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SERIES Y: GLOBAL INFORMATION
INFRASTRUCTURE, INTERNET PROTOCOL ASPECTS,
NEXT-GENERATION NETWORKS, INTERNET OF
THINGS AND SMART CITIES

Internet of things and smart cities and communities –
Frameworks, architectures and protocols

Architectural reference models of devices for Internet of things applications

Recommendation ITU-T Y.4460

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Recommendation ITU-T Y.4460

Architectural reference models of devices for Internet of things applications

Summary

Recommendation ITU-T 4460 describes the architectural reference models of devices for Internet of things (IoT) applications, based on a classification of devices defined by processing power and communication capabilities. The architectural reference models described also includes the device's functional entities and the functional entities interaction for each device's architectural reference model.

Processing power and communication capabilities define how the device communicates and interacts with other entities in an IoT solution. By correlating the processing and communication capabilities classifications, it is possible to enumerate three types of devices:

- 1) low processing and low connectivity device – LPLC device;
- 2) low processing and high connectivity device – LPHC device;
- 3) high processing and high connectivity device – HPHC device.

NOTE – Devices with no processing capabilities are also not considered on this Recommendation because they are simple devices (ID tags) that were defined in Recommendation ITU-T Y.4108/Y.2213.

History

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Recommendation ITU-T Y.4460

Architectural reference models of devices for Internet of things applications

1 Scope

This Recommendation describes the architectural reference models of devices for Internet of things (IoT) applications, by providing:

- a classification of devices for IoT applications, regarding their processing and connectivity capabilities;
- the architectural reference models of devices for IoT applications based on the classification above;
- the functional entities for each architectural reference model;
- the functional entities interaction for each architectural reference model.

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 Y.4000] Recommendation ITU-T Y.4000 (2012), *Overview of Internet of things*.

[ITU-T Y.4108] Recommendation ITU-T Y.4108/Y.2213 (2008), *NGN service requirements and capabilities for network aspects of applications and services using tag-based identification*.

3 Definitions

3.1 Terms defined elsewhere

This Recommendation uses the following terms defined elsewhere:

3.1.1 application [b-ITU-T Y.2091]: A structured set of capabilities, which provide value-added functionality supported by one or more services, which may be supported by an API interface.

3.1.2 cloud service [b-ITU-T Y.3500]: One or more capabilities offered via cloud computing invoked using a defined interface.

3.1.3 device [ITU-T Y.4000]: With regard to the Internet of things, this is 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 gateway [b-ITU-T Y.4101]: A unit in the Internet of things which interconnects the devices with the communication networks. It performs the necessary translation between the protocols used in the communication networks and those used by devices.

3.1.5 ID tag [ITU-T Y.4108]: A physical object which stores one or more identifiers and optionally application data such as name, title, price, address, etc.

NOTE – It may have a communication capability with an ID terminal depending on its implementation.

3.1.6 ID terminal [ITU-T Y.4108]: 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 – The data reading (and optionally writing) capability depends on its implementation.

3.1.7 Internet of Things (IoT) [ITU-T Y.4000]: 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, while ensuring that security and privacy requirements are fulfilled.

NOTE 2 – From a broader perspective, the IoT can be perceived as a vision with technological and societal implications.

3.1.8 service [b-ITU-T Y.2091]: A set of functions and facilities offered to a user by a provider.

3.1.9 tag-based identification [ITU-T Y.4108]: The process of specifically identifying a physical or logical object from other physical or logical objects by using identifiers stored on an ID tag.

3.1.10 thing [ITU-T Y.4000]: With regard to 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.

3.2 Terms defined in this Recommendation

This Recommendation defines the following terms:

3.2.1 HPHC device: An IoT device that not only has high connectivity capabilities, allowing it to directly connect to applications and cloud services, but also has high enough processing capabilities to make decisions and run complex algorithms (e.g., artificial intelligence (AI) related algorithms). Devices are autonomous. They make decisions about their own functions and can also coordinate other devices.

3.2.2 LPHC device: An IoT device that only acts as an interface for data collection from physical things or the surrounding environment, and/or performs operations on physical things or the surrounding environment. This device has sufficient connectivity capabilities to directly connect to the communication networks.

3.2.3 LPLC device: An IoT device that only acts as an interface for data collection from physical things or the surrounding environment, and/or performs operations on physical things or the surrounding environment. This device does not have sufficient processing capabilities to make decisions or run complex algorithms; it also does not have sufficient connectivity capabilities to directly connect to the communication networks.

4 Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

ADC	Analogue to Digital Converter
AI	Artificial Intelligence
API	Application Programming Interface
D2D	Device to Device
DAC	Digital to Analogue Converter
GPIO	General Purpose Input/Output
GPRS	General Packet Radio Service