## ITU-T SG20 standard progress on IoT requirements and framework and Smart Sustainable Cities' interoperability

Dr. Xueqin JIA Associate Rapporteur of Question 2 of ITU-T SG20 China Unicom 2018-07



### Contents

### **From IoT to Smart Sustainable Cities**

Development approaches for standards

Standardization progress (incl. ITU-T Q.1/20 and Q.2/20)

Introduction on SSC Recommendations

Standardization challenges



### **IoT improves our lives**



Smart cities



Manufacturing



Livestock farming



Mobile health



Irrigation



Fresh water



### **IoT expands the business market space**

IoT expands network subscribers from human to machines. Correspondingly, the market space will be largely extended not only for the telecommunication industry but also for other industries which are influenced by the telecom industry.



## What is IoT? How to define it?



- Thing: Physical thing and Virtual thing
- More than "connected things"

**Internet of Things (IoT):** A global infrastructure for the information society, enabling advanced services by interconnecting (physical and virtual) things based on, existing and evolving, interoperable information and communication technologies.

NOTE 1 – Through the exploitation of identification, data capture, processing and communication capabilities, the IoT makes full use of things to offer services to all kinds of applications, whilst ensuring that security and privacy requirements are fulfilled.

NOTE 2 – In a broad perspective, the IoT can be perceived as a vision with technological and societal implications.



# IoT links the physical world with the information world

- IoT links the physical world with the information world, where the physical world will be largely impacted by the information world.
- Virtual things in the information world will act on behalf of physical things in the physical world as digital twins. The knowledge and capabilities of the information world will expand the local knowledge and capabilities of the physical things and bring unimaginable experiences to the users.





Technical overview of IoT [b-ITU Y.2060]

### IoT ecosystem



IoT ecosystem: A large and long industry chain



### IoT, one of the enablers of SSCs

To enable data sharing and opening for government, residence and enterprise

To dedicatedly provide Information technologies for specific SSCs segments e.g., government, e-health, education, and so on.



Provide common capabilities, e.g. data collection, network connectivity, interoperability to support SSC applications

To reduce cost for infrastructure, with resources (including computing, storage, network, and so on) sharing among departments or organizations



### **IoT supports SSCs**



### **Three important aspects for SSCs**



### **Deployment view for SSCs**



### Contents

From IoT to Smart Sustainable Cities

**Development approaches for standards** 

Standardization progress (incl. ITU-T Q.1/20 and Q.2/20)

Introduction on SSC Recommendations

Standardization challenges



### **General standardization approach**



### Multiple approaches adopted by ITU-T SG20

networks,

#### The Structure of SG20

#### Title **Working Party 1** Question 1/20 End connectivity, to end interoperability, infrastructures and Big Data aspects related to IoT and SC&C

- Question 2/20 Requirements, capabilities, and use cases across verticals
- Question 3/20 Architectures, management, protocols and Quality of Service
- Question 4/20 e/Smart services, applications and supporting platforms

#### **Working Party 2**

technologies,
dentification for
Smart
unities
1 1

#### Multiple approaches in practice

Focuses on key technologies, e.g. interoperability, big data.

Adopt general approach (from use case, requirements to architectures, protocols.....) and other approach

Focuses on e/smart services, applications and so on, e.g. .



### **ITU-T Standard System of SG20 on IoT and SSC**



15

Source: refer to ITU-T FG-SSC Technical Report

### **ITU-T Recommendations under Study Group 20 responsibility**

ITU-T Y. 4000	
series	Recommendation Category
Y. 4000-Y. 4049	General
Y. 4050-Y. 4099	Definitions and terminologies
Y. 4100-Y. 4249	Requirements and use cases
Y. 4250-Y. 4399	Infrastructure, connectivity and networks
Y. 4400-Y. 4549	Frameworks, architectures and protocols
	Services, applications, computation and data
Y. 4550-Y. 4699	processing
Y. 4700-Y. 4799	Management, control and performance
Y. 4800-Y. 4899	Identification and security
Y. 4900-Y. 4999	Evaluation and accessment



### Contents

From IoT to Smart Sustainable Cities

Development approaches for standards

Standardization progress (incl. ITU-T Q.1/20 and Q.2/20)

Introduction on SSC Recommendations

Standardization challenges



#### Q1/20 End to end connectivity, networks, interoperability, infrastructures and Big Data aspects related to IoT and SC&C

Work Item	Title
<u>Y.4201 (ex. Y.frame-scc)</u>	Framework and high-level requirements of smart cities and communities (approved)
<u>Y.fsn</u>	Framework and Service scenarios for Smartwork
<u>Y.Infra</u>	Overview of city infrastructure
<u>Y.ism-ssc</u>	A Technical Framework of Integrated Sensing & Management for Smart Sustainable Cities
<u>Y.isw-ssc</u>	The Integrated Sensor Web Resource Metadata for Smart Sustainable Cities
Y.SC-OpenData	Framework of Open Data in Smart Cities
<u>Y.Suppl.45 to ITU-T Y.4000</u> series (ex. Y.SC-Overview)	An overview of smart cities and communities and the role of information and communication technologies (agreed)
<u>Y.4200 (ex. Y.SSCP)</u>	Requirements for interoperability of smart and sustainable city platforms based on a multi-layered model (approved)



### **Q2/20** Requirements, capabilities, and use cases across verticals

Work Item	Title
SuppY.IoT Scenarios for Develo ping Countries	Scenarios of Implementing Internet of Things in networks of developing countries
Supp-Y.IoT-Use-Cases	IoT Use Cases
<u>Y.4101/Y.2067</u>	Common requirements and capabilities of a gateway for Internet of Things applications (Approv ed)
Y.4114 (ex Y.IoT-BigData-reqts)	Specific requirements and capabilities of the IoT for Big Data(Approved)
<u>Y.4116 (ex Y.TPS-req)</u>	Requirements of transportation safety service including use cases and service scenarios(Appr oved)
Y.4117 (ex Y.IoT-WDS-Reqts)	Requirements and capabilities of Internet of Things for support of wearable devices and relat ed services (Approved)
Y.4118 (ex Y.IoT-AC-reqts)	Internet of Things requirements and technical capabilities for support of accounting and char ging (Consented)
Y.4119 (ex Y.AERS-reqts)	Requirements and capability framework for IoT-based automotive emergency response syste $m_{(\mbox{Approved})}$
Y.Accessibility-IoT	Accessibility requirements for the Internet of things applications and services
Y.IoT-BPM-reqts-caps	Specific Requirements and Capabilities of the Internet of Things for Business Process Manage ment

# **Q2/20 (continue)** Requirements, capabilities, and use cases across verticals

Work Item	Title
Y.IoT-EC-reqts	IoT requirements for edge computing
Y.IoT-GP-Reqts	Requirements for an IoT enabled network to support applications for global processes of t he earth
Y.IoT-ITS-framework	Framework of Cooperative Intelligent Transport Systems based on the Internet of Things
Y.IoT-NCM-reqts	Requirements and capabilities of network connectivity management in the Internet of Thi ngs
Y.IoT-Retail-Reqts	Requirements of applications for retail stores enabled by Internet of Things technologies
Y.IoT-things-description-reqts	Requirements of things description in the Internet of Things
Y.IoT-UAS-Reqts	Use cases, requirements and capabilities of unmanned aircraft systems for Internet of Thi ngs
Y.IoT-UM-reqts	Requirements and Use Cases for Universal Communication Module of Mobile IoT devices
Y.SCC-Reqts	Common requirements and capabilities of smart cities and communities from IoT and ICT perspectives
Y.SCC-Use-Cases	Use Cases of Smart Cities and Communities

### **Q2/20 (continue)** Requirements, capabilities, and use cases across verticals

Work Item	Title
Y.SEM	Requirements and capability framework of Smart Environmental Monitoring
Y.SmartMan-IIoT-overview	Overview of smart manufacturing in the context of Industrial Internet of Things
Y.smartport	Requirements of smart management of supply services in smart port
Y.SRC	Requirements for deployment of smart services in rural communities
Y.UCS-reqts	Requirements and capabilities of user-centric work space service
Y.WPT-usecase	Use cases of Wireless Power Transfer Application Service



### Contents

From IoT to Smart Sustainable Cities

Development approaches for standards

Standardization progress (incl. ITU-T Q.1/20 and Q.2/20)

### **Introduction on SSC Recommendations**

Standardization challenges



# **Recommendation ITU-T Y.4200 Requirements for the interoperability of smart city platforms (Feb. 2018)**

Scope This Recommendation identifies the technical requirements for interoperability of smart city platforms (SCP\*) to enable the additional functions provided by external providers or other city platforms.



Overview of an SCP and external systems/platforms [ITU-T Y.4201]

23

#### **Recommendation ITU-T Y.4201 High-level requirements and reference** framework of smart city platforms (Feb. 2018)

Scope This Recommendation defines the reference framework and high-level requirements of smart city platforms.





### Contents

From IoT to Smart Sustainable Cities

Development approaches for standards

Standardization progress (incl. ITU-T Q.1/20 and Q.2/20)

Introduction on SSC Recommendations

**Standardization challenges** 



### **SSC standardization challenges**

- Differentiated society and culture for countries, together with different economy and environment development level
- Huge and complex SSC ecosystem; Segmented service requirements
- Involving experts with multidisciplinary knowledge
- How to improve the visibility of SSC standards on market and technology development
  - □ Standards: define what we need to do
  - Open source: implement functions defined by standards
  - □ How the two aspects coordinate with each other efficiently





### **Useful references**

ITU-T SG20: http://www.itu.int/en/ITU-T/studygroups/2017-2020/20/Pages/default.aspx
JCA-IoT and SC&C: http://www.itu.int/en/ITU-T/jca/iot/Pages/default.aspx

•FG-DPM: http://www.itu.int/en/ITU-T/focusgroups/dpm/Pages/default.aspx



Presenter: Dr. Xueqin JIA, China Unicom E-mail: jiaxq21@chinaunicom.cn



# Thank you for your attention!

Acknowledgement: CAICT provides necessary material for smart city development in China.

