approach to 5G security.

Discussing the evolving technical and business dynamics of the ICT ecosystem, CTOs noted that the diversity of digital service providers has called the classic definition of a telecommunications operator into question, a subject currently under discussion in ITU-T Study Group 2 (Operational aspects).

CTOs discussed the ongoing review of the structure of ITU-T Study Group 17 (Security), exploring how modifications to its structure could assist the group in supporting industry-specific ‘vertical’ environments in addition to its current focus on horizontal relevance. One key aspect of such a restructuring, said CTOs, could be an improvement in ITU-T Study Group 17’s ability to meet the security demands of cloud computing.

**Voice as a dominant human-machine interface**

CTOs noted that voice is emerging as a primary interface between humans and machines, with the effect that AI is fast becoming a more prominent user interface. The meeting made an example of the rapid entrance of smart speakers into consumers’ homes. Smart speakers are a prime example of AI reducing friction between the user, the service and the service provider, a trend that CTOs expect will continue to accelerate. CTOs agreed that the development of AI-powered voice-assisted user interfaces and user experience (AI-voice-UI/UX) is outpacing standardization and regulation.

The meeting’s review of market activity and its expected evolution resulted in CTOs encouraging ITU to investigate the implications of AI-voice-UI/UX for authentication and e-commerce, audio security and the protection of personal data, and control protocols and interoperability.

**ITU leadership in cloud-optimized and 5G transport**

End-to-end flexibility will be one of the defining features of 5G networks. Network softwarization and slicing, underpinning deeply programmable networks able to be sliced into virtual networks with specialized capabilities such as low latency or high reliability, will give networks the agility required to support the specific requirements of any particular 5G application.

CTOs highlighted the importance of cloud-optimized networking to the 5G vision. 5G network slicing, said CTOs, will in some cases require comprehensive performance monitoring and highly dynamic network operation and optimization. Transport networks are evolving to interconnect clouds of all types, at all levels of distribution, in a flatter network with meshed, dynamic cloud-driven traffic patterns. CTOs agreed that the dynamic, automated creation of network slices requires adaptive architectures incorporating programmability at the packet and optical layer, allowing for different architectures and performance-assurance mechanisms specific to different slices, including the related services.

Programmable, reusable assets and resources will be essential to the overall optimization of the network, said CTOs, enabling orchestrators to configure such resources rapidly in the creation of network slices. The inability to predict the characteristics of future services reinforces the importance of dynamic programmability.

CTOs highlighted federated network orchestration – the ability to achieve end-to-end network slicing across different operators’ networks – as an issue deserving of more attention. CTOs said the same of performance assurance for different slices, highlighting the importance of appropriate performance indicators and noting that industry is awaiting clarity on how 5G networks will request services from the transport network.

Meeting participants reaffirmed industry’s support for ITU-T Study Group 15’s leadership of international standardization work to evolve the transport network in support of 5G and cloud-optimized services, work that is coordinated with related activities of organizations including, for example, MEF, ONF, 3GPP, NGMN, TMF, and ETSI ZSM.

**Next steps**

The Rapporteur on ITU-T standardization strategy thanked attendees of the CTO meeting for their valuable guidance and gave examples of how recommendations made by past CTO meetings had given rise to new ITU standardization activities.

The CTO meeting’s participants expressed their gratitude to ITU for the opportunity to exchange views on standardization priorities.

Chaesub Lee, the Director of the ITU Telecommunication Standardization Bureau, extended an invitation to CTOs to participate in the next CTO meeting scheduled for 9 September 2018 in Durban, South Africa, at ITU Telecom World 2018.

**The participating organizations were:**

**Aeris Communications Inc.**, United States; **Apple**, United States; **Dolby Laboratories**, United States; **Ericsson**, Canada; **Huawei**, China; **Knowles Corporation**, United States; **Nokia**, Finland; **Symantec**, United States; **TTC**, Japan; **Twilio**, United States; Chairmen **ITU-T Study Group 15** and **Study Group 17**; **TSB**.

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