Shaping Smart Sustainable Cities through international standards

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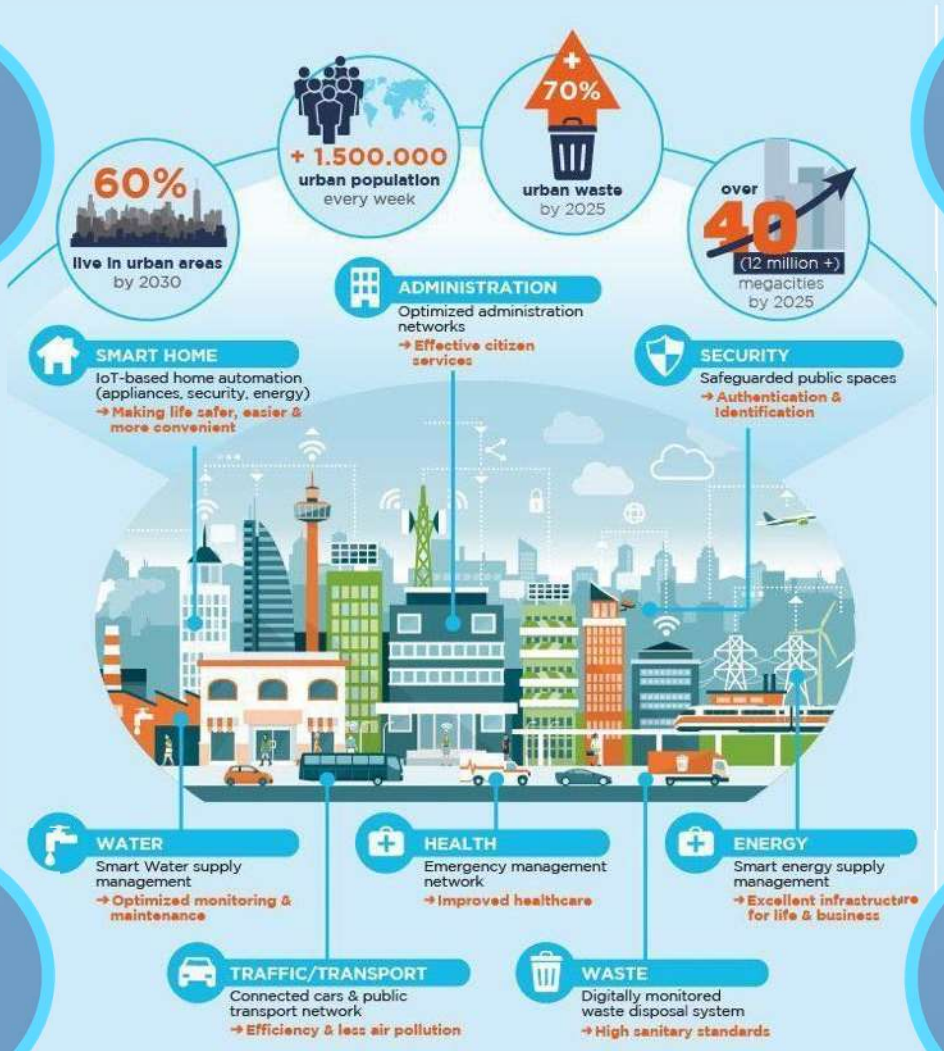
IoT enabling connected living in Smart Cities

Fast growing urbanization needs optimized infrastructure

By 2050, **70%** of the world population will live in cities



By 2020, **50 billion devices** will be connected

There are more than **40** megacities worldwide by 2017, each with a population of at least 10M

Smart City Technologies will increase **IoT Revenue to $49.95B**

Content

- Smart city development, China as an example
- Standardization work of SG20 facilitates smart cities

Why China need smart city

Smart City：to break the shackles of traditional thinking and solve the key problems in the process of urbanization.

The urbanization rate grows rapidly during last decade in China; in 2011, it goes beyond 50% and marked that urbanization has entered a new period for the first time. With every one point increase in the urbanization rate, there will be 14million rural people turn into **Urbanian.**

- The Sustainable Development
  - Extensive economy growth mode
  - The shortage of resource: water, land and energy
  - Ecological environmental degeneration
  - Lack of social capital :social trust 、 community spirit and community attachment
  - City management and public services
  - Traffic jams……

- The equity of development (region/city and countryside /social groups)
  - The quality of living
  - Public services
  - Opportunities of developing……

The new town and new district of smart cities in China are mainly concentrated in Eastern areas, expanding to western

Why?

- **Advanced economy—means they have money to do this**
- **Talented people----means they have technology to build this**
- **Open-minded----means they are easy and willing to accept kinds of new concepts**

Smart City Presents 3 Development Models

Type	Development Characteristics	Typical cities
Comprehensive Development Model	• Large-scale city, strong Economic, high- level Informatization • The construction of Smart City is a city development strategy, which drives the development of city and promotes the transformation and upgrading of city	• First-tier city like Beijing、Shanghai、Guangzhou
Industries Pulling Model	• Highlight local competitive industry, such as resources. • The construction of Smart City pulls special industries, and bring more quality resources with local advantage.	• The southeast coastal developed cities like Wuxi、Yangzhou
Follow-up Model	• The promotion of information infrastructure and application，combined with the city strategy itself, could consolidate the foundation of smart development and reference for other cities.	• Small and medium-sized city like Zhuzhou、Siping

Development Goals of New-type Smart City in China

Competitive industrial environment

Attractive living environment

innovation management pattern

Industry

Resident

Government

Improve Public Service Performance

Smart City development core is " benefit people through information " 。 Through release digital dividend , it could benefit people through information anywhere and build a harmonious, livable, vibrant and more features modern city.

Focus on "two development goals"

Enhance Urban Governance Level

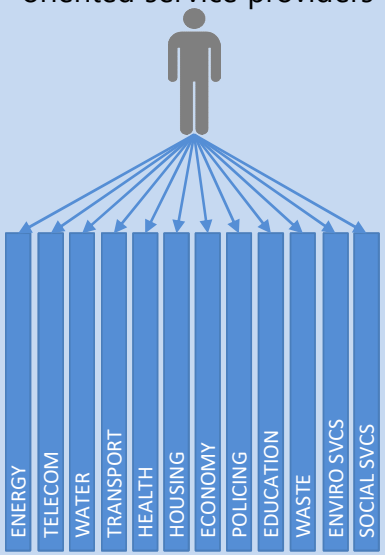
By innovating institution and integrating city recourse, it could promote accurate, transparent and efficient urban management and impel the modernization of urban governance system and governance capacity.

- Smart city development, China as an example
- Standardization work of SG20 facilitates smart cities

ITU-T SG20: IoT and Smart Cities & Communities

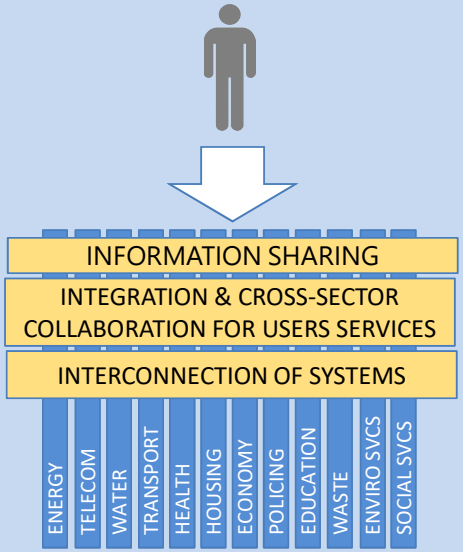
FROM

Closed & un-connected vertical silos of functionally-oriented service providers



TO

Innovative and collaborative new models that connect these vertical silos



- Internet of things (IoT) and its applications
- Smart cities and communities, including its e-services and smart services
- Internet of things identification

What is SG20 currently working on:

Internet of things (IoT)

- **Drones** for IoT
- IoT requirements for **edge computing**
- **Artificial Intelligence** and IoT
- Smart Manufacturing - **Industrial Internet of things**
- **Blockchain** and IoT
- IoT for **developing countries**
- **Intelligent Transport Systems (ITS)** based on IoT
- **Privacy and trust** of IoT systems
- **Interoperability**

Smart cities and communities

- **Open Data** in Smart Cities
- **Use cases, requirements and architectures for** Smart cities and communities
- **Smart Services in rural communities**
- **Disaster notification** of the population in smart cities and communities
- **Smart Tourist** destinations
- *Smart City Infrastructure*

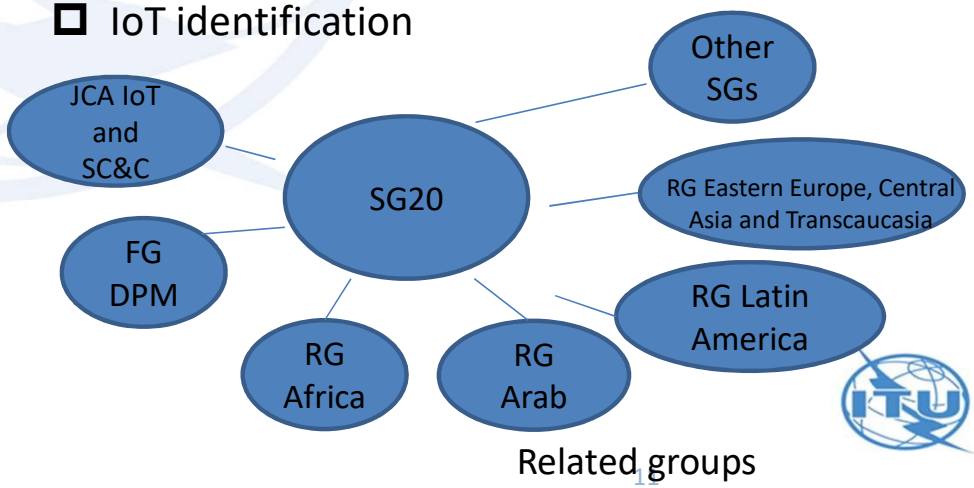
Data management & processing

- Data structure and data transfer protocol for **automotive emergency response system**
- Function description and metadata of Spatio-temporal Information Service for SSC
- *Integrity*

The structure of ITU-T SG20

	Title
Working Party 1	
Question 1/20	End to end connectivity, networks, 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	
Question 5/20	Research and emerging technologies, terminology and definitions
Question 6/20	Security, privacy, trust and identification
Question 7/20	Evaluation and assessment of Smart Sustainable Cities and Communities

- Study Group 20 is working to address the standardization requirements of Internet of Things technologies, with an initial focus on IoT applications in smart cities and communities (SC&C).
- ITU-T SG20 is the leading group in ITU-T on:
  - Internet of things (IoT) and its applications;
  - Smart Cities and Communities (SC&C), including its e-services and smart services
  - IoT identification



Some examples of SG20 current work items:

Draft ITU-T Y.SRC "Requirements for deployment of smart services in rural communities"

This Recommendation aims to establish basic conditions of operation of services (such as e-government, health, education, etc.) and contribute to the development of enterprises and create conditions for making smart communities attractive to the population.

Draft ITU-T Y.SSC-AISE-arc "Reference architecture of artificial intelligence service exposure for smart sustainable cities"

This Recommendation introduces concept of artificial intelligence service exposure (AISE) for smart sustainable cities, analyses its common characteristics and high-level requirements, brings a reference architecture of AISE and relevant common capabilities.

Draft ITU-T TR.AI4IoT "Artificial Intelligence and Internet of Things"

ITU-T SG20 last meeting main results
Cairo, Egypt, 6-16 May 2018

Statistics:

216 Participants

1 Recommendation approved

- ITU-T Y.4500.2 (ex.Y.oneM2M.REQ) **"oneM2M- Requirements"**

9 Draft Recommendations consented

14 New work items

ITU-T SG20 Main outcomes
Cairo, Egypt, 6-16 May 2018

9 draft Recommendations consented

- **ITU-T Y.4120** - Requirements of Internet of Things applications for smart retail stores
- **ITU-T Y.4121** - Requirements of an Internet of Things enabled network for support of applications for global processes of the earth
- **ITU-T Y.4003** - Overview of smart manufacturing in the context of Industrial Internet of Things
- **ITU-T Y.4416** - Architecture of the Internet of Things based on NGNe
- **ITU-T Y.4417** - Framework of self-organization network in the IoT environments
- **ITU-T Y.4418** - Functional architecture of gateway for IoT applications
- **ITU-T Y.4500.32 -** oneM2M-MAF and MEF Interface Specification
- **ITU-T Y.4457 -** Architectural framework for transportation safety services
- **ITU-T Y.4415 -** Architecture of web of objects based virtual home network

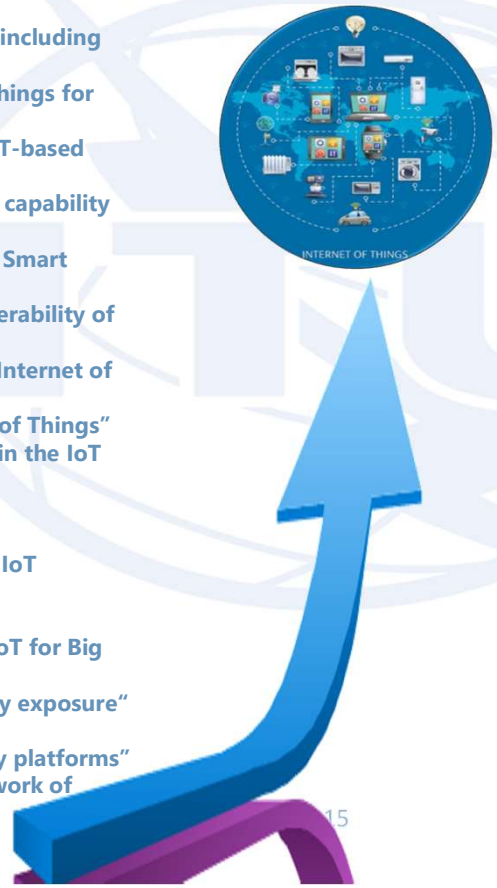
14 new work items

- **Y.SmartAirport** - Services and high-level requirements of smart airports for interaction with external platforms
- **Y.Sup-IoT-Eco-Plan -** Framework for Internet of Things Ecosystem Master Plan
- **Y.IoT-SLF -** Framework and capabilities for Smart Livestock Farming Based on Internet of Things
- **Y.Accessibility-PTS -** Accessibility Requirements for Smart Public Transportation Services
- Y.IoT-EC-GW - Capabilities and framework of edge computing-enabled gateway in the IoT
- **Y.dev-IoT-arch -** Architectural reference model of devices for IoT applications
- **Y.dec-IoT-arch -** Decentralized IoT communication architecture based on ICN and blockchain
- **Y.cnce-IoT-arch -** Functional architecture of cellular-radio network capability exposure for smart hospital based on Internet of things
- **Y.NDA-arch** - Functional architecture of network-based driving assistance for autonomous vehicles

ITU-T SG20 main results
October 2015 – May 2018

33 New Recommendations approved

- ITU-T Y.4101 "**Common requirements and capabilities of a gateway for Internet of Things applications**"
- ITU-T Y.4116 "**Requirements of transportation safety service including use cases and service scenarios**"
- ITU-T Y.4117 "**Requirements and capabilities of Internet of Things for support of wearable devices and related services**"
- ITU-T Y.4119 "**Requirements and capability framework for IoT-based automotive emergency response system**"
- ITU-T Y.4455 "**Reference architecture for IoT network service capability exposure**"
- ITU-T Y.4456 "**Requirements and Functional Architecture for Smart Parking Lot in Smart City**"
- ITU-T Y.4805 "**Identifier service requirements for the interoperability of Smart City applications**"
- ITU-T Y.4806 " **Security capabilities supporting safety of the Internet of Things**"
- ITU-T Y.4113 "**Requirements of the network for the Internet of Things**"
- ITU-T Y.4451 "**Framework of constrained device networking in the IoT environments**"
- ITU-T Y.4452 "**Functional framework of Web of Objects**"
- ITU-T Y.4453 "**Adaptive software framework for IoT devices**"
- ITU-T Y.4553 "**Requirements of smartphone as sink node for IoT applications and services**"
- ITU-T Y.4702 "**Common requirements and capabilities**"
- ITU-T Y.4114 "**Specific requirements and capabilities of the IoT for Big Data**"
- ITU-T Y.4115 "**Reference architecture for IoT device capability exposure**"
- ITU-T Y.4500.1 "**oneM2M- Functional Architecture**"
- ITU-T Y.4200 "**Requirements for interoperability of smart city platforms**"
- ITU-T Y.4201 "**High-level requirements and reference framework of smart city platform**"
- ITU-T Y.4500.22 "**oneM2M-Field Device Configuration**"



- ITU-T Y.4500.10 "**oneM2M- MQTT Protocol Binding**"
- ITU-T Y.4500.11 "**oneM2M- Common Terminology**"
- ITU-T Y.4500.12 "**oneM2M Base Ontology**"
- ITU-T Y.4500.13 "**oneM2M- Interoperability Testing**"
- ITU-T Y.4500.14 "**oneM2M- LwM2M Interworking**"
- ITU-T Y.4500.15 "**oneM2M- Testing framework**"
- ITU-T Y.4500.20 "**oneM2M- WebSocket Protocol Binding**"
- ITU-T Y.4500.23 "**oneM2M-Home Appliances Information Model and Mapping**"
- ITU-T Y.4500.4 "**oneM2M- Service Layer Core Protocol Specification**"
- ITU-T Y.4500.5 "**oneM2M- Management enablement (OMA)**"
- ITU-T Y.4500.6 "**oneM2M Management enablement (BBF)**"
- ITU-T Y.4500.8 "**oneM2M- CoAP Protocol Binding**"
- ITU-T Y.4500.9 "oneM2M- HTTP Protocol Binding"

ITU-T SG20 main results (2)
October 2015 – May 2018

10 New Supplements agreed

- ITU-T Y.Supp.45 to ITU-T Y.4000 series "**An overview of smart cities and communities and the role of information and communication technologies**"
- ITU-T Y.Supp.42 to ITU-T Y.4100 series **"Use cases of User-Centric work Space (UCS) Service**
- ITU-T Y.Supp.34 to ITU-T Y.4000 series **"Smart Sustainable Cities - Setting the stage for stakeholders' engagement"**
- ITU-T Y.Supp.33 to ITU-T Y.4000 series **"Smart Sustainable Cities - Master plan"**
- ITU-T Y.Supp.32 to ITU-T Y.4000 series **"Smart sustainable cities - a guide for city leaders"**
- ITU-T Y.Supp.31 to ITU-T Y.4550 series **"Smart Sustainable Cities - Intelligent sustainable buildings"**
- ITU-T Y.Supp.28 to ITU-T Y.4550 series **"Integrated management for smart sustainable cities";**
- ITU-T Y.Supp.29 to ITU-T Y.4250 series **"Multi-service infrastructure for smart sustainable cities in new-development areas";**
- ITU-T Y.Supp.30 to ITU-T Y.4250 series **"Overview of smart sustainable cities infrastructure";**
- ITU-T Y.Supp.27 to ITU-T Y.4400 series **"Setting the framework for an ICT architecture of a smart sustainable city".**

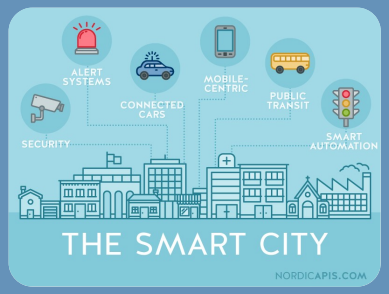
1 Draft new Recommendations determined

- ITU-T Y.4454 **"Platform Interoperability for Smart Cities"**

6 Technical Reports agreed

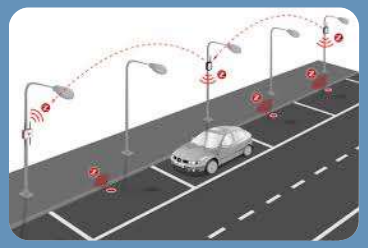
- Y.oneM2M.Ind.DE **"oneM2M Industrial Domain Enablement"**
- Y.oneM2M.UCC **"oneM2M Use Case Collection"**
- Y.oneM2M.DG.AppDev **"oneM2M- Application developer guide: Light control example using HTTP binding"**
- Y.oneM2M.DG.CoAP **"oneM2M Developer Guide of CoAP binding and long polling for temperature monitoring"**
- Y.oneM2M.DG.DM **"oneM2M- Developer guide of device management"**
- Y.oneM2M.DG.SEM **"oneM2M-Developer Guide of Implementing semantics"**

Some examples of SG20 achievements on IoT and SC&C:



ITU-T Y.4200 "Requirements for interoperability of smart city platforms"

This Recommendation defines the requirements for interoperability of a **Smart City Platform (SCP)** and reference points in order to ensure the correct functioning of the city services.



ITU-T Y.4456 "Requirements and Functional Architecture for Smart Parking Lot in Smart City"
"

Smart Parking Lot can provide various parking services for different scenarios of parking lots. The typical services include parking guidance, parking space reservation, vehicle reverse search, vehicle automatic access control and self-service payment. This Recommendation specifies requirements and functional architecture for Smart Parking Lot.

Strengthening Regional & International Collaboration

Regional Groups

- SG20RG-LATAM
- SG20RG-AFR
- SG20RG-ARB
- SG20RG-EECAT

JCA-IoT and SC&C

- Collaboration and coordination with other SDOs on topics on IoT and SC&C
- IoT and SC&C online standards roadmap

FG-DPM

SDOs

oneM2M ISO IEC

Raising awareness on IoT and SC&C

Over 15 events
organized on IoT and smart cities and communities

- **ITU-T Study Group 20: Internet of things and smart cities & communities meeting**
  Wuxi, China, 3-13 December 2018.

Thank you

ITU-T, IoT and smart cities & communities

http://itu.int/go/tsg20

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