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ITU-T: IoT and Smart & Sustainable Cities and Communities

Trends & Convergence Workshop – IoT4SCC

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ITU-T Activities on IoT & Smart Sustainable Cities





Development and implementation of standards

ITU-T Study Group 20



Research & pre-standardization work

Focus Group on Data Processing Management (FG-DPM)

Resolution 98 Enhancing the standardization of IoT and Smart Cities and Communities for global development

WIS9.16

IoT4SDGs: Considers the importance of IoT to contribute to achieving the 2030 Agenda for Sustainable Development.

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Open platform for knowledge sharing & Forward looking research

United for Smart Sustainable Cities (U4SSC)



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





ITU-T Study Group 20: Internet of things (IoT) and Smart Cities and Communities (SC&C)



Examples of Standardization Work:

- Y.infra, Overview of city infrastructure
- Y.SC-OpenData, Framework of open data in smart cities
- Y.ism-ssc, Technical framework for integrated sensing and management system
- Y.isw-ssc, The integrated sensor web resource metadata for smart sustainable cities
- 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





Most recent approved ITU-T Recommendations



Recommendation ITU-T Y.4114 "Specific requirements and capabilities of the IoT for Big Data".

This Recommendation complements the developments on common requirements of the IoT [ITU-T Y.2066] and functional framework of the IoT [ITU-T Y.2068] in terms of the specific requirements and capabilities that the IoT is expected to support in order to address the challenges related to Big Data.

Recommendation ITU-T Y.4115 "Reference architecture for IoT device capability exposure".

This Recommendation specifies reference architecture of IoT device capability exposure (IoT DCE) which supports IoT applications in DCE devices (e.g., smart phones, tablets and home gateways) to access device capabilities exposed by IoT devices connected to the DCE device.

Recommendation ITU-T Y.4805 "Identifier service requirements for the interoperability of Smart City applications".

This Recommendation explores the set of requirements for identifier services used in Smart City. An identifier service for Smart City must be scalable and secure, and not only promote interoperability among different Smart City applications, but also compatible with any existing practices in the application domain.





Problems Space of Smart Cities and Communities is vast.. [Interoperability & Interworking – Security\Privacy – Engagement and Adoption – Monetization – Sustaibility ...etc.]

Lack of Interoperability/Interworking Frameworks in Specific Industry Domains





In complex systems of systems (smart cities), adopting an interoperable architecture and selecting optimal integration points to satisfy stakeholders' requirements is challenging!

Let's pick one system: 'ITS': requires the integration of many different technologies and the buy in of so many different stakeholders.



The ITS industry standardization streams: NTCIP (C2C, C2F, F2C), DATEX II (C2C), & Urban Traffic Controllers (e.g. OCIT, SCATS, SCOOT)







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Can we integrate an OCIT RSU with IoT environmental sensors? Proximity? Incidents?

Backend analytics for incident detection and management requires edge/backend (cloud capabilities?

How can we extend functionalities of OCIT, SCATS, SCOOT specs?

What KPIs are we achieving by implementing an ITS system? What are the objectives? The system is driven by many stakeholders.

OCIT interfaces for cooperative city infrastructure.



Lack of Interoperability/Interworking in IoT/Smart City Platforms (Systems and Sub-functions Levels)





There are so many IoT and smart city platforms which may or may not be living in silos.







Platforms + Data APIs Standardization









But..

If platforms (technologies) are not endorsed or used by relevant stakeholders

They will be useless!

The wider the stakeholders group involved.. the higher the impact.





United for Smart Sustainable Cities (U4SSC) – 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!



Setting the Framework

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



Connecting Cities and Communities

- Smart living
- Smart mobility
- Smart environment



Secretariat: Contact: <u>u4ssc@itu.int</u>

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Enhancing Innovation & Participation

- Smart governance
- Smart people
- Smart economy



A Virtual Meeting every month!



On the sub-functions levels:

Two approaches.. either create a "thick" horizontal layer (unifying common services/sub-functions) or pick a common sub-function and segregate it horizontally..

How thick should you design your layer (1st approach), and in case of the 2nd approach, which layer to choose?





oneM2M focused on developing a common services horizontal framework for the application layer.. now ITU-T Standards..







Framework for Service Discovery Interworking is being developed to solve the problem of the use of different service discovery protocols by different IoT service platforms. Cross-platform service discovery is hence needed.





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ITU-T SG20 draft Recommendation ITU-T Y.IoT-sd-arch is being developed to define the functional architecture of service discovery for interworking between heterogeneous IoT platforms.







A typical architecture of an existing BMS with an upgrade path towards BACnet.



How can we integrate this BMS architecture with other platforms?



Lack of Interoperability Frameworks between Gateways of Specific Industries/Verticals

Is creating fat gateways a feasible solution?





In a scenario where there are multiple gateways operating in a single complex systems.. Interoperability at which level, and control and coordination in which direction?



Selecting optimal points is necessary while

taking into consideration the Impact of pushing intelligence and computing towards the edge.





ITU-T SG20 Draft Recommendation Y.IoT-EC-reqts on "IoT requirements for edge computing".







ITU-T Holistic Interop Frameworks @ Different Levels of IoT/Smart City Technology Stack is done hand in hand with the Policy Dimension and International Engagements





Takeaways: Interoperability by Design

- Interop @
 - Device/Gateway Level .. Edge .. New Global Identifiers..
 - Representation and Abstraction Levels (of Devices, Services)
 - Platform Level (System Level)
 - Platform Specific Functionalities (i.e. Cross-Platform Service Discovery)
 - Data Models
- Multi-Stakeholders Policy Enabling Instruments





Thank you

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Q&A



