ITU-T Study Group 20: Internet of things (IoT) and smart cities and communities (SC&C)

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Rapporteur of Q3/20

December 2016
Bangkok, Thailand
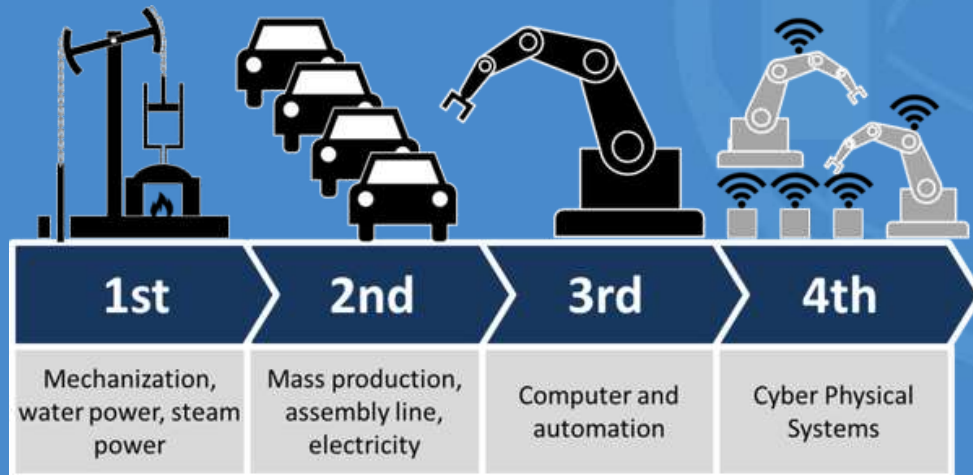
ITU-T Study Group 20: Internet of things (IoT) and smart cities and communities (SC&C)

Technical Trend of IoT/SC&C

The Fourth Industrial Revolution

1st Mechanization, water power, steam power

2nd Mass production, assembly line, electricity

3rd Computer and automation

4th Cyber Physical Systems

ITU-T SG20

It includes studies relating to Big data aspects of IoT and SC&C, e-services and smart services for SC&C

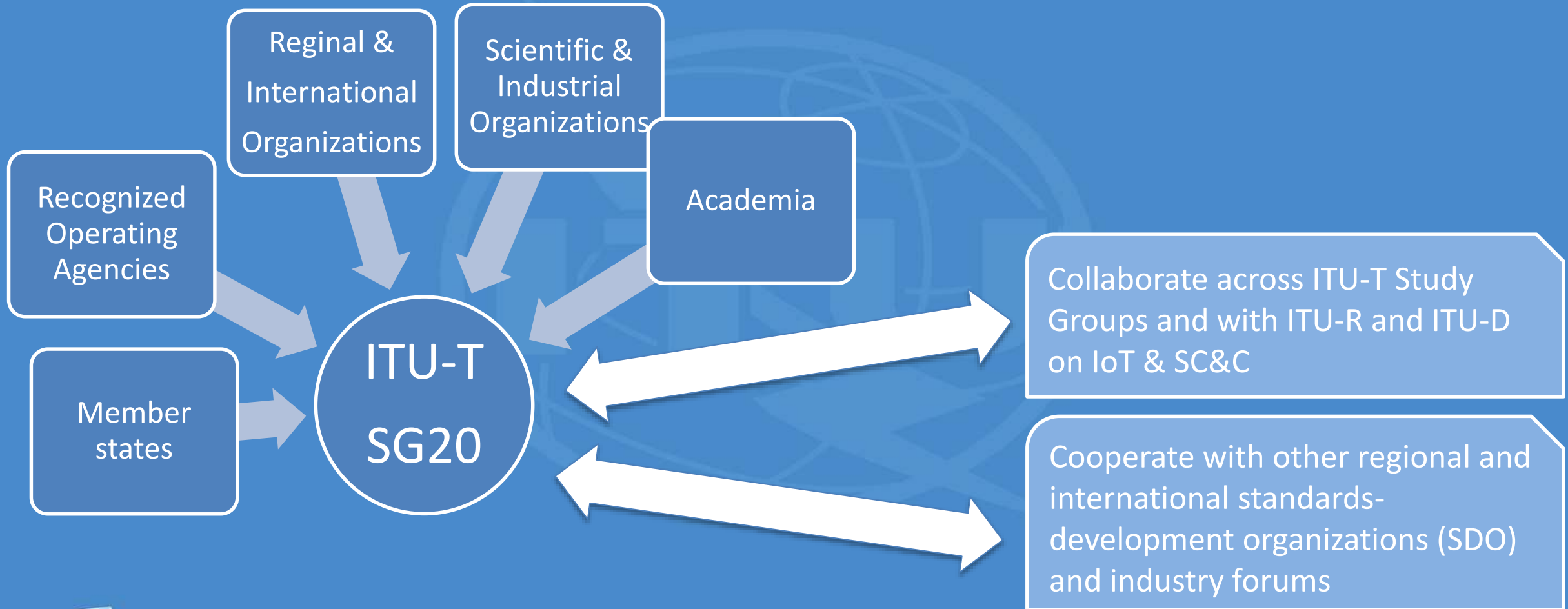Responsible for studies relating to IoT and its applications, and smart cities and communities (SC&C).

Lead study group on

Internet of things (IoT) and its applications

Smart Cities and Communities (SC&C), including its e-services and smart services

IoT identification

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ITU-T SG20 Members & Collaborations

Recognized Operating Agencies

Reginal & International Organizations

Scientific & Industrial Organizations

Academia

Member states

ITU-T SG20

Collaborate across ITU-T Study Groups and with ITU-R and ITU-D on IoT & SC&C

Cooperate with other regional and international standards-development organizations (SDO) and industry forums

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Why you should join ITU-T SG20?

- Address broad market needs

- Leverage expert knowledge

- Open new markets and applications

- Drive global innovation and advancement

- Reduce cost

- Embody diverse perspectives

- Serve as building blocks for innovation

- Encourage market competition

- Streamline development and implementation

- Drive interoperability and scalability

ITU-T SG20 Current Key topics

Research and emerging technologies including terminology and definitions

- Common terminology for IoT and SC&C
- Consideration on end user adoption of IoT
- IPv6
- Research and emerging technologies related to IoT and SC&C

Internet of Things (IoT)

- General requirements and capabilities of IoT applications and services
- Frameworks and functional architectures of IoT to support networks and gateway
- Specific IoT services covering transportation safety services, e-health services and so on
- IoT based smart greenhouse, smart farming, smart manufacturing and Big Data issues
- Security, trust and privacy protection in IoT

Smart cities and Communities (SC&C)

- SC&C related ecosystem, applications, services and use cases
- Standards that are directly related to SC&C with focus on:

✓ Urban planning ✓ Water ✓ Mobility ✓ Logistic ✓ Waste ✓ Healthcare ✓ E-government ✓ Education ✓ Transport ✓ Energy

- Open Data
- Spatio-temporal modeling for SC&C
- Integrated sensing & management for Smart Sustainable Cities

ITU-T SG20 main results
October 2015 – December 2016

6 New Recommendations approved

- 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"**

1 Draft new Recommendation determined

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

9 New Supplements agreed

- 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".**

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Some ongoing work items under study

- Y.Accessibility-IoT - Accessibility requirements for the Internet of things applications and services

- Y.del-fw - Framework of delegation service for the IoT devices

- Y.IoT-DA-Counterfeit - Information Management Digital Architecture to combat counterfeiting in IoT

- Y.IoT-Interop - An Interoperability framework for IoT

- Y.IoT-IoD-PT - Identity of IoT devices based on secure procedures and ensures privacy and trust of IoT systems

- Y.ODI - Open Data Indicator in smart cities

- Y.smartport – Requirement of smart managements of supply services in smart port

- Y.frame-scc - Framework and high-level requirements of smart cities and communities

- Y.fsn - Framework and Service scenarios for Smartwork

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JCA – IoT and SC&C

- To co-ordinate the activity on IoT & SCC across ITU-T Study Groups and to coordinate with ITU-R and ITU-D.
- To provide a visible contact point IoT and SC&C activities in ITU-T, to seek co-operation from external bodies working in the field of IoT & SCC and enable effective two-way communication with these bodies.
- Maintenance of a list of cross-SDO IoT & SCC standardization items and associated roadmap.

- Next meeting to take place in March 2017

Co-Conveners:
- Hyoung Jun Kim (ETRI, Korea)
- Fabio Bigi (Italy)

D.2r15 - IoT and SC&C standards roadmap (free download) – **Send us your inputs!**

Secretariat:
Contact: tsbjcaiot@itu.int

New Resolution
Enhancing the standardization of Internet of things and Smart Cities and Communities for global development

25 October – 3 November 2016

Highlights of this Resolution:

- Considers the importance of IoT to contribute to achieving the 2030 Agenda for Sustainable Development.
- Resolves to instruct ITU-T SG20 to develop ITU-T Recommendations aimed at implementing IoT and SC&C.
- Instructs the Director of TSB to continue to support the **United for Smart Sustainable Cities Initiative (U4SSC),** launched by ITU together with the United Nations Economic Commission for Europe (UNECE) in May 2016, and share its deliverables with ITU-T Study Group 20 and other study groups concerned.

United for Smart Sustainable Cities (U4SSC) – new UN Initiative!

U4SSC is a global platform for smart city stakeholders which advocates for public policy to encourage the use of ICTs to facilitate the transition to smart sustainable cities.

JOIN us now!

WG 01

Setting the Framework

- Urban planning
- Policy, standards & regulation
- Key performance indicators

WG 02

Connecting Cities and Communities

- Smart living
- Smart mobility
- Smart environment

WG 03

Enhancing Innovation & Participation

- Smart governance
- Smart people
- Smart economy

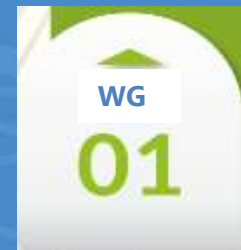**11 SUSTAINABLE CITIES AND COMMUNITIES**

Co-Chairmen:
- H.E. Ms Daiva Matoniene, Vice Minister of Environment (Lithuania)
- Nasser Saleh Al Marzouqi, Chairman, ITU-T SG20

Secretariat:
Contact: u4ssc@itu.int

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A Virtual Meeting every month!

ITU

KPIs Project for Smart Sustainable Cities to Reach SDGs

KPIs Dimensions

11 SUSTAINABLE CITIES AND COMMUNITIES

Economy

- ICT infrastructure and Access/Usage
- Innovation
- Employment
- Trade
- Productivity
- Physical infrastructure
- Public sector

Environment

- Air quality
- Water
- Noise
- Environmental quality
- Biodiversity
- Energy

Society and culture

- Education
- Health
- Safety
- Housing
- Culture
- Social inclusion

Dubai

Singapore

Valencia

Buenos Aires

Montevideo

Manizales

and many others...

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Publications on IoT and Smart Sustainable Cities

Flipbook on Unleashing the potential of the Internet of Things

This flipbook presents a compendium of the first set of ITU international standards for IoT, providing a resource of great value to standards experts interested in contributing to the work of ITU-T Study Group 20.

Flipbook on Shaping smarter and more sustainable cities: Striving for Sustainable Development Goals

This compendium of Technical Reports and Specifications details policy and technical considerations relevant to the development of SSC, providing policymakers and engineers with valuable reference material to guide their pursuit of happier, safer life in our cities.

Available on ITU website for free!

Next ITU-T SG20 meeting

- **ITU-T SG20 Meeting**
  - 13 - 23 March 2017, Dubai, UAE
- **Forum on "Accelerating IoT for Smart Cities"**
  - 12 March 2017, Dubai, UAE

Thank you

ITU-T, IoT and smart cities & communities

http://itu.int/go/tsg20

tsbsg20@itu.int

Supplementary slides

ITU-T SG20 Approved Recommendations

- **ITU-T Y.4113 "Requirements of the network for the Internet of Things":** This Recommendation describes the requirements of the network for the Internet of Things (IoT) that enhance the common requirements of the IoT identified in ITU-T Recommendation Y.2066. The requirements focus on the transport functions of the network, but also cover service support functions.

- **ITU-T Y.4451 "Framework of constrained device networking in the IoT environments":** This Recommendation specifies the framework of constrained device networking in the Internet of things (IoT) environments in an aspect of the communications of IoT device. This Recommendation describes the concept of constrained device networking in the IoT environments and communication of constrained devices. It also describes network architecture and mechanisms of constrained device networking.

- **ITU-T Y.4452 "Functional framework of Web of Objects":** This Recommendation provides the functional framework of Web of Objects (WoO) including the concept, the reference model, functional capabilities and information models.

- **ITU-T Y.4453 "Adaptive software framework for IoT devices":** This Recommendation addresses the concept of the adaptive software framework (ASF), identifies high-level requirements, and provides a reference functional architecture for the IoT devices.

- **ITU-T Y.4553 "Requirements of smartphone as sink node for IoT applications and services":** This Recommendation provides common Requirements of a smartphone working as a sink node (SPSN) for IoT applications and services. This Recommendation clarifies the concept of a sink node in IoT domain, and identifies the characteristics, work modes and the high level functional requirements of the SPSN. The use cases are also provided in appendix.

- **ITU-T Y.4702 "Common requirements and capabilities":** This Recommendation provides the common requirements and capabilities of device management in the Internet of Things (IoT). The provided common requirements and capabilities are intended to be generally applicable in device management application scenarios.

ITU-T SG20 determined Recommendation

1 Recommendation determined

ITU-T Y.4454 "Platforms Interoperability for Smart Cities"

Determined on 5 August 2016

This Recommendation presents a platform of smart city services that ensures their correct functioning, as well as their efficiency, performance, security and scalability. The platform provides a comprehensive system for smart city management, including:

a)   Compiling data on the city, citizens and businesses.

b)   Distributing data, to be subsequently processed by managers of the different services.

c)   Analyzing data.

d)   Making decisions by returning the analysed data to the systems carrying out the different tasks.

e)   Making data and capabilities available to developers to facilitate an applications ecosystem based on a platform that creates added value for citizens.

List of Recommendations transferred from other Study Groups

		Study Group 20: IoT and its applications including smart cities and communities (SC&C) Y.4000 Series Stucture	
Y.4000 Number	**Previous Work Item**	**IoT and SC&C proposed subseries**	**From**
Y.4000-Y.4049		**General**	
Y.4000	(Y.2060)	Overview of the Internet of things	SG13
Y.4001	(F.748.2)	Overview and reference model of machine socialization	SG16
Y.4002	(F.748.3)	Relation management models and descriptions for machine socializations	SG16
Y.4050-Y.4099		**Definitions and terminologies**	
Y.4050	(Y.2069)	Terms and definitions for the IoT	SG13
Y.4100-Y.4249		**Requirements and use cases**	
Y.4100	(Y.2066)	Common requirements of the Internet of Things	SG13
Y.4101	(Y.2067)	Common requirements and capabilities of a gateway for Internet of Things applications	SG13
Y.4102	(Y.2074)	Requirements for Internet of things devices and operation of Internet of things applications during disasters	SG13
Y.4103	(F.748.0)	Common requirements for Internet of Things (IoT) applications	SG16
Y.4104	(F.744)	Service description and requirements for ubiquitous sensor network middleware	SG16
Y.4105	(Y.2221)	Requirements for support of ubiquitous sensor network (USN) applications and services in the NGN environment	SG13
Y.4106	(F.747.3)	Requirements and functional model for ubiquitous network robot platform to support USN applications and services	SG16
Y.4107	(F.747.6)	Requirements of water quality assessment services in ubiquitous sensor network (USN)	SG16
Y.4108	(Y.2213)	NGN service requirements and capabilities for network aspects of applications and services using tag-based identification	SG13
Y.4109	(Y.2061)	Requirements for the support of machine-oriented communication applications in the NGN environment	SG13
Y.4110	(Y.2065)	Service and capability requirements for e-health monitoring services	SG13
Y.4111	(Y.2076)	Semantics based requirements and framework of the Internet of Things	SG13
Y.4112	(Y.2077)	Requirements of the Plug and Play capability of the Internet of Things	SG13
Y.4250-Y.4399		**Infrastructure, connectivity and networks**	
Y.4250	(Y.2222)	Sensor control networks and related applications in a next generation network environment	SG13
Y.4251	(F.747.1)	Capabilities of ubiquitous sensor networks (USN) for supporting requirements of smart metering services	SG16
Y.4252	(Y.2064)	Energy saving using smart objects in home networks	SG13

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Y.4000 Number	**Previous Work Item**	**IoT and SC&C proposed subseries**	**From**
Y.4250-Y.4399		**Infrastructure, connectivity and networks**	
Y.4250	(Y.2222)	Sensor control networks and related applications in a next generation network environment	SG13
Y.4251	(F.747.1)	Capabilities of ubiquitous sensor networks (USN) for supporting requirements of smart metering services	SG16
Y.4252	(Y.2064)	Energy saving using smart objects in home networks	SG13
Y.4400-Y.4549		**Frameworks, architectures and protocols**	
Y.4400	(Y.2063)	Framework of the web of things	SG13
Y.4401	(Y.2068)	Functional framework and capabilities of the Internet of Things	SG13
Y.4402	(F.747.4)	Requirements and functional architecture for the open USN service platform	SG16
Y.4403	(Y.2026)	Functional requirements and architecture of the next generation network for support of ubiquitous sensor network applications and services	SG13
Y.4404	(Y.2062)	Framework of object-to-object communication for ubiquitous networking in next generation networks	SG13
Y.4405	(H.621)	Architecture of a system for multimedia information access triggered by tag-based identification	SG16
Y.4406	(Y.2016)	Functional requirements and architecture of the NGN for applications and services using tag-based identification	SG13
Y.4407	(Y.2281)	Framework of networked vehicle services and applications using NGN	SG13
Y.4408	(Y.2075)	Capability framework for e-health monitoring services	SG13
Y.4409	(Y.2070)	Requirements and architecture of the home energy management system and home network services	SG13
Y.4410	(Y.2291)	Architectural overview of next generation home networks	SG13
Y.4411	(Q.3052)	Overview of APIs and protocols for M2M service layer	SG11
Y.4412	(F.747.8)	Requirements and reference architecture for audience selectable media service framework in the IoT environment	SG16
Y.4413	(F.748.5)	Requirements and reference architecture of M2M service layer	SG16
Y.4414	(H.623)	Web of things service architecture	SG16
Y.4550-Y.4699		**Services, applications, computation and data processing**	
Y.4450	(Y.2238)	Overview of Smart Farming based on networks	SG13
Y.4551	(F.771)	Service description and requirements for multimedia information access triggered by tag-based identification	SG16
Y.4552	(Y.2078)	Application support models of the Internet of Things	SG13

List of Recommendations transferred from other Study Groups

Study Group 20: IoT and its applications including smart cities and communities (SC&C) Y.4000 Series Stucture			
Y.4000 Number	**Previous Work Item**	**IoT and SC&C proposed subseries**	**From**
Y.4700-Y.4799		**Management, control and performance**	
Y.4700	(F.747.2)	Deployment guidelines for ubiquitous sensor network (USN) applications and services for mitigating climate change	SG16
Y.4701	(H.641)	SNMP-based sensor network management framework	SG16
Y.4800-Y.4899		**Identification and security**	
Y.4800	(F.747.5)	Requirements and functional architecture of an automatic location identification system for ubiquitous sensor network (USN) applications and services	SG16
Y.4801	(F.748.1)	Requirements and common characteristics of IoT identifier for IoT service	SG16
Y.4802	(H.642.2)	Multimedia information access triggered by tag-based identification: Registration procedures for identifiers	SG16
Y.4803	(H.642.3 | ISO/IEC 29177 (common text))	Information technology - Automatic identification and data capture technique - Identifier resolution protocol for multimedia information access triggered by tag-based identification	SG16
Y.4804	(H.642.1)	Multimedia information access triggered by tag-based identification: Identification scheme	SG16
Y.4900-Y.4999		**Evaluation and assessment**	
Y.4900	L.1600	Overview of key performance indicators in smart sustainable cities	SG5
Y.4901	L.1601	Key performance indicators related to the use of information and communication technology in smart sustainable cities	SG5
Y.4902	L.1602	Key performance indicators related to the sustainability impacts of information and communication technology in smart sustainable cities	SG5
Supplements			
Y.Sup.37 to Y.4050-Y.4099	ITU-T L Suppl.17 to ITU-T L.1600	Definition for smart sustainable city	SG5
Y.Sup.38 to Y.4050-Y.4099	ITU-T L Suppl.18 to ITU-T L.1600	Smart sustainable cities: an analysis of definitions	SG5
Y.Sup.39 to Y.4900	ITU-T L Suppl.19 to ITU-T L.1600	Key performance indicators definitions for smart sustainable cities	SG5
Y.Sup.36 to Y.4550-Y.4699	ITU-T L Suppl.16 to ITU-T L.1500	Smart water management in cities	SG5
SG5 transferred Recommendations			
Y.4903	(L.1603)	Key performance indicators for smart sustainable cities to assess the achievement of sustainable development goals (consented) (under AAP ITU-T SG5)	SG5

Past Events on IoT and Smart Sustainable Cities

Forum on Internet of Things: Empowering the New Urban Agenda
Geneva, 19 October 2015

Joint ISO/IEC/ ITU Workshop on "Internet of Things"
Berlin, Germany, 13 May 2016.

Forum on "Powering Smart Sustainable Cities With the Internet of Things", jointly organized by ITU, UN-Habitat and UNESCO, Nassau, Bahamas, 17-18 December 2015.

Forum on "Shaping smarter and more sustainable cities: Striving for Sustainable Development Goals"
Rome, Italy, 18-19 May 2016.

Forum on "Internet of Things in Smart Sustainable Cities: A New Age of Smarter Living"
Singapore, 18 January 2016.

World Smart City Forum
Singapore, 13 July 2016.

Joint UNECE-ITU Workshop on "Laying the foundation for Sustainable Development Goals: Role of Smart Sustainable Cities"
Geneva, 2 May 2016.

6th ITU Green Standards Week Shaping Smart Sustainable Cities: Towards Habitat III
Montevideo, Uruguay 5-9 September 2016.

Smart Sustainable city definition

"A smart sustainable city is an innovative city that uses information and communication technologies (ICTs) and other means to improve quality of life, efficiency of urban operation and services, and competitiveness, while ensuring that it meets the needs of present and future generations with respect to economic, social, environmental as well as cultural aspects".

UNECE

Smart Sustainable Cities

ITU