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SERIES Y: GLOBAL INFORMATION INFRASTRUCTURE, INTERNET PROTOCOL ASPECTS AND NEXT-GENERATION NETWORKS

Next Generation Networks – Frameworks and functional architecture models

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## Terms and definitions for the Internet of things

Recommendation ITU-T Y.2069

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# Recommendation ITU-T Y.2069

## Terms and definitions for the Internet of things


### Summary

Recommendation ITU-T Y.2069 specifies the terms and definitions relevant to the Internet of things (IoT) from an ITU-T perspective, in order to clarify the Internet of things and IoT-related activities.


### History

| Edition | Recommendation | Approval | Study Group |
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| 1.0 | ITU-T Y.2069 | 2012-07-29 | 13 |

## FOREWORD

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# Recommendation ITU-T Y.2069

## Terms and definitions for the Internet of things

### 1 Scope

This Recommendation specifies the terms and definitions relevant to the Internet of things (IoT) from an ITU-T perspective, in order to clarify the Internet of things and IoT-related activities.

### 2 References

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published. The reference to a document within this Recommendation does not give it, as a stand-alone document, the status of a Recommendation.


[ITU-T F.744] Recommendation ITU-T F.744 (2009), *Service description and requirements for ubiquitous sensor network middleware*.

[ITU-T F.771] Recommendation ITU-T F.771 (2008), *Service description and requirements for multimedia information access triggered by tag-based identification*.

[ITU-T Q.1300] Recommendation ITU-T Q.1300 (1995), *Telecommunication applications for switches and computers (TASC) – General overview*.

[ITU-T Y.2002] Recommendation ITU-T Y.2002 (2009), *Overview of ubiquitous networking and of its support in NGN*.

[ITU-T Y.2060] Recommendation ITU-T Y.2060 (2012), *Overview of the Internet of things*.

[ITU-T Y.2061] Recommendation ITU-T Y.2061 (2012), *Requirements for the support of machine-oriented communication applications in the next generation network environment*.

[ITU-T Y.2063] Recommendation ITU-T Y.2063 (2012), *Framework of the web of things*.

[ITU-T Y.2091] Recommendation ITU-T Y.2091 (2011), *Terms and definitions for Next Generation Networks*.

[ITU-T Y.2213] Recommendation ITU-T Y.2213 (2008), *NGN service requirements and capabilities for network aspects of applications and services using tag-based identification*.

[ITU-T Y.2221] Recommendation ITU-T Y.2221 (2010), *Requirements for support of ubiquitous sensor network (USN) applications and services in the NGN environment*.

[ITU-T Y.2240] Recommendation ITU-T Y.2240 (2011), *Requirements and capabilities for next generation network service integration and delivery environment*.

## 3 Definitions

### 3.1 Terms defined elsewhere

This Recommendation uses the following terms defined elsewhere:

**3.1.1 actuator** [ITU-T Y.2061]: A device that triggers a physical action following stimulation by an input signal.

NOTE (from [ITU-T Y.2061]) – As examples, an actuator might act on the flow of a gas or liquid, or electricity, through a mechanical operation. Dimmers and relays are examples of actuators. The decision to activate the actuator may come from an MOC application, human or MOC devices and gateway.

**3.1.2 context** [ITU-T Y.2002]: The information that can be used to characterize the environment of a user.

NOTE (from [ITU-T Y.2002]) – Context information may include where the user is, what resources (devices, access points, noise level, bandwidth, etc.) are near the user, at what time the user is moving, interaction history between person and objects, etc. According to specific applications, context information can be updated.

**3.1.3 device** [ITU-T Y.2060]: 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.

**3.1.4 ID tag** [ITU-T Y.2213]: A physical object which stores one or more identifiers and optionally application data such as name, title, price, address, etc.

NOTE 1 (from [ITU-T Y.2213]) – Depending on its implementation, it may have a communication capability with an ID terminal.

NOTE 2 – The same term is also defined in [ITU-T F.771].

**3.1.5 ID terminal** [ITU-T Y.2213]: A device with a data reading and optional writing capability which reads (and optionally writes) identifier(s) and optionally application data from/into an ID tag.

NOTE 1 (from [ITU-T Y.2213]) – The data reading (and optionally writing) capability depends on its implementation.

NOTE 2 – The same term is also defined in [ITU-T F.771].

**3.1.6 identifier** [ITU-T Y.2091]: An identifier is a series of digits, characters and symbols or any other form of data used to identify subscriber(s), user(s), network element(s), function(s), network entity(ies) providing services/applications, or other entities (e.g., physical or logical objects). Identifiers can be used for registration or authorization. They can be either public to all networks, shared between a limited number of networks or private to a specific network (private IDs are normally not disclosed to third parties).

NOTE – The same term is also defined in [ITU-T F.771].

**3.1.7 identifier resolution** [ITU-T Y.2213]: A function to resolve an identifier into associated information (see "Forward identifier resolution") and vice versa (see "Reverse identifier resolution").

NOTE – A similar term "ID resolution" is defined in [ITU-T F.771].

**3.1.8 identifier scheme** [ITU-T Y.2213]: It is a numbering scheme that specifies the format and structure of the identifiers used within that scheme.

**3.1.9 Internet of things (IoT)** [ITU-T 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 (from [ITU-T Y.2060]) – From a broad perspective, the IoT can be perceived as a vision with technological and societal implications.

NOTE 2 (from [ITU-T Y.2060]) – 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.

**3.1.10 machine-oriented communication (MOC)** [ITU-T Y.2061]: A form of data communication between two or more entities in which at least one entity does not necessarily require human interaction or intervention in the process of communication.

**3.1.11 machine-to-machine applications** [ITU-T Y.2240]: Applications enabled by the communication between two or more machines that need limited or no direct human intervention.

NOTE – The major subject of [ITU-T Y.2240] is the NGN service integration and delivery environment in which M2M is considered as one of the possible use cases. At the time of approval, M2M and its definition were under study in ITU-T. The definitions of M2M may be modified according to the study.

**3.1.12 meter** [ITU-T Y.2061]: A device that measures and optionally records the quantity, degree, or rate of something, e.g., the amount of electricity, gas, or water used.

NOTE – (from [ITU-T Y.2061]): A meter is responsible for measuring the total amount of something consumed in a given period.

**3.1.13 multimedia information** [ITU-T F.771]: Multimedia information is digital information that uses multiple forms of information content and information processing, such as text, pictures, audio, video, three-dimensional panoramic pictures and digital maps to inform or entertain users.

**3.1.14 multimedia information delivery function** [ITU-T F.771]: A multimedia information delivery function is a function for delivering multimedia information to an ID terminal which is triggered by tag-based identification.

**3.1.15 object** [ITU-T Q.1300]: An intrinsic representation of an entity that is described at an appropriate level of abstraction in terms of its attributes and functions.

NOTE 1 (from [ITU-T Y.2002]) – An object is characterized by its behaviour. An object is distinct from any other object. An object interacts with its environment including other objects at its interaction points. An object is informally said to perform functions and offer services (an object which makes a function available is said to offer a service). For modelling purposes, these functions and services are specified in terms of the behaviour of the object and of its interfaces. An object can perform more than one function. A function can be performed by the cooperation of several objects.

NOTE 2 (from [ITU-T Y.2002]) – Objects include terminal devices (e.g., used by a person to access the network such as mobile phones, personal computers, etc.), remote monitoring devices (e.g., cameras, sensors, etc.), information devices (e.g., a content delivery server), products, contents, and resources.

**3.1.16 open application interface** [ITU-T F.744]: An interface used by USN applications to access USN middleware.

NOTE – This definition is associated with USNs, but it can be applied to the interfaces between the application layer and the service support/application support layer.

**3.1.17 processed data** [ITU-T F.744]: Data that is processed from raw sensed data by sensor network or USN middleware.

NOTE – This definition is associated with USNs, but it can be applied to other use cases of the IoT.

**3.1.18 real-world entity** [ITU-T F.771]: A real-world entity is a physical and logical entity which mainly acts or is used in the real world, such as a physical object, logical object, place or person. Examples of *physical objects* include a water bottle, book, desk, wall, chair, tree, animal, cloth, food, television, light and so on. Examples of *logical objects* include digital content such as a video, movie, music or story. Examples of *places* include a room, corridor, road, gate, garden and so on. The real-world entity concept includes both networked entities and non-networked entities.

**3.1.19 sensed data** [ITU-T F.744]: Data sensed by a sensor that is attached to a specific sensor node.

**3.1.20 sensor** [ITU-T Y.2221]: An electronic device that senses a physical condition or chemical compound and delivers an electronic signal proportional to the observed characteristic.

**3.1.21 sensor network** [ITU-T Y.2221]: A network comprised of interconnected sensor nodes exchanging sensed data by wired or wireless communication.

**3.1.22 sensor network common interface** [ITU-T F.744]: An interface used between USN middleware and a sensor network/radio frequency identification (RFID) reader.

**3.1.23 sensor network metadata** [ITU-T F.744]: Information about a sensor network, such as a description of the sensor network, sensor node identifier, supported sensor type, the number of attached sensors for each sensor node, and the number of sensor nodes connected to the specific sensor network, etc.

**3.1.24 sensor network metadata directory service** [ITU-T F.744]: A directory service that provides sensor network metadata.

**3.1.25 sensor node** [ITU-T Y.2221]: A device consisting of sensor(s) and optional actuator(s) with capabilities of sensed data processing and networking.

**3.1.26 smart grid** [b-Smart-O-30Rev.6]: The "Smart Grid" is a two way electric power delivery network connected to an information and control network through sensors and control devices. This supports the intelligent and efficient optimization of the power network.

**3.1.27 tag-based identification** [ITU-T Y.2213]: The process of specifically identifying a physical or logical object from other physical or logical objects by using identifiers stored on an ID tag.

NOTE – The same term is also defined in [ITU-T F.771].

**3.1.28 thing** [ITU-T Y.2060]: In the Internet of things, this is an object of the physical world (physical things) or of the information world (virtual things), which is capable of being identified and integrated into communication networks.

**3.1.29 ubiquitous networking** [ITU-T Y.2002]: The ability for a person and/or device to access services and communicate while minimizing technical restrictions regarding where, when and how these services are accessed, in the context of the service(s) subscribed to.

NOTE (from [ITU-T Y.2002]) – Although technical restrictions to access services and communicate may be minimized, other constraints such as regulatory, national, provider and environmental constraints may impose further restrictions.

**3.1.30 ubiquitous sensor network (USN)** [ITU-T Y.2221]: A conceptual network built over existing physical networks which makes use of sensed data and provides knowledge services to anyone, anywhere and at any time, and where the information is generated by using context awareness.

**3.1.31 web of things** [ITU-T Y.2063]: A concept which refers to making use of the IoT in order for (physical and virtual) things to be connected and controlled via the world wide web.

NOTE (from ITU-T Y.2063) – This Recommendation intends using and accessing several kinds of physical devices on the web whether the devices are accessible on the web itself or not.

## 4 Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

IoT Internet of Things

M2M Machine to Machine

MOC Machine-Oriented Communication

USN Ubiquitous Sensor Network

# Bibliography

[b-Smart-O-30 Rev.6] Smart-O-30 Rev.6 (2011), Focus Group on Smart Grid (FG Smart), *Deliverable on Smart Grid Terminology*. <http://www.itu.int/en/ITU-T/focusgroups/smart/Pages/Default.aspx>

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