

ITU Workshop on the “Internet of Things - Trend and Challenges in Standardization”

(Geneva, Switzerland, 18 February 2014)

Introduction to the ITU-T Global Standards Initiative on IoT with focus on SG13 activities

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ITU-T organizational structure for "main" IoT/M2M standardization activities

IoT Standards Roadmap

- On-going and published work on IoT in ITU and other SDOs
- Open to public (free download)

IoT work plan

- On-going and planned work on IoT within ITU-T

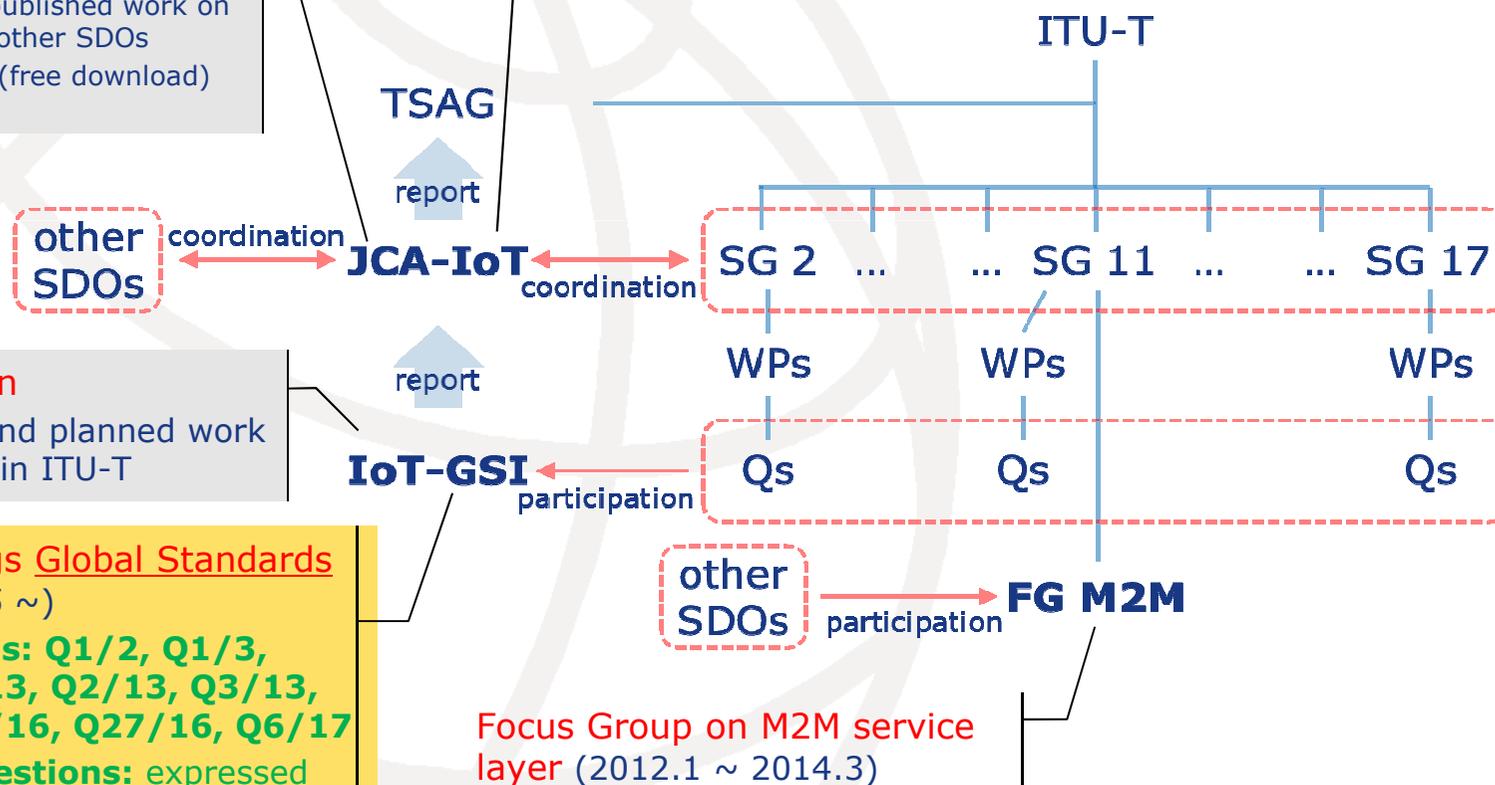
Internet of Things Global Standards Initiative (2011.5 ~)

- **Core Questions:** Q1/2, Q1/3, Q12/11, Q1/13, Q2/13, Q3/13, Q11/13, Q25/16, Q27/16, Q6/17
- **Additional Questions:** expressed interest but are not considered "core" Questions of IoT activities

Joint Coordination Activity on IoT (2011.3 ~)

Participating entities: All ITU-T SGs, ITU-R WP1A, WP1B, WP5A, ISO TC 122, 204, ISO/IEC JTC 1 SC 6, 31, WG 7, ETSI, CEN, OMA, GS1/EPC global, YRP, ECMA, GSIFI, TIA, GSM MSTF, OGC

- Working deliverable: IoT Standards Roadmap



Focus Group on M2M service layer (2012.1 ~ 2014.3)

IoT-GSI

IoT Global Standards Initiative

- Established in May 2011
- The banner for the effective IoT standardization work
- Visible single location for information on/development of IoT standards
- Participation from: industry, government entities, SDOs
Initial key efforts have included:
 - ◆ **IoT terminology** (including the definition of “IoT”)
 - ◆ **IoT overview** (ITU-T Rec Y.2060 “Overview of IoT” - approved in June 2012)
 - ◆ **IoT work plan** (potential study items within ITU-T)

The success of the Internet of Things in business and social communities will depend strongly on the existence and effective operation of global standards

www.itu.int/itu-t/gsi/iot

ITU-T definition of IoT

Internet of Things [ITU-T Recommendation Y.2060]:

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.

NOTE2 - In a broad perspective, the IoT can be perceived as a vision with technological and societal implications.

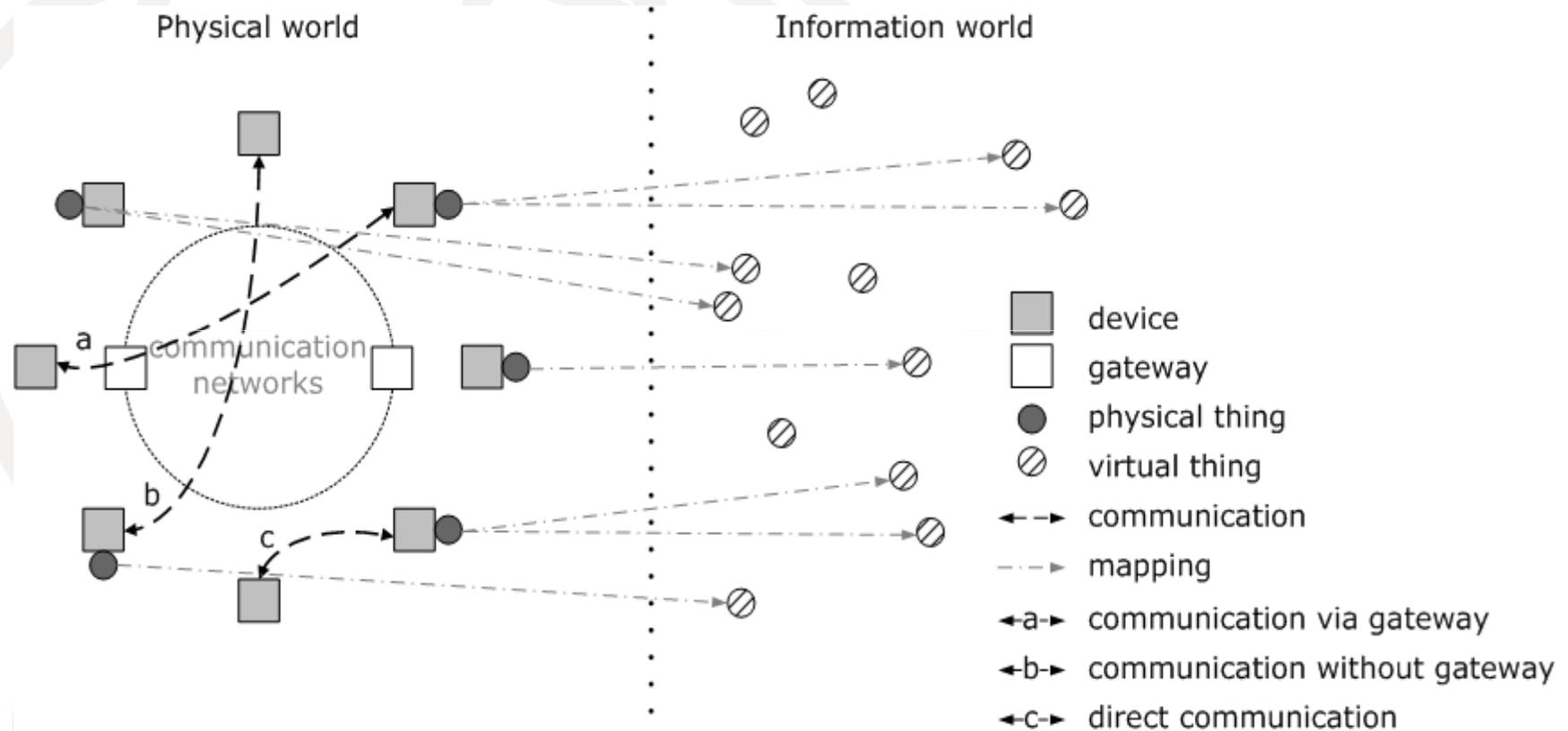
Above definition is fundamentally aligned with the IoT concepts and terminology developed in other key SDOs and communities

Thing: In the Internet of Things, object of the physical world (physical things) or of the information world (virtual things), which is capable of being identified and integrated into the communication networks.

IoT versus M2M (Machine to Machine): the M2M communication technologies are "a key enabler of the IoT"

IoT in ITU-T Y.2060 (1/5)

■ Technical overview

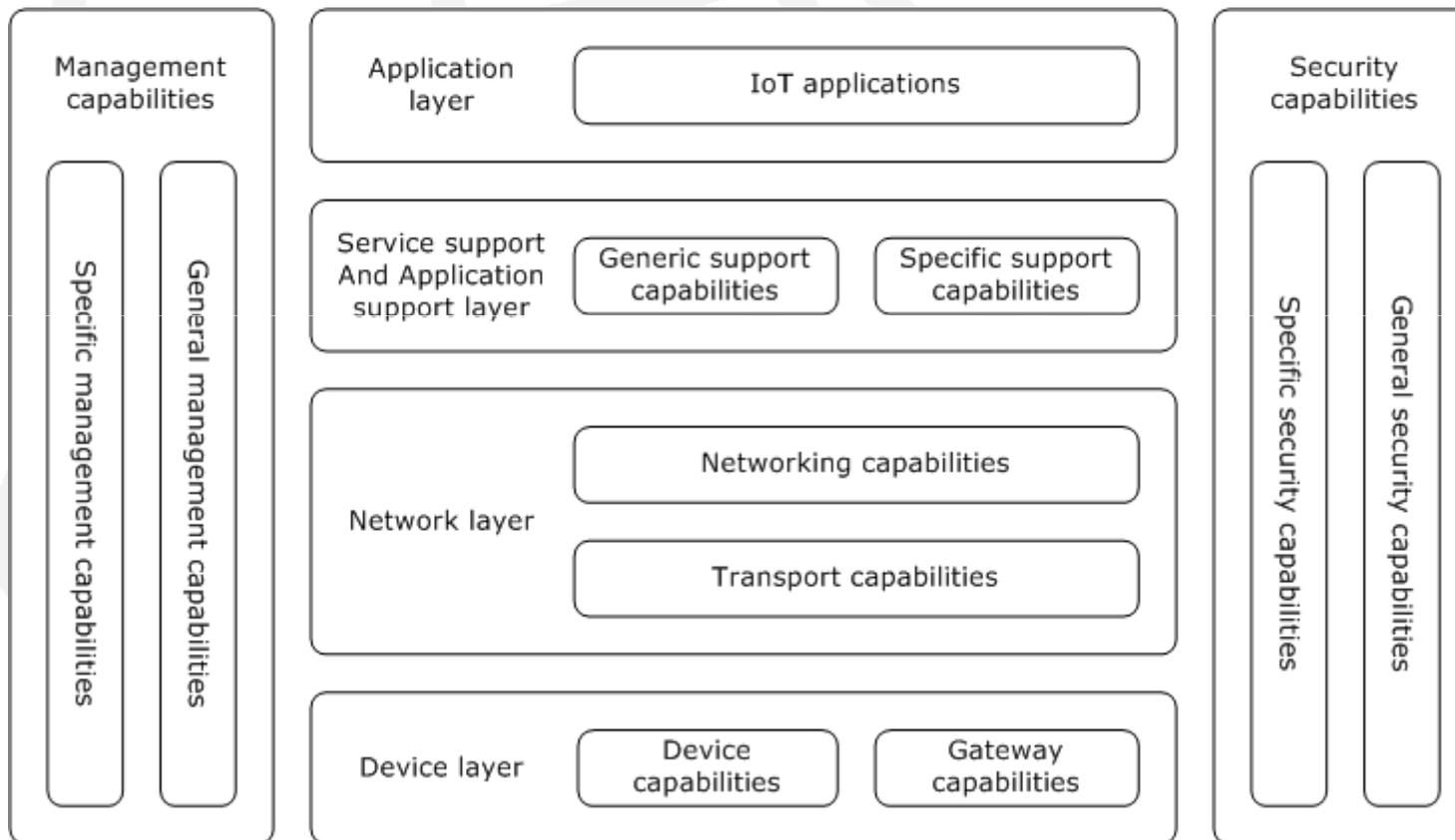


Source: ITU-T Y.2060, 2012

Device: In the Internet of Things, a piece of equipment with the mandatory capabilities of communication and the optional capabilities of sensing, actuation, data capture, data storage and data processing

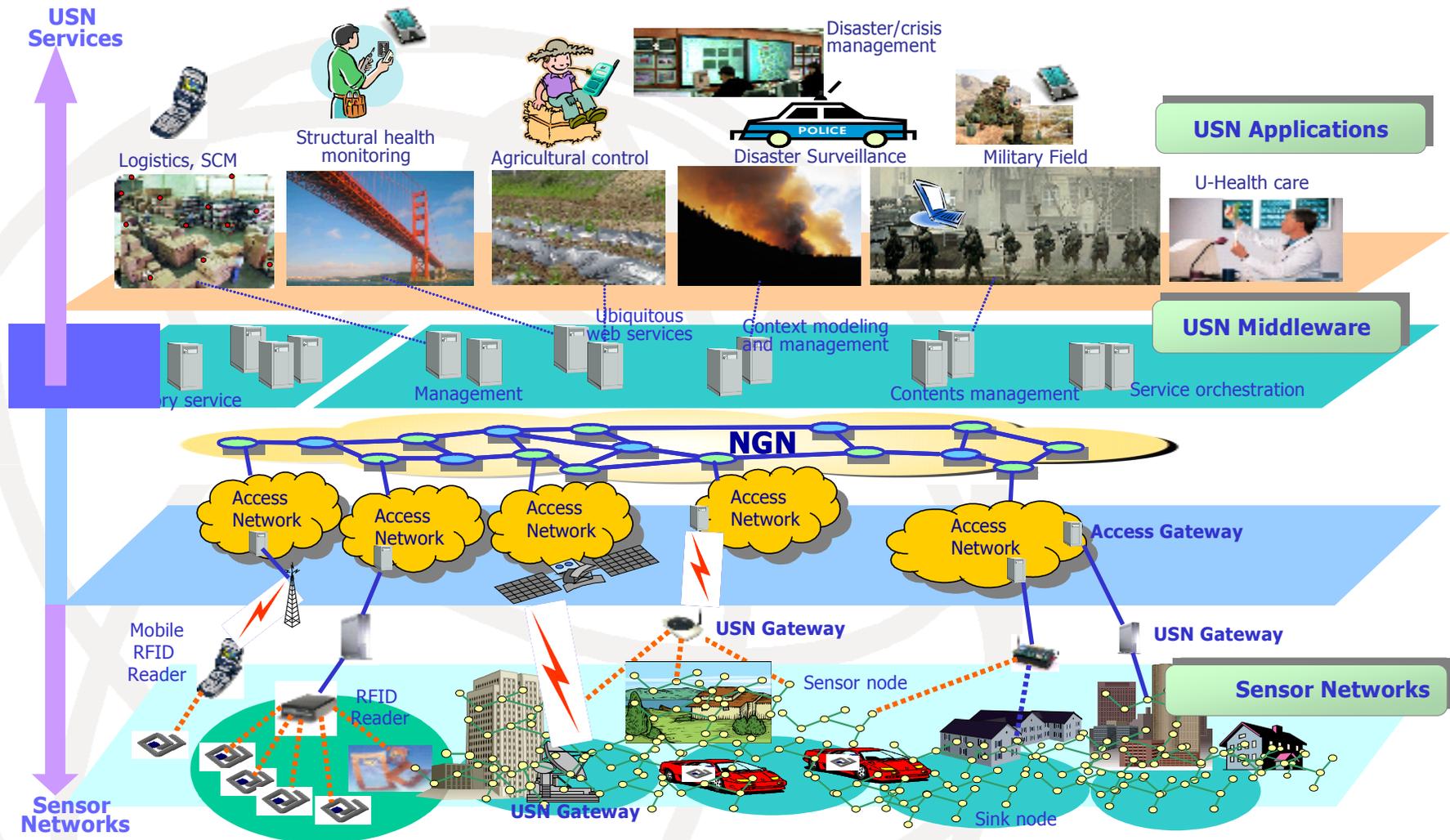
IoT in ITU-T Y.2060 (2/5)

■ IoT reference model



Source: ITU-T Y.2060, 2012

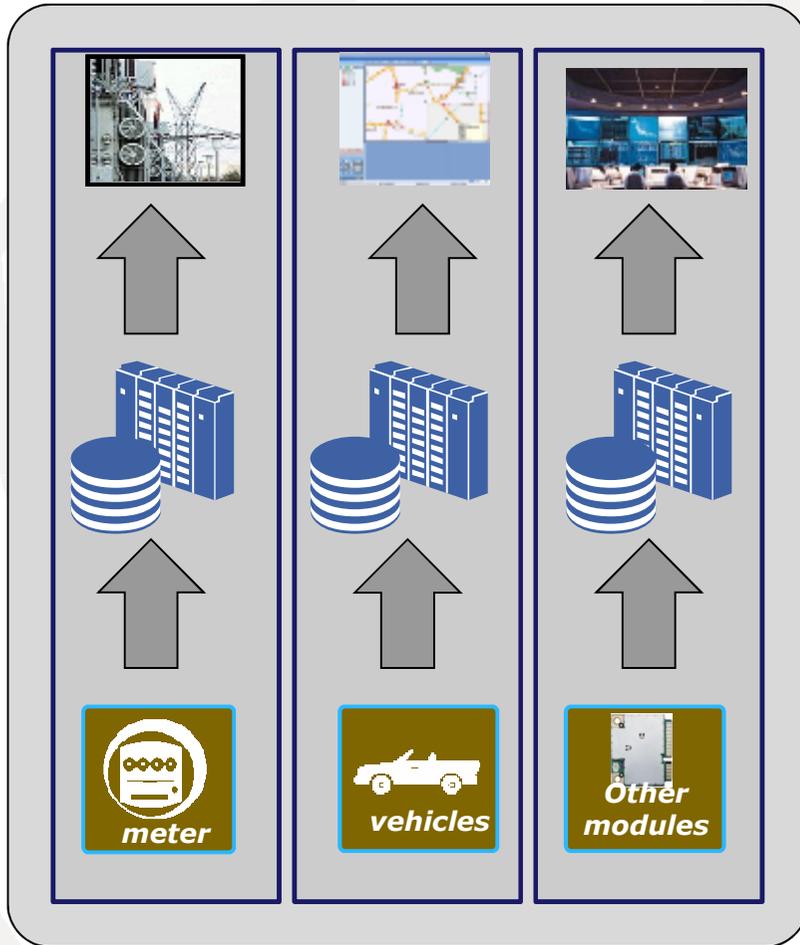
IoT reference model generalized from previous studies



Source: ITU-T Rec. Y.2221 - Requirements for support of Ubiquitous Sensor Networks (USN) applications over NGN

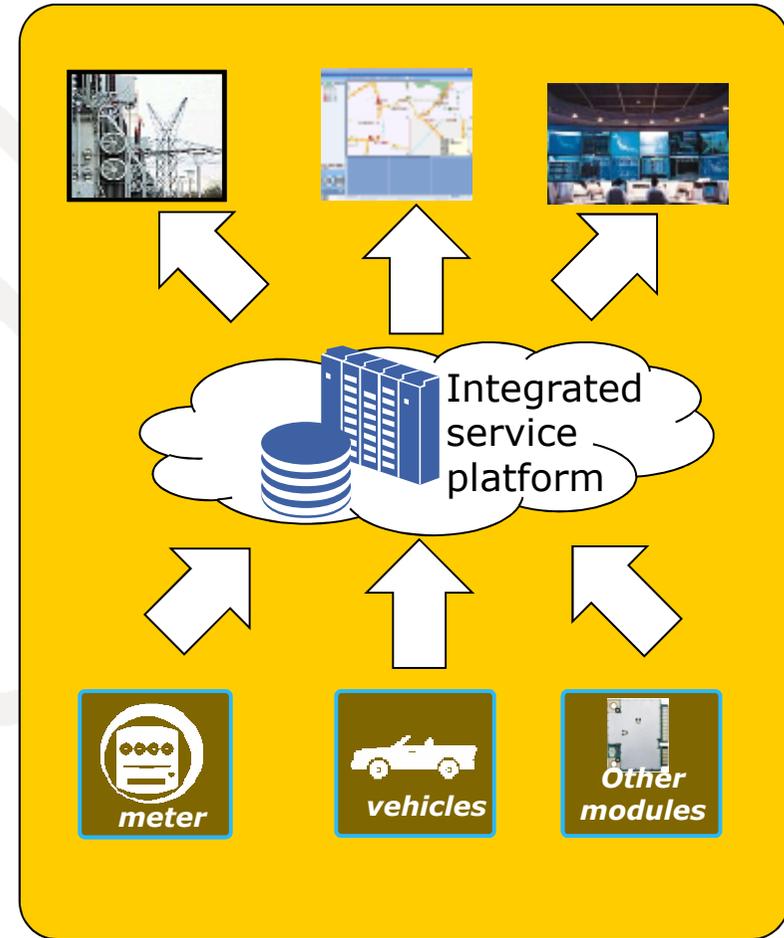
From vertical to horizontal integration model

VERTICAL MODEL



Service platform configured per vertical application

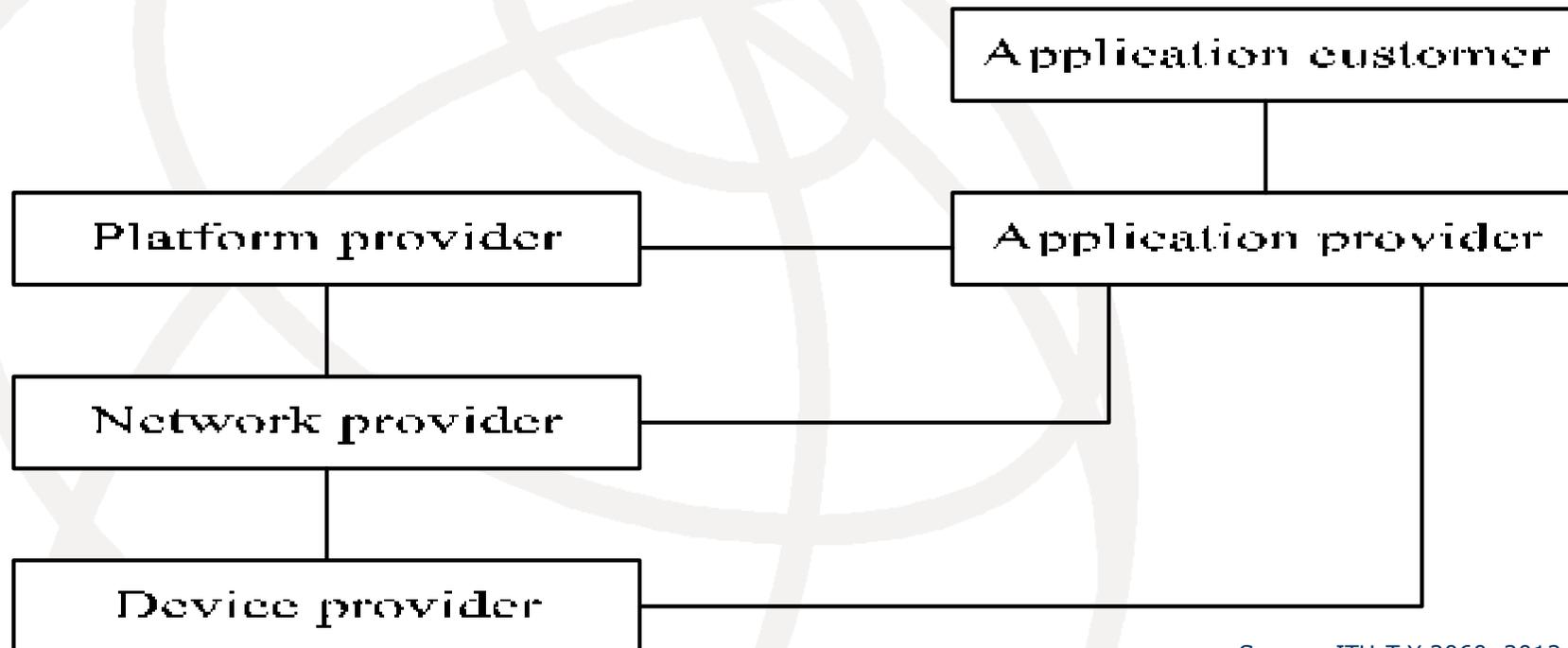
HORIZONTAL MODEL



- Integrated service platform supporting multiple applications
- Generic and application specific components

IoT in ITU-T Y.2060 (3/5)

■ IoT Ecosystem

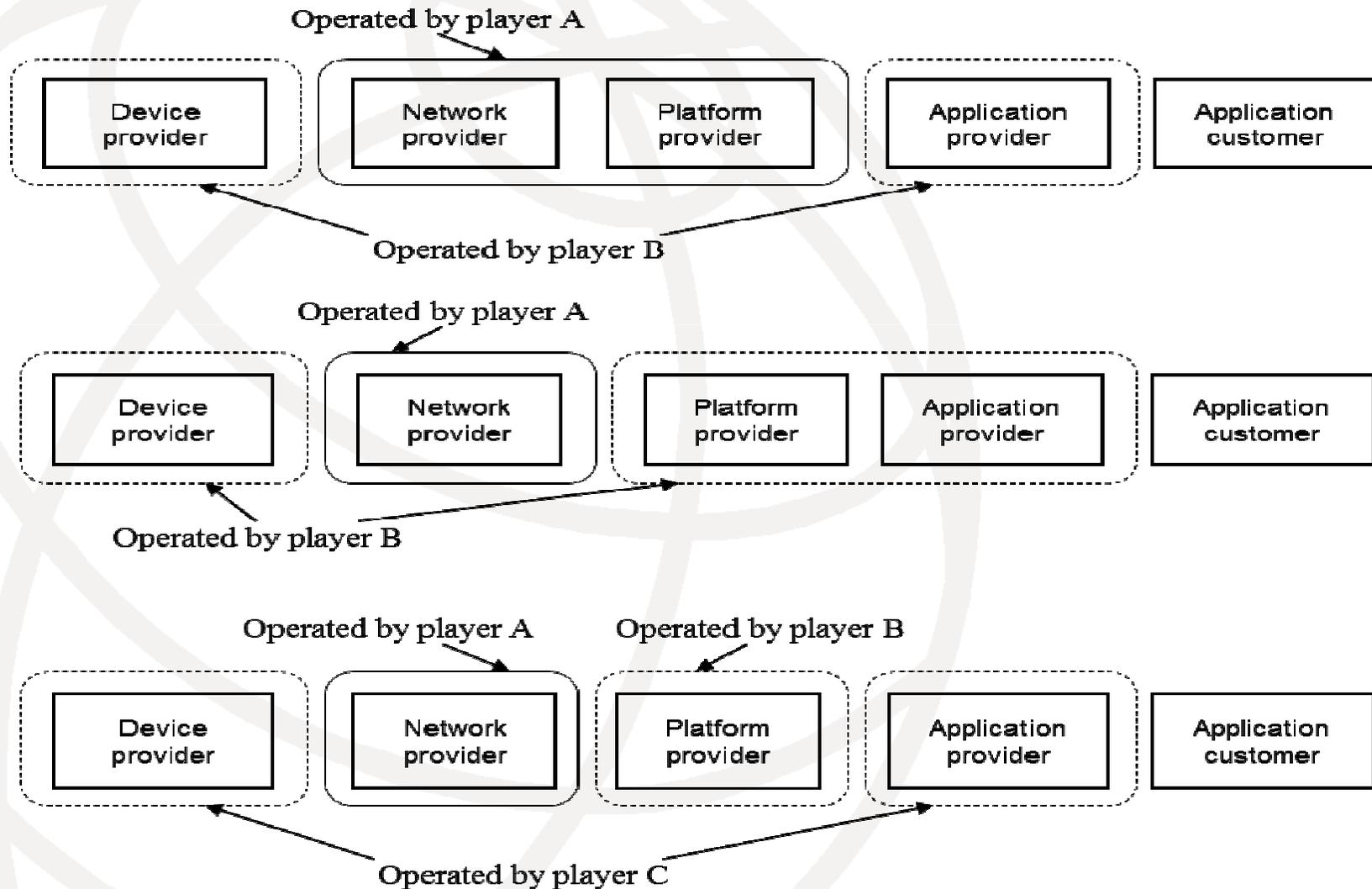


Source: ITU-T Y.2060, 2012

NOTE - The identified business roles and their relationships do not represent all possible roles and relationships which can be found across IoT business deployments

IoT in ITU-T Y.2060 (4/5)

IoT Business Models – examples



IoT in ITU-T Y.2060 (5/5)

- Fundamental characteristics and high level requirements of the IoT

Characteristics

- Interconnectivity
- Things-related services
- Heterogeneity
- Dynamic changes
- Enormous scale

Requirements

- Identification-based connectivity
- Interoperability
- Autonomic networking
- Autonomic services provisioning
- Location-based capabilities
- Security
- Privacy protection
- High quality and highly secure human body related services
- Plug and play
- Manageability

The “IoT work plan” of IoT-GSI

A living document containing potential study items for consideration and possible launch as new IoT standardization work items within ITU-T (cooperation with other SDOs not excluded); once a potential item is actually launched, it is moved to the JCA-IoT standards roadmap

Last version of the work plan [to be updated at 19-25 Feb 2014 IoT-GSI event]

Item number	Item title	[Last version – it will be updated at the Feb 2014 IoT-GSI event]
1	Identification and addressing aspects in IoT	
2	Requirements and capabilities for energy saving using smart objects	
3	APIs for IoT	
4	IoT functional architecture	
5	Data centric capabilities for IoT	
6	IoT and general Service Delivery Platforms (common SDP capabilities for support of multiple IoT apps)	
7	IoT application domains and related use cases	
8	Support of Inter- provider application scenarios	
9	IoT management and provisioning	
10	Quality of Service for IoT	
11	Security and privacy protection in IoT	
12	IoT and Cloud	
13	IoT and Peer2Peer/DSN	
14	Conformance and interoperability testing in IoT	
15	IoT Governance	
16	IoT terminology (incl. update of last version of the IoT terminology Recommendation)	
17	Plug and Play for IoT	

ITU-T SG13 and its core Questions for IoT

ITU-T SG13 «Future networks including cloud computing, mobile and next-generation networks»

SG13 leads on the network aspects of the IoT

Q.1/13 *Service scenarios, deployment models and migration issues based on convergence services*

Q.2/13 *Requirements for NGN evolution (NGN-e) and its capabilities including support of IoT and use of software-defined networking [and Q.3/13 in 2009-2012]*

Q.3/13 *Functional architecture for NGN evolution (NGN-e) including support of IoT and use of software-defined networking [and Q.5/13 in 2009-2012]*

Q.11/13 *Evolution of user-centric networking, services, and interworking with networks of the future including software-defined networking [and Q.7/13 in 2009-2012]*

Past achievements of SG13 with relevance to IoT/M2M (1/2)

Services using tag-based identification

- *Y.2213: NGN service requirements and capabilities for network aspects of applications and services using tag-based identification*
- *Y.2016: Functional requirements and architecture of the NGN for applications and services using tag-based identification*

Ubiquitous networking

- *Y.2002: Overview of ubiquitous networking and of its support in NGN*
- *Y.2062: Framework of object-to-object communication for ubiquitous networking in next generation networks*

Ubiquitous Sensor Networks and Sensor control networks

- *Y.2221: Requirements for support of ubiquitous sensor network (USN) applications and services in the NGN environment*
- *Y.2026: Functional requirements and architecture of the next generation network for support of ubiquitous sensor network applications and services*
- *Y.2222: Sensor control networks and related applications in a next generation network environment*

Past achievements of SG13 with relevance to IoT/M2M (2/2)

Machine-oriented communications

- Y.2061: *Requirements for the support of machine-oriented communication applications in the next generation network environment*

Overview and terminology of the IoT

- Y.2060: *Overview of the Internet of things*
- Y.2069: *Terms and definitions for the Internet of things* [NOTE – document requiring update]
- Y.2063: *Framework of the web of things*

IoT application or domain specific

- Y.2064: *Energy saving using smart objects in home networks*
- Y.2281: *Framework of networked vehicle services and applications using NGN*
- Y.2065: *Service and capability requirements for e-health monitoring services* [NOTE – document currently in AAP]
- Y Suppl. 22 of ITU-T Y.2200-series: *Greenhouse gas monitoring services provided over NGN*

Ongoing IoT/M2M work items in SG13

[not an exhaustive list]

Requirements of IoT

- Y.IoT-common-reqts "*Common requirements of Internet of Things*"

Capabilities of IoT

- Y.IoT-funct-framework "*IoT functional framework and capabilities*"

Application support models of IoT

Y. IoT-app-models "*IoT application support models*"

Gateways and Device Management

- Y.gw-IoT-reqts "*Common requirements and capabilities of gateways for IoT apps*"
- Y.gw-IoT-arch "*Functional architecture of gateway for IoT applications*"
- Y.DM-IoT-reqts "*Common reqts and capabilities of device management in IoT*"

Plug and play capability

- Y.IoT-PnP-reqts "*Requirements of the Plug and Play Capability of the IoT*"

Web of Objects

- Y.sms-WoO "*Smart Media Service Framework based on Web of Objects*"
- Y.sfem-WoO "*Service framework of Web of Objects for energy management*"

Others incl. items recently launched (Nov 2013)

- Y.EHM-cap "*Capability framework for e-health monitoring services*"
- Y.social-device "*Framework of the social device networking*"
- Y.ufn-sc "*Service model, scenarios for Ubiquitous Plant Farming based on networks*"
- Y.fsul "*Framework and scenarios for ubiquitous learning (u-learning) service*"

Discussion on other potential IoT work items is expected at this IoT-GSI event!

Some relevant ITU-T links on IoT/M2M

- IoT-GSI
<http://www.itu.int/en/ITU-T/gsi/iot/Pages/default.aspx>
- ITU-T Y series Recommendations (SG13)
<http://www.itu.int/ITU-T/recommendations/index.aspx?ser=Y>
- JCA-IoT
<http://www.itu.int/en/ITU-T/jca/iot/Pages/default.aspx>
- Focus Group on M2M Service Layer
<http://www.itu.int/en/ITU-T/focusgroups/m2m/Pages/default.aspx>



Thanks for your attention