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| INTERNATIONAL TELECOMMUNICATION UNION | **Joint Coordination Activity on IPTV** |
| **TELECOMMUNICATIONSTANDARDIZATION SECTOR**STUDY PERIOD 2013-2016 | Doc T13-09  |
| **English only****Original: English** |
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|  |
| **Source:** | ITU-T SG20 |
| **Title:** | LS/i on new ITU-T SG20 [from ITU-T SG20 to TSAG] |
| **LIAISON STATEMENT(Ref:** [SG20 - LS 9 -E](http://handle.itu.int/11.1002/ls/sp15-sg20-oLS-00009.zip)) |
| **For action to:** | TSAG |
| **For comment to:** | - |
| **For information to:** | JCA-AHF, JCA-IdM, JCA-IPTV, JCA-CIT, JCA-IOT, ITU-T SG2, SG3, SG5, SG9, SG11, SG12, SG13, SG15, SG16, SG17, JCA-COP, JCA-SDN, JCA-Res178 |
| **Approval:** | ITU-T Study Group 20 meeting (Geneva, 23 October 2015) |
| **Deadline:** | N/A |
| **Contact:** | Nasser Saleh Al MarzouqiTelecommunications Regulatory AuthorityUnited Arab Emirates | Tel: +97 6118 468Fax: +97 6118 484Email: nasser.almarzouqi@tra.gov.ae  |

The new ITU-T Study Group 20 on IoT and its applications including smart cities and communities (SC&C) established in June 2015 by TSAG, held its first meeting from 19 to 23 October 2015 in Geneva, Switzerland.

During the first meeting SG20 agreed on its structure which is contained in the attached [TD 003 Rev.5 (GEN/20)](http://www.itu.int/md/T13-SG20-151019-TD-GEN-0003/en).

[TD 003 Rev.5 (GEN/20)](http://www.itu.int/md/T13-SG20-151019-TD-GEN-0003/en) also contains the title, general areas of study (Resolution 2, Annex A) and points of guidance to SG20 for the development of the post-2012 work programme (Resolution 2, Annex B) as agreed during the last TSAG meeting held in Geneva from 2 to 5 June 2015.

It should be noted that during the TSAG meeting held in June 2015, ITU-T Study Group 20 was not given the designation of the lead ITU-T Study Group in specific areas of study.

ITU-T Study Group 20 at its first meeting in October 2015 would like to seek the endorsement of TSAG to designate SG20 as the:

* Lead study group on Internet of Things (IoT) and its applications
* Lead study group on Smart Cities and Communities (SC&C)

During the TSAG meeting held in June 2015, it was decided that the parent group of the JCA-IoT would be transferred to the new ITU-T SG20. SG20 agreed to revise the terms of reference of JCA‑IoT. The revised terms of reference of the Joint Coordination Activity on Internet of Things and Smart Cities and Communities (JCA-IoT and SC&C) are contained in the attached [TD 024 Rev.2 (GEN/20)](http://www.itu.int/md/T13-SG20-151019-TD-GEN-0024/en).

Please be informed that the Global Standards Initiative on Internet of Things (IoT-GSI) concluded its activities in July 2015 following TSAG decision to establish the new Study Group 20 on "IoT and its applications including smart cities and communities". All activities ongoing in the IoT-GSI were transferred to the SG20.

For additional information on SG20 structure, management team and ongoing work, please see: [www.itu.int/en/ITU-T/studygroups/2013-2016/20/Pages/default.aspx](http://www.itu.int/en/ITU-T/studygroups/2013-2016/20/Pages/default.aspx)

ITU-T SG20 looks forward to cooperating with TSAG.

**Attachment:**

- [TD 003 Rev.5 (GEN/20)](http://www.itu.int/md/T13-SG20-151019-TD-GEN-0003/en) “Proposed structure for ITU-T SG20 (TD posted after SG20 plenary)”

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| INTERNATIONAL TELECOMMUNICATION UNION | **STUDY GROUP 20** |
| **TELECOMMUNICATIONSTANDARDIZATION SECTOR**STUDY PERIOD 2013-2016 | **TD 003 Rev.5 (GEN/20)** |
| **English only****Original: English** |
| **Question(s):** | All/20 | Geneva, 19-23 October 2015 |
| **TD** |
| **Source:** | Chairman and Vice Chairmen SG20 |
| **Title:** | Proposed structure for ITU-T SG20 (TD posted after SG20 plenary) |

**Introduction**

TSAG agreed at its meeting in June 2015 to create a new ITU-T Study Group 20 entitled “IoT and its applications including smart cities and communities”.

Taking into consideration TD322 Rev.3 from TSAG (contained in [Contribution 001](http://www.itu.int/md/T13-SG20-C-0001/en)), the SG20 Management Team held four e-meetings on 24 June 2015, 1 July 2015, 22 July 2015 and 29 July 2015 to consider SG20’s layout and to facilitate its activities.

The SG20 management team discussed ways to run SG20 meetings as efficiently as possible and to encourage participation of external entities, including other SDOs, forums and consortia.

As a result of these discussions, on 7 August 2015, the SG20 Chairman and the management team presented a structure for SG20, along with the text of its Questions, to the TSAG Chairman, Review Committee Chairman, and ITU-T study-group Chairmen for comments and views. The comments received were taken into consideration.

Annex A contains the title, areas of study, points of guidance and list of responsible Recommendations of the new Study Group, Annex B contains the proposed structure of SG20 and Annex C contains the proposed text of SG20 Questions.

The SG20 Chairman and Vice Chairmen are pleased to put forward this proposal to the first meeting of SG20.

Annex A:

Title, areas of study, points of guidance and list of responsible Recommendations of the new Study Group on IoT and its applications including smart cities and communities (SC&C)

## A.1 Title

ITU-T Study Group 20: IoT and its applications including smart cities and communities (SC&C).

## A.2 Part I - General areas of study (Resolution 2, Annex A)

ITU-T SG20 is responsible for studies relating to Internet of Things (IoT) and its applications, with an initial focus on Smart Cities and Communities (SC&C).

**Part 2** *(pending endorsement of TSAG)* **– Lead ITU-T Study Group in Specific Areas of Study**SG20 Lead study group on Internet of Things (IoT) and its applications
Lead study group on Smart Cities and Communities (SC&C)

## A.3 Points of guidance to study groups for the development of the post-2012 work programme (Resolution 2, Annex B)

ITU-T SG 20 will work on the following items:

– Framework and roadmaps for the harmonized and coordinated development of Internet of things (IoT), including M2M communications, ubiquitous sensor networks and smart sustainable cities and communities, in ITU‑T and in close cooperation with ITU-D and ITU‑R SGs and other regional and international standards-development organizations (SDO) and industry forums;

* Requirements and capabilities of IoT and its applications including SC&C;
* Definitions and terminology for IoT;
* IoT infrastructure/ services available in smart sustainable cities/ architecture framework and requirements of IoT for SC&C;
* efficient service analysis and infrastructure of IoT use in smart sustainable cities and communities to assess how the use of IoT has an impact on the smartness of cities;
* guidelines, methodologies and best practices related to standards to help cities (including rural areas and villages) deliver services using the IoT, with an initial view to address city challenges;

– IoT end-to-end architectures;

– Data sets that will enable data interoperability for various verticals, including smart cities, e-agriculture, etc.;

– High-layer protocols and middleware for IoT systems and applications including SC&C;

– Middleware for interoperability between IoT applications for different IoT verticals;

– Quality of service (QoS) and end-to-end performance for IoT and its applications including SC&C;

– Security of IoT systems, services and applications;

– Database maintenance of existing and planned IoT standards.

Annex B:
SG20 Structure

The table below illustrates the proposed SG20 structure.

|  |  |
| --- | --- |
|  | **Title** |
| **PLEN** |  |
| Question 1/20 | Research and emerging technologies including terminologies and definitions |
| **Working Party 1** | **Internet of Things (IoT)** |
| Question 2/20 | Requirements and use cases for IoT |
| Question 3/20 | IoT functional architecture including signalling requirements and protocols  |
| Question 4/20 | IoT applications and services including end user networks and interworking |
| **Working Party 2** | **Smart cities and Communities (SC&C)** |
| Question 5/20 | SC&C requirements, applications and services |
| Question 6/20 | SC&C infrastructure and framework |

Annex C:
Text of proposed Questions for the new Study Group 20

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| --- | --- | --- |
| **Question** | **Title** | **Status** |
| Question 1/20 | Research and emerging technologies including terminologies and definitions | Continuation of part of Q20/5, Q1/11, Q2/13, Q3/13, Q11/13 and Q25/16  |
| Question 2/20 | Requirements and use cases for IoT | Continuation of part of Question 2/13 |
| Question 3/20 | IoT functional architecture including signalling requirements and protocols  | Continuation of part of Question 1/11and part of Question 3/13 |
| Question 4/20 | IoT applications and services including end user networks and interworking | Continuation of part of Q11/13 and part of Question 25/16 |
| Question 5/20 | SC&C requirements, applications and services | Continuation of part of Q20/5 and part of Q25/16 |
| Question 6/20 | SC&C infrastructure and framework | Continuation of part of Q20/5 |

**Question 1/20 – Research and emerging technologies including terminology and definitions**

(Continuation of part of Q20/5, Q1/11, Q2/13, Q3/13, Q11/13, Q25/16)

**Motivation**

The Internet of Things (IoT) has the potential to change the lifestyle of the people and the way they interact with the surroundings, especially in smart cities and communities (SC&C). In this regard, it is important to explore the emerging technologies and trends that will contribute to that change. It is expected that IoT will have a significant impact on key infrastructural elements pertaining to cities, including the transportation, health and energy sectors, quality of life (QoL) and environment as well as on society and the economy in general.

To facilitate discussions and to have a common background of relevant issues, the terminologies related to IoT and SC&C need to be coordinated and unified. Accordingly, it would be appropriate to identify research and analyze emerging applications and solutions for IoT and SC&C.

**Question**

This Question is tasked to capture and develop definitions, to contribute to a common terminology for IoT and SC&C. Also, this Question can contribute to the research on solutions for interoperability across different technologies (including identification) and taking into account both end-user and market needs. Considering the rapid evolution of the IoT domain, this Question can also contribute to bringing relevant research and technological developments in this area, to the attention of the ITU-T Study Group 20 (SG20).

Study items to be considered include, but are not limited to:

* Terms, definitions, abbreviations, letter symbols and schematic symbols used for IoT and SC&C research.
* Which new Recommendations should be developed for IoT and SC&C, related terms and definitions?
* Which new Recommendations should be developed for research and emerging technologies related to IoT and SC&C?
* How and where could the use of IoT emerging technologies create value?
* What are the impacts of introducing IoT on human activities and how can the corresponding constraints be addressed?
* How can end user adoption of IoT be considered?
* How will IoT change the business models and the market environment?
* Research related to IoT identification and relevant concepts and mechanisms, including IoT ID Naming and Addressing.
* What are the emerging technologies and research outcomes relevant for IoT and SC&C?

**Tasks**

Tasks include, but are not limited to:

− Development, maintenance and enhancement of the Recommendations on terminology related to IoT and SC&C;

− Development, maintenance and enhancement of the Recommendations;

− Development in collaboration with other SG20 Questions, on frameworks and roadmaps for the harmonized and coordinated development of Internet of things (IoT), including M2M communications and ubiquitous sensor networks in ITU‑T;

− Development in close cooperation with ITU-D and ITU‑R Study Groups and other regional and international standards-development organizations (SDOs), academia and industry fora;

− Development of a global database for IoT and SC&C standards based on the information gathered in the Roadmap on IoT developed by JCA-IoT;

− Maintenance of existing and future ITU-T Recommendations related to IoT and SC&C;

− Development of guidelines, methodologies and best practices related to IoT and SC&C to help developing countries in bridging the digital gap in this field;

− Development of a global repository on IoT and SC&C to promote SG20 work results and activities, as well as to list reports and links of external organizations involved in this area;

− Harmonization of the terminology within ITU and relevant SDOs;

− Identification of emerging technologies and relevant research work on IoT and SC&C;

− Liaise and foster cooperation with the academia, research and innovation community on IoT and SC&C;

− Liaise and foster cooperation with other SDOs and international fora including small and medium enterprises (SMEs) on IoT and SC&C;

− Identify in coordination with other SG20 Questions new work areas linked to IoT and SC&C, and collaborate with relevant ITU-T SGs and other SDOs and fora, to initiate studies on those identified work areas.

Relationships

Recommendations:

− Y.4000-series

Questions:

− All Questions of SG20

Study Groups:

− ITU-T (e.g. considering their lead study group role), ITU-D and ITU-R Study Groups as appropriate

− This Question will collaborate with ITU-T SG2 on issues related to Naming, Numbering Addressing and Identification

TSAG and Review Committee

Other bodies:

− IEC, ISO and other relevant standardization bodies, and specialized international fora.

**Question 2/20 - Requirements and use cases for IoT**

(Continuation of part of Question 2/13)

**Motivation**

With the ever increasing number of services and applications, demand for studying the requirements and use cases for IoT has been steadily increasing. Emerging IoT services and applications are placing more and more requirements on networks and the provisioning of new services. One essential objective is the maximization of the usage of common requirements in order to provide support to a broad range of IoT services and applications in different vertical markets, in cost efficient, multi-vendor and easily deployable ways over converged infrastructures

Emerging services and applications to be considered include:

– Internet of Things (IoT) services and applications in different vertical market areas (key identified market areas including, but not limited to, smart home, smart water, smart energy, smart agriculture, smart manufacturing, wearables, emergency management, etc.).

Consideration will also be given to applications and services based on the integration of the aforementioned services and applications with advanced information and communication technologies (ICTs).

The following major Recommendations, fall under the responsibility of this Question:

– Y.2069, Y.2213, Y.2221, Y.2222, Y.2060, Y.2061, Y.2065, Y.2066, Y.2067, Y.2068, Y.2074.

**Question**

This Question addresses the support of emerging services and applications for IoT. On the basis of use cases and related ecosystem aspects, the requirements imposed on IoT will be specified.

Study items include, but are not limited to:

– What are the requirements needed for the support of emerging services and applications for IoT?

– What are the use cases for IoT applications and services?

– Collaboration with which standards developing organizations (SDOs) would be necessary to maximize synergies and harmonization of the existing standards related to this field of work?

**Tasks**

Tasks include, but are not limited to:

– Development of Recommendations for the support of emerging services and applications for IoT, covering:

– use cases;

– ecosystem aspects taking into account business models and use cases;

– requirements for IoT services and applications (including for the different service interfaces that will be required);

* + Providing the necessary collaboration for joint activities in this field within ITU and between ITU-T and other relevant SDOs, consortia and fora.

The latest work programme under the responsibility of this Question is available at: <http://www.itu.int/ITU-T/workprog/wp_search.aspx?Q=xx/20>

**Relationships**

**Recommendations:**

– Y.4000-series

**Questions:**

– All Questions of SG20

**Study Groups:**

– ITU-T (e.g. considering their lead study group role), ITU-D and ITU-R Study Groups as appropriate

**Other bodies:**

– IETF

– OMA

– OGC

– IEEE

– ATIS

– ETSI TC Smart M2M

– OneM2M

– ISO/IEC JTC 1/WG 10 and ISO/IEC JTC 1/WG9

– 3GPP/3GPP2

– W3C

– Industrial Internet Consortium (IIC)

– Alliance for IoT Innovation (AIoTI)

**Question 3/20 – IoT functional architectures, including signalling requirements and protocols**

(Continuation of part of Question 1/11and part of Question 3/13)

**Motivation**

As the Internet of Things (IoT) establishes its position as an underlying mechanism for various applications, special attention is being paid to how advanced information and communication technology (ICT) systems are designed based on IoT and related conceptual architectures including signalling requirements and protocol. Given the rich features of IoT, highly capable ICT systems meeting vertical industry demands, can be realized by supplementary development based on IoT architectures. This is a promising way in terms of efficiency and time to market.

To support this approach, the IoT architectures, their functionalities, data model and protocols have to be studied building also on existing Recommendations, including ITU-T Y.2060.

**Question**

This Question addresses IoT functional architectures, signalling requirements and protocols needed to control network attachment procedures (including mobility management and authentication); to control session establishment and release, to control bearer resources (including quality of service control), to interact with services and applications and to interact with legacy networks.

Study items to be considered include, but are not limited to:

– What new and revised framework and/or conceptual architecture Recommendations are required to realize convergence based on IoT?

– What signalling and control architectures are required for IoT and SC&C?

– What capabilities of the signalling and control architectures are required to support services and/or applications of public interest during emergency situations?

– What capabilities of signalling and control architectures are required to provide energy savings?

– What enhancements to existing signalling requirements and protocols are required to support the Internet of things (IoT), machine-to-machine (M2M) communication services and/or applications?

− Collaboration with which standards developing organizations (SDOs) would be necessary to maximize synergies and harmonize existing standards?

**Tasks**

Tasks include, but are not limited to:

– Studies on general reference models on IoT and emerging industry needs;

– Frameworks to identify the basic architectural compositions and views on IoT. These will be based on the identification of architectural requirements derived from the industry needs;

– Identification of entities, their functions, and reference points, required to provide support to IoT applications and services;

– Determine the requirements that the IoT signalling and protocols are intended to support. It is anticipated that these requirements will need to be periodically refined to reflect the evolution of IoT-related technologies taking into consideration the signalling requirements and protocols available from ITU‑T and other SDOs;

– Identify modifications and enhancements to the signalling requirements and protocols that will enable them to meet the IoT requirements and architecture;

– Identify a set of physical interfaces for which interoperability between different IoT network elements is desirable and for which detailed signalling requirements need to be studied and control protocols need to be standardized. This includes middleware for interoperability between IoT applications for different IoT verticals;

– Identify data sets that will enable data interoperability for various verticals including SC&C;

– Define interworking with legacy systems;

– Study specific IoT signalling requirements and protocols such as peer-to-peer and mesh architectures;

– Providing the necessary collaboration for joint activities in this field within ITU and between ITU-T and SDOs, consortia and fora,

An up-to-date status of work under this Question is contained in the SG20 work programme (<http://itu.int/ITU-T/workprog/wp_search.aspx?Q=xx/20>)

**Relationships**

**Recommendations**

– Y.4000-series

**Questions**

– All SG20 Questions

**Study Groups:**

– ITU-T (e.g. considering their lead study group role), ITU-D and ITU-R Study Groups as appropriate

– ITU-T SG13 is the lead Study group on network infrastructural architecture, Q3/20 will collaborate its IoT studies related network infrastructural architecture including mobility management with SG13.

– IoT Interoperability aspects and its applications including smart cities and communities (SC&C) will be developed in collaboration with ITU-T SG11.

Other bodies:

– ATIS

– IETF

– ETSI Smart M2M, oneM2M

– ISO/IEC JTC 1/ WG10

– 3GPP/3GPP2

– IEEE, W3C

– HGI (Home Gateway Initiative)

**Question 4/20 ‑ IoT applications and services including end user networks and interworking**

(Continuation of part of Q11/13 and part of Question 25/16)

**Motivation**

Developments in Internet of Things (IoT) technologies have wide impacts, especially in enhancing the end user experience by advanced networking and services, which will form part of smart user environments through the collaboration among humans and things. IoT applications and services receive more importance in the whole process of communications such as configuration of resources, provision of capabilities and management. Through the exploitation of identification, data capture, processing and communication capabilities, IoT makes full use of “things” to offer services to all kinds of applications, whilst maintaining the required privacy and security.

IoT provides context-aware information and knowledge services, which are developed by using context awareness with sensing, storing, processing and integrating situational and environmental information gathered from sensor tags and/or sensor nodes affixed to anything, even the human body. It can deliver such information and knowledge services to anyone, anywhere and at anytime. Ubiquitous Sensor Networks applications and services are emerging at the moment.

Situational and context-aware information and knowledge produced by IoT will add value and enable business opportunities to sensor-integrated applications and services such as manufacturing and industrial fields; military, health care, environmental control and utility use management, civil engineering, agriculture, transportation, and so on.

End user networks with identification schemes for various devices/sensors including RFID tags enable end users to cooperate by sharing services and resources for interactions among humans and things using awareness features to support specific IoT applications and services. This is achieved by organizing a collaboration group and sharing media via fixed/mobile access networking technologies and in an end user environment.

**Question**

This Question is tasked to focus on interworking aspects between different networks and services. Also, this Question is tasked to focus on the interworking aspects related to all vertical and horizontal layers, to facilitate seamless services among heterogeneous IoT environments.

There are several work items to support IoT applications and services including end user networks and interworking. Hence, this Question should cover all the work items in a harmonized way.

Study items to be considered include, but are not limited to:

– Analysis of service and functional requirements: Requirements analysis is a starting point to extract service features, required functions, relevant attributes and also to attribute values from various IoT applications and services, including end user networks and interworking;

– Specification of application profiles: IoT applications and services have vertical characteristics and each one may have unique requirements. Each type of IoT application and service needs an application profile to define service features, processing functions, operation attributes, attribute values, etc.;

– Sensor information description language: A variety of sensor information data in IoT needs to be described in a standardized, machine-readable form to support semantics;

– IoT middleware-relevant standards: A set of relevant standards need to be developed for such middleware functions, such as sensor information gathering, filtering by various policies and rules, data comparison and analysis, data mining, context modelling language, context-awareness processing, context-aware decision and estimation, integrated management of sensor information, service integration, audio and video data transmission, and reference middleware framework;

– Directory service standards: A set of relevant standards need to be developed to define a data structure for directory services, register and discovery of IoT services;

– End user networks: This requires networking and service solutions, including middleware to provide the connectivity and services with global networks through M2M communications capabilities and multiple interfaces for various end devices, sensors and tags;

– Interworking in IoT: Interworking models are needed to support end-to-end transparent IoT applications and services;

– Security, privacy and trust of IoT systems, services and applications;

– Quality of service (QoS) and end-to-end performance for IoT and its applications;

– High-layer protocols and middleware for IoT systems and applications;

– Collaboration with which standards developing organizations (SDOs) would be necessary to maximize synergies and harmonize existing standards related to this field work?

**Tasks**

Tasks include, but are not limited to:

– Studies on functionality profiles of IoT applications and services including IoT and tag-based identification;

– Studies on sensor information description languages;

– Studies on context modelling languages for context awareness of IoT middleware;

– Studies on application interfaces (e.g., API) among IoT middleware entities;

– Studies on an identification scheme of IoT elements, including sensor nodes and location-based services considering social relationships among human and things;

– Studies on security, privacy and trust of IoT systems, services and applications, including identification of security requirements in support of the overall security framework for IoT;

– Studies on High-layer protocols and middleware for IoT applications;

– Studies on Quality of service (QoS) and end-to-end performance for IoT and its applications;

– Studies on autonomic network and service management, including security, privacy and trust issues for IoT;

– Studies on end user networks (e.g., enhancement of home networks, personal area networks, wireless sensor networks, etc.), taking into consideration their specific IoT applications and services in end users perspective;

– Studies on interworking for IoT applications and services in end user, heterogeneous networks (e.g., enhancement of home networks, personal area networks, wireless sensor networks, etc.)

– Coordination with Question 5/20 with regards to IoT applications and services will be carried out.

− Providing the necessary collaboration for joint activities in this field within ITU and between ITU-T and other relevant SDOs, consortia and fora.

An up-to-date status of work under this Question is found in the SG20 work programme (<http://itu.int/ITU-T/workprog/wp_search.aspx?sp=15&q=xx/20>).

**Relationships**

**Recommendations**

– Y.4000-series

**Questions**

– All SG20 Questions

**Study groups**

– ITU-T (e.g. considering their lead study group role), ITU-D and ITU-R Study Groups as appropriate

– This Question will collaborate with ITU-T SG17 on issues related to security aspects

– This Question will collaborate with ITU-T SG3 namely Q1/3 on tariff and economic issues relating to IoT and its applications.

- This Question will collaborate with ITU-T Study Group 12 on quality of service.

- This Question will collaborate with ITU-T SG2 on issues related to naming, numbering addressing and identification.

**Other bodies**

– 3GPP SA2 on M2M standards

– ETSI, oneM2M

– ISO/IEC JTC 1/SC 31 on NID standards

– ISO/IEC JTC 1/WG 7 on Sensor Network standards

– ISO/IEC JTC 1/WG 10

– IEC TC 100 on wireless power transmission

– IEEE 1451 on sensor and sensor node interface standards

– IEEE 802.15 on low-power wireless networking standards

– IETF 6LoWPAN on IPv6-based low-power networking over IEEE 802.15.4

– ISO/IEC JTC 1/SC 6 on USN matters from lower to higher layers

– ZigBee Alliance on low-power sensor networking and application issues over IEEE 802.15.4 (Low Rate WPAN)

– HGI (Home Gateway Initiative)

– IPSO Alliance

– OMA (Open Mobile Alliance)

– OGC (Open Geospatial Consortium)

– AIOTI (The Alliance for the Internet of Things)

**Question 5/20 – SC&C requirements, applications and services**

(Continuation of part of Q20/5 and part of Q25/16)

**Motivation**

Comprehensive strategies to implement Smart Cities and Communities (SC&C) are emerging around the globe as a response to the challenges posed by the rapid urbanisation. This involves the integration of information communication technologies (ICTs) into all aspects of city planning and operation. Acting as a platform, ICTs improve the efficiency of a city’s functions by enabling gathering of pertinent information and interconnecting the multitude of different domains. This would allow the concerned municipalities, the communities and the citizens to make better informed decisions, thereby facilitating the integration of city services and cooperation across different sectors.

**Question**

This Question intends to study: SC&C related ecosystem, applications, services and use cases; studies that are directly related to SC&C including, inter alia, smart grids, water, mobility, logistic, waste, healthcare, e-government, emergency telecommunications, education, transport, utilities, etc.); basic and high-level requirements, characteristics, and general capabilities of SC&C; ICT requirements and the related communications technologies to be taken into account when designing smart city services; efficient service analysis, strategic planning, deployment and implementation of SC&C, taking into account different needs of developed and developing countries; and security, privacy and trust of IoT systems, services and applications for SC&C.

Study items to be considered include, but are not limited to:

− Which will be the SSC&C related ecosystems, applications and use cases including, inter alia, its characteristics, high-level requirements and general capabilities?

− Which new Recommendations should be developed for definition and analysis of service efficiency and effectiveness of SC&C and its strategic planning, deployment, implementation opportunities and diverse needs of different geographic areas, of developed and developing countries?

− Which new Recommendations should be developed for requirements, guidelines, and best practices linked to standards, to help cities deliver services through ICT and enable smooth and viable modernization of present SC&C services?

− Which new Recommendations should be developed to identify the ICT requirements and the related communications technologies, to be taken into account when designing smart city services?

− Which new Recommendations should be developed for Quality of Service (QoS) and end-to-end performance for IoT and its applications in SC&C;

− Collaboration with which standards developing organizations (SDOs) would be necessary to maximize synergies and harmonization of the existing standards related to SC&C?

**Tasks**

Tasks include, but are not limited to:

− Developing Recommendations on ecosystem and use cases related to the ICT perspective of SC&C;

− Developing Recommendations for the analysis of service efficiency and effectiveness of SC&C, including its strategic planning, deployment, implementation opportunities and diverse needs of different geographic areas, of developed and developing countries;

− Developing Recommendations that are directly related to SC&C including, inter alia, smart grids, water, mobility, logistic, waste, healthcare, e-government, emergency telecommunications, education, transport, utilities, etc.);

− Developing guidelines, methodologies and best practices to help cities and communities (including rural areas and villages) deliver smarter ICT services, with a view of addressing their development challenges;

− Developing Recommendations on services delivery (through ICT), to enable smooth and viable modernization of present SC&C services;

− Providing the necessary collaboration for joint activities in this field within ITU and between ITU-T and SDOs conducting relevant work on SC&C, consortia and fora;

− Developing studies on security, privacy and trust of IoT systems, services and applications for SC&C;

− Coordination with Question 4/20 on IoT applications and services will be carried out.

**Relationships**

**Recommendations:**

* Y.4000-series

**Questions:**

* All Questions of SG20

**Study Groups:**

– ITU-T (e.g. considering their lead study group role), ITU-D and ITU-R Study Groups as appropriate

− This Question will collaborate with ITU-T SG17 on issues related to security aspects

- This Question will collaborate with ITU-T Study Group 16 on issues related to e-health, ITS and e-education.

**Other bodies:**

− CEN-CENELEC-ETSI Coordination Group ‘Smart and Sustainable Cities and Communities’ (SSCC-CG)

− ETSI TC EE

− ETSI TC Smart M2M

− IEC SEG1

− IEC TC 111

− IEEE

− ISO/IEC JTC 1/SG Smart Cities

− ISO TC 268 SC1

− ISO SAG

**Question 6/20 – Smart Cities and Communities Infrastructure and Framework**

(Continuation of part of Q20/5)

**Motivation**

Comprehensive strategies to implement smart cities and communities (SC&C) are emerging around the globe as a response to the challenges posed by the rapid urbanisation. This involves the integration of information communication technologies (ICTs) into all aspects of city planning and operations. Acting as a platform, the Internet of Things (IoT) can improve the efficiency of a city’s functions by enabling the gathering of pertinent information.

**Question**

This Question intends to study: general reference models of SC&C; spatio-temporal modeling for SC&C; frameworks to identify the architectural and service compositions and views on SC&C; identification of entities, their functions, and reference points required to provide support to SC&C applications and services; ICT use for physical infrastructure, including but not limited to: telecom networks, underground pipelines, capillary network, intelligent building system, building information modeling (BIM), traffic system and other facilities.

Study items to be considered include, but are not limited to:

− Which new general reference models and spatio-temporal modelling are required for SC&C?

− Which new and revised framework and/or architecture are required to make up SC&C?

− Which entities, functions, reference points and interfaces of the architecture are required to support services and/or applications in SC&C?

− Which ICT deployment and ICT use for physical infrastructure, including but not limited to: telecom networks, underground pipeline, capillary network, intelligent building system, building information modeling (BIM), traffic system and other facilities, are key for building SC&C?

− Which new Recommendations should be developed to enable efficient and effective deployment of ICT infrastructure among different SC&C applications and services?

− Which new Recommendations should be developed to enable cost-effective deployment of ICT for SC&C, using existing physical infrastructure (e.g., ducts, poles, etc.) in cities?

− Which new guidelines, methodologies and best practices need to be developed to help cities deliver ICT services, including IoT?

− Which guidelines on IoT use and best practices related to the implementation of SC&C services should be developed?

− Collaboration with which standards developing organizations (SDOs) would be necessary to maximize synergies and harmonize existing standards related to SC&C?

**Tasks**

Tasks include, but are not limited to:

− Developing Recommendations for general reference models and spatio-temporal modeling;

− Developing frameworks to identify the basic architectural compositions and views on SC&C;

− Developing Recommendations to identify entities, their functions, and reference points, required to provide support to SC&C applications and services;

− Developing guidelines, methodologies and best practices to help cities to deliver ICT services, inter alia, using IoT;

− Developing guidelines and best practices related to ICT use for physical infrastructure that can be used (and/or shared) for ICT deployment, including but not limited to: telecom networks, underground pipeline, capillary network, intelligent building system, building information modeling (BIM), traffic system.

− Providing the necessary collaboration for joint activities in this field between ITU-T and other SDOs, which conduct relevant work on IoT for SC&C, consortia and fora.

NOTE – An up-to-date status of the work conducted under this Question is contained in the SG20 Work Program (http://www.itu.int/ITU-T/workprog/wp\_search.aspx?Q=xx/20)

**Relationships**

**Recommendations:**

− Y.4000-series

**Questions:**

− All Questions of SG20

**Study Groups:**

− ITU-T (e.g. considering their lead study group role), ITU-D and ITU-R Study Groups as appropriate

− This Question will collaborate with ITU-T SG3 namely Q1/3 on tariff and economic issues relating to smart cities and communities (SC&C).

**Other bodies:**

− CEN-CENELEC-ETSI Coordination Group ‘Smart and Sustainable Cities and Communities’ (SSCC-CG)

− ETSI TC EE

− ETSI TC Smart M2M

− IEC SEG1

− IEC TC 111

− IEEE

− ISO/IEC JTC 1/SG Smart Cities

− ISO TC 268 SC1

− ISO SAG

− IIC (Industrial Internet Consortium)

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