



SUMMARY REPORT

ON

ITU-T SG20 MEETING

19-24th October 2015

GENEVA, SWITZERLAND

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Internet of Things WG

On Behalf of

**MALAYSIAN TECHNICAL STANDARDS
FORUM BHD**

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1. Abstract

A new ITU-T Study Group is established under the name Study Group 20 - "IoT and its applications including smart cities and communities". This meeting marks the inaugural session of the Study Group, which was hosted at the ITU Headquarter in Geneva, from 19 to 23 October 2015.

On the first day, a forum is conducted in addressing the topic of "Internet of Things: Empowering the New Urban Agenda". This forum discussed the role that Internet of Things (IoT) plays in relation to converging technologies for building smart sustainable cities with integrated ecosystems.

The remaining days of the ITU-T SG20 meeting sessions discuss the main framework for the establishment of the study group, the appointment of representatives, and other roles in the study group. This framework includes the setting up of working parties in addressing several questions with regards to the topic.

2. List of Participants

Please refer to:

Appendix A - TD32

3. Introduction

A new ITU-T Study Group is established under the name Study Group 20 - "IoT and its applications including smart cities and communities". This report presents the outline of the first meeting of this Study Group, which was hosted at the ITU Headquarter in Geneva, from 19 to 23 October 2015.

In Section 5, findings and information gathered from the meeting are reported. The recommendations and action items for MTSFB to take up from this meeting are included.

There is also a Forum on the topic of "Internet of Things: Empowering the New Urban Agenda" conducted on the 19th of October 2015. This forum discussed the role that Internet of Things (IoT) plays in relation to converging technologies for building smart sustainable cities with integrated ecosystems.

4. Agenda

The main outline from the agenda of this meeting is as follows:

1. Recap of the main decisions taken by TSAG-15:
 - a. Resolution 2: Mandate of Study Group 20: Area of responsibility, Lead Study Group, Recommendations under its responsibility
 - b. Study Questions allocated to Study Group 20 by TSAG-15
2. Organization of the work of Study Group 20
 - a. Establishment, allocation of Questions and meetings of Working Parties
 - b. Designation of Working Party Chairmen
 - c. Designation of Rapporteurs
 - d. Designation of Liaison rapporteurs to the collaborating international organizations

Table 1 below shows the timetable of the meeting.

Draft timetable of the new ITU-T Study Group 20 Meeting							
Date	Sunday 18 October	Monday 19 October		Tuesday 20 October	Wednesday 21 October	Thursday 22 October	Friday 23 October
Room name	M328	Popov	G3 (K)	Popov	Popov	Popov	C
08:30 - 10:00		09:00 - 10:00 SG20 Opening Plenary		Q1/20	Q2/20	Q5 and Q6/20	WP1/20 Closing
10:00 - 11:00		10:00 - 10:30 Coffee Break		WP1/20 Opening	Q3/20	Q5 and Q6/20	SG20 Closing Plenary
		10:30 - 11:00 Forum on IoT: Empowering the New Urban Agenda					
11:00 - 11:30		11:00 - 11:15 Coffee break	SG20 Drafting Group 11:00-13:00	Coffee Break		SG20 Management coordination (closed meeting) (G3)	SG20 PHOTO
11:30 - 13:00		Forum on IoT: Empowering the New Urban Agenda		Q2/20	Q1/20		Q6/20
13:00 - 14:30	Lunch	13:00 - 14:00 Lunch	Lunch	Lunch			Lunch
		14:00 - 15:30 Forum on IoT: Empowering the New Urban Agenda		SG16 & SG20 management meeting closed meeting 13:30- 14:30 (G1)	Q2/20 drafting group 13:30- 14:30 (K1)	Y-series structure (K1) Closed meeting 13:30-14:30	
14:30 - 16:00	14:30 - 16:30 SG20 Management Team Meeting (closed meeting)			Q3/20	Q4/20	Liaison statement session + SG20 plenary	Q5/20 (K2) 14:00- 16:00
16:00 - 16:30	Coffee Break	15:30 - 15:45 Coffee Break	Coffee Break				
16:30 - 18:00		15:45 -17:00 Forum on IoT: Empowering the New Urban Agenda		Q4/20 16:30-18:00	WP2/20 Opening 16:30-18:00	Q4/20 Question 16:30-18:00	
18:00 - 19:30		SG20 18:30-19:30		Newcomer session for SG5 & SG20	Q2/20	Q1/20 18:00-19:30	
19:30 - 20:30		Cocktail Reception offered by UAE		Coordination session between Q20 (WP3/5) and SG20	Q5/20	Q4/20 (H1)	WP2/20 Closing 19:30 - 20:30

Table 1: Timetable for the Study Group 20 Meeting on 19-24th October 2015.

5. ITU-T Study Group 20 Findings

5.1 Background of Study Group 20

In November 2005, ITU put forth a vision of IoT in the landmark "Internet of Things" report¹, as part of a series of ITU reports on the Internet. This document provides the preliminary concepts and framework of IoT.

In February 2013, the Focus Group of Smart Sustainable Cities (FG-SSC) was established at Study Group 5 meeting in Geneva. This group serves as an open platform for smart city stakeholders to exchange knowledge in the interest to identify the standardised framework needed to support the integration of ICT services in smart cities. FG-SSC concluded its activities in May 2015 with the release of 21 technical reports² and specifications.

The decision to create a new study group on IoT was made by the Telecommunication Standardization Advisory Group (TSAG) at its meeting at ITU Headquarters in Geneva, 2-5 June 2015, exercising TSAG's authority to modify ITU-T's structure and work programme between quadrennial World Telecommunication Standardization Assemblies.

The foundations of the new Study Group are provided by ITU-T's experience in the development of IoT standards and the findings of the ITU-T Focus Group on Smart Sustainable Cities (FG-SSC).

Study Group 20 (SG20) was established as a new Study Group working to address the standardization requirements of Internet of Things (IoT) technologies, with an initial focus on IoT applications in smart cities and communities (SC&C).

5.2 Objectives of Study Group 20

SG20 develops international standards to enable the coordinated development of IoT technologies, including machine-to-machine communications and ubiquitous sensor networks. A central part of this study is the standardization of end-to-end

¹ Appendix B - ITU Internet of Things Report 2005

² Appendix C - List of FC-SSC Technical Reports

architectures for IoT, and mechanisms for the interoperability of IoT applications and datasets employed by various vertically oriented industry sectors.

The deployment of IoT technologies is expected to connect an estimated 50 billion devices to the network by year 2020, impacting nearly every aspect of our daily lives. IoT is contributing to the convergence of industry sectors, and SG20 provides the specialized IoT standardization platform necessary for this convergence to rest on a cohesive set of international standards.

An important aspect of SG20's work is the development of standards that leverage IoT technologies to address urban-development challenges.

IoT is a key enabler of the Information Society and offers an opportunity to transform city infrastructure, benefiting from the efficiencies of intelligent buildings and transportation systems, and smart energy and water networks. SG20 will assist government and industry in capitalizing on this opportunity, providing a unique platform to influence the development of international IoT standards and their application as part of urban-development master plans.

5.3 Results of Study Group 20 First Meeting

5.3.1 Plenary

Question 1 - Research and emerging technologies including terminology and definitions

1. Promotion of ITU-T SG20
 - a. Liaison statements
 - b. ITU to build synergies with the IoT Week conference in June 2017 through a joint event to promote SG20's work.
2. Some potential areas of work for consideration in the next meeting
 - a. Internet of Things testbeds and crowd-sourcing potential for IoT standardization and smart cities
 - b. IoT framework and roadmap for rural areas in developing countries
 - c. Personal data protection and privacy impact on IoT standardization
 - d. Study the impact of IPv6 transition on IoT standardization
 - e. Identify and study emerging IoT technologies

5.3.2 Working Party 1

Question 2 - Requirements and use cases for IoT

1. Discussion started on Q2/20 work plan:
 - a. To develop further requirements of IoT in the different vertical fields (plan to be defined for involvement of stakeholders)
 - b. To collect IoT-enabled use cases in support to the requirements studies (inputs from regions already in progress)
 - c. To identify relevant ecosystems and associated models in the different IoT-enabled fields
 - d. To identify requirements for services based on the integration with advanced ICT (e.g. Cloud-enabled IoT services)
2. Q2/20 is now responsible for studies on:
 - a. Big Data in IoT, IoT Accounting and Charging, Wearables, network requirements, device management

Question 3 - IoT functional architecture including signalling requirements and protocols

1. Discussion started on Q3/20 work plan:
 - a. To develop new architecture aspects required to realize convergence based on IoT (plan to be defined for involvement of stakeholders)
 - b. To identify requirements for signalling and control architectures for IoT and SC&C
 - c. To identify requirements for enhancements to existing signalling requirements and protocols required in the Internet of things (IoT), machine-to-machine (M2M) communication services and/or applications
2. Q3/20 is now responsible for ongoing studies on:
 - a. IoT-Self Organization Networking (draft Y.IoT-son) , IoT-constrained device networking (draft Y.IoT-cdn),
3. New studies include:
 - a. IoT architecture aspects, requirements for signalling and control architectures in IoT

Question 4 - IoT application and services including end-user networks and interworking

1. Discussion started on Q4/20 work plan:
 - a. To progress the work on Y.WoO-hn, Y.IoT-ASF, etc.
 - b. To discuss new work items including liaison statements.
 - c. Question 4/20 discussed 6 Contributions including Liaison Statements. During the meeting, Q4/20 has made progress on 2 draft Recommendations and has accepted 4 new work items as initial draft recommendations. At the meeting, Q4/20 produced 8 output documents including revised texts of on-going and initial draft Recommendations, living list and the meeting report.

5.3.3 Working Party 2

Question 5 - SC&C requirements, applications and services

1. Progress on draft Recommendations & Supplements:

Working title	Title
Y.SC-Residential	Requirements of Smart Residential Communities
Y.SC-OpenData	Framework of Open Data in Smart Cities
Y.SC-Interop	Identifier service requirements for the interoperability of Smart City applications
Y.SC-Overview	Overview of smart cities and communities, and the role of information and communication technologies
Supplement A to Y.4000 series	Smart cities and communities: a guide for city leaders
Supplement B to Y.4000 series	Setting the stage for stakeholders' engagement in smart cities and communities
Supplement C to Y.4000 series	Intelligent sustainable buildings for smart cities and communities
Supplement D to Y.4000 series	Master plan for smart cities and communities

Question 6 - SC&C infrastructure and framework

1. Progress on draft Recommendations & Supplements:

Working title	Title
Y.frame-ssc	Framework and high-level requirements of smart cities and communities
Y.infra	Overview of city infrastructure
Y.ism-ssc	A Technical Framework of Integrated Sensing & Management for Smart Sustainable Cities
Y.isw-ssc	Integrated Sensor Web Resource Metadata for Smart Sustainable Cities
Supplement E to Y.4000 series	Integrated management for smart sustainable cities
Supplement F to Y.4000 series	Multi-service infrastructure for smart sustainable cities in new-development areas
Supplement G to Y.4000 series	Overview of smart sustainable cities infrastructure
Supplement H to Y.4000 series	Setting the framework for an ICT architecture of a smart sustainable city

6. IoT Forum Findings

6.1 Keynote Speech

1. Wilfried Grommen, Chief Technologist, HP: "IoT Contextual Reflections"

IoT is the next wave of the Internet with 70% growth factor. It is very complex and diverse, with vertical and horizontal players.

IoT faces issues ranging from scale, privacy and security, cloud and acceptance. Iot is seen as an underpinning platform for smart cities, and being the enabler of inter-industries user challenges.

The role of ITU is to fill the holes of standard essentials in building the IoT ecosystem.

2. Jesus Cañadas, Ministry of Industry, Energy and Tourism, Spain: "Open Platforms for Smart Cities: Interoperability"

Spain has engages in several IoT initiatives. The main problem in Spain for IoT is in the area of interoperability in service provisions. Compatibility between platforms, devices and applications are the main challenges to be addressed.

6.2 Session 1: "Realizing the Promise of the Internet of Things (IoT) for the New Urban Agenda."

This session will provide a platform to discuss the challenges and opportunities to build an IoT ecosystem.

Moderator: Ahmed Zeddami, Chairman of Study Group 5 on “Environment and Climate Change”

Speakers:

1. **Shoumen Datta**, Senior Vice President, Industrial Internet Consortium and Research Affiliate, School of Engineering, Massachusetts Institute of Technology (MIT)

“Internet of Systems: Trans-disciplinary of IoT and CPS may transform paradoxes to paradigms.”

Abstract - A broad spectrum of disruption is anticipated by the increasing diffusion of connectivity catalyzed by systems science, engineering and technology. The data deluge is likely to reshape our thinking about privacy and propriety. It will change the “nature of the firm” through its influence on transaction cost economics. It may challenge conventional wisdom, foster counter-intuitive approaches, usher in micro-revenues to transform pay-per-service business models. The network of things and cyberphysical systems may connect known unknowns and unknown unknowns. Hence, it could expose cryptic relationships, create new correlations, induce non-obvious analyses and trigger socio-economic as well as geo-political disequilibrium in autonomy, manufacturing, transport, finance and cybersecurity in a variety of verticals, including retail, energy, healthcare and massively convergent enterprises such as resiliency, emergency and smart management systems (smart cities). Hence, the networked society may find the status quo of “silo” modus operandi strenuously inadequate to improve operations, visibility, agility, efficiency and profitability. Compartments must be dissolved by deliberate design of complementarity, to evolve, embrace, adapt and adopt global platforms with distributed ambient intelligence derived from and based on ubiquitous systems transdisciplinary.

Sometimes the period of change is an age of hope, sometimes it is an age of despair. The fall of the Roman Empire occurred in a prolonged age of despair. Steam, Democracy, CPS, IoT and IoS (internet of systems) belongs to an age of resiliency, resplendence and reasonable hope. The sum of the parts, if taken together, may exponentially accelerate the dynamic pursuit of ethical

globalization, usher an era of remediable injustices and improve equity on the road to égalité.

2. Ayman El-Nashar, Senior Director, Wireless Broadband, Terminals & Performance, Du: "Building IoT Network for Smart City"

The presentation addressed the evolution of IoT ecosystem for the smart city. The network topology for IoT was presented along with different smart city use cases.

Also, the low power wide area (LPWA) network was presented to address several smart city use cases as well as other low power and long range use cases. The potential IoT networks in licensed and unlicensed bands was evaluated. Finally, a strategy for building IoT network and its roadmap was presented.

3. Shane He, Nokia: "Connections for Future IoT Ecosystem"

Currently the Internet of Things (IoT) is not just a concept, but is in a gradually becoming a reality. With thousands of different verticals and use cases, how to connect IoT with people's lives is one of the important technical issues. After analyzed current challenges and opportunities, this presentation shows the IoT system architecture, wherein the connectivity layer is acting as a foundation of the entire IoT Ecosystem. The network operators are expected to provide the scalable, flexible, efficient and secure networks in order to support this connectivity layer. The mobile network can be optimized and designed for various verticals based on different technologies, as LTE-M, GSM evolution, 5G, short-range communication, MEC, and security solutions, etc. Other solutions also offer flexible IoT deployment options on cloud, based on current core network or based on cloud infrastructure. In the future, the connectivity technologies will support selective and customized IoT services, and to expand the human possibilities of the connected world.

4. Abdur Rahim Biswas, Create-Net, Italy: "Empowering Urban Innovation Through Convergence of IoT/ Big Data and Cloud"

The next general Internet of Things (IoTs) connected worlds comprise millions of apps, billions of users and trillion of devices. Over the last years, the IoTs has moved from being a futuristic vision to an increasing market reality. It is not a question any more what is IoT and whether IoT will come, but it is already there.

The connected trillions of devices are the enablers however the value of IoT is on the data and its advanced knowledge and services. IoT data is more dynamic, and heterogeneous, and imperfect, and unprocessed, and unstructured, and real-time than typical business data. And it demands more sophisticated, IoT-specific analytics to make it meaningful. The exploitation of the real-time big data obtained from sensors/actuators, apps in IoT context and being processed in sophisticated cloud, towards advanced proactive and intelligent applications and services.

These IoT Big data can offers:

- i) deep understanding (gained important insight)
- ii) real-time actionable insight (detect and react in real-time)
- iii) performance optimization and
- iv) proactive and predictive advanced knowledge.

To complement the needs of IoT/Big data, the cloud technologies offer decentralized and scalable information processing/analytic, data management capabilities. The presentation addressed the IoT/Big data Cloud-based platform concept and its emergence requirements on the convergence of multiple sensors and devices with big data analytics and cloud data management, and edge-heavy computing in the context of urban applications. The presentation delivered the results of iKaaS EU-Japan project on IoT/Cloud/Big data.

5. Ankush Johar, Director, Global Operations, Wireless Federation: "The Role of Regulators and Governments in Realizing the Promise of IoT"

The presentation will address why there is a compelling need for Smart Cities, and how IoT and 'Open' Big Data will play an important role within that. 'Open Data' platforms, that utilise 'Smart Data' as an asset in its own right, to create citizen focussed innovations, driven & managed by 'Smart City Stakeholder Groups' can best address any city's challenges and opportunities.

Regulators & Governments will play a vital role in the creation as well as proliferation of IoT and smart cities, and this presentation highlights the key challenges and roles that need to be addressed by these important entities.

These are backed by brief case examples from existing implementations and experiences. Why re-invent the wheel when you can simply learn from others successes and failures.

6. Craig Spiezle, Executive Director, Online Trust Alliance: "Building a Trust Framework: A foundation for certification and codes of conduct"

The role of OTA is to enhance online trust and empowering users, while promoting innovation and the vitality of the Internet:

- a. Goal to help educate businesses, policy makers and stakeholders while developing and advancing best practices and tools to enhance the protection of users' security, privacy and identity.
- b. Collaborative public-private partnerships, benchmark reporting, meaningful self-regulation and data stewardship.
- c. U.S. based 501(c)(3) tax-exempt charitable organization
- d. Global focus & charter
- e. Supported by dues and donations

The presentation discussed also where is currently OTA at and where will it be heading.

6.3 Session 2: "Why IoT Standardization Matters."

Standards play a central role in enabling the creation of markets for new technologies like IoT. This session will provide a platform to discuss IoT standardization trends

Moderator: Bilel Jamoussi, Chief of Study Groups Department, ITU

Speakers:

1. **Sébastien Ziegler**, Director and Founder, Mandat International, President, IoT Forum, and Vice Chairman, IEEE Comsoc TsC Internet of Things

Presented IoT standards development from the IEEE perspective and addressed challenges of IoT. Discussed work on integration between IoT and cloud computing, and presented how in the future there will be convergence between these three areas of IPv6, Cloud computing and IoT.

2. **David Welsh**, Microsoft/ ISO: "*Cooperation and Opportunities for Standards in the New Urban Agenda*"

Smart Cities are complex adaptive systems of systems with a diversity of stakeholders. Whereas each city has a unique context and establishes its own vision and values, cities generally have a common purpose and a common set of challenges. The pace at which technologies advance is putting intense pressure on Cities, and international standards development organizations (SDO) have the potential to provide guidance to help Cities deal with change. But SDO's are not top of mind with cities. Cities are predominantly influenced by a wide variety of other networks, associations, funders, analysts, advisors, local partners, and others. They gain a city's attention through relationships, insight and funding. Indeed, such parties often produce guidance materials which at times are pseudo-standards for cities. This presents a brand challenge to SDO's and to be relevant to Cities, SDO's need to cooperate around a new coherent portfolio of materials (not just technical specifications) that cities want to use.

3. **Omar Elloumi**, OneM2M Technical Plenary Chairman: "An Introduction to oneM2M"

The speaker introduced standardisation development work conducted at OneM2M, its standardisation architecture approach, technical specifications and technical views.

M2M Service layer is described as a software layer which sits between M2M applications and communication HW/SW that provides data transport. This normally rides on top of IP and it provides functions that M2M applications across different industry segments commonly need. Those functions are exposed to Applications via IT-friendly APIs. It allows for distributed intelligence (device, gateway, cloud apps) and it is based on RESTful APIs and resources.

4. **Sekhar Kondepudi**, Professor, National University of Singapore: "*IoT Standards Wars*"

The speaker begins by presenting on the complexity of IoT technology landscape and its multiple stakeholders environment. The speaker then zoomed in into the

wireless communication part of IoT and showed how this slice of IoT component alone has various protocols, standards and technology alliances.

Various SDO for IoT are presented and the complexity of this relationship or the standard wars between them are explained. It is then presented how moving forward the SDO can work together, especially the heavyweight players and an academic framework for synergy was presented.

7. Summary

The inaugural Study Group 20 meeting in Geneva addressed the principal ground works in creating the right architecture and framework for IoT standardisation development. Several issues have been addressed in the Work Party meetings and the committee have come out with a preliminary report from this meeting that is available on the ITU-T SG20 online database.

This meeting provides a good baseline for standardisation work at the MTSFB IoT Working Group.

8. Acknowledgement

The author would like to thank you Malaysian Technical Standards Forum Bhd and the Malaysian Communications and Multimedia Commission for the nomination to participate and contribute at the inaugural Study Group 20 meeting at the ITU Headquarter. The author acknowledges with gratitude, the support and encouragement for this trip from Telekom Malaysia Berhad.



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