

Recommendation

ITU-T Y.4603 (03/2023)

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 –
Services, applications, computation and data processing

Requirements and functional model to support data quality management in Internet of things

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Recommendation ITU-T Y.4603

Requirements and functional model to support data quality management in Internet of things

Summary

Data quality management comprises the mature processes, tools, and in-depth understanding of data you need to make decisions or solve problems to minimize risk and impact to your organization or customers. Data quality management in Internet of things (IoT) is the practice of using that IoT data to serve your purposes with flexibility and agility for IoT applications. To do this, it is necessary to assess what data you have today and the processes and tools that use or support data against purposes and requirement of IoT applications. The requirements for data and its quality vary from IoT application to application or organization in different contexts. Data quality management practice in IoT makes data a holistic asset, by which it means that data is the input and output of every task and transaction performed according to the IoT application for a business.

Recommendation ITU-T Y.4603 specifies key requirements with respect to data quality management in IoT and important elements to fulfil these requirements. This Recommendation indicates the requirements and functional model in terms of the scopes of the following: data quality management in IoT, requirements of data quality management in IoT and a functional model to support data quality management.

History

Edition	Recommendation	Approval	Study Group	Unique ID*
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Keywords

Data quality, data quality classification, data quality management, IoT.

* To access the Recommendation, type the URL <http://handle.itu.int/> in the address field of your web browser, followed by the Recommendation's unique ID. For example, <http://handle.itu.int/11.1002/1000/11830-en>.

FOREWORD

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The World Telecommunication Standardization Assembly (WTSA), which meets every four years, establishes the topics for study by the ITU-T study groups which, in turn, produce Recommendations on these topics.

The approval of ITU-T Recommendations is covered by the procedure laid down in WTSA Resolution 1.

In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

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Recommendation ITU-T Y.4603

Requirements and functional model to support data quality management in Internet of things

1 Scope

This Recommendation identifies requirements and a functional model for data quality management in Internet of things (IoT). The scope of this Recommendation covers several key requirements with respect to data quality management in IoT, many important elements to fulfil these requirements and a functional model. Specifically, it covers the following:

- Overview of data quality;
- Data quality management in IoT;
- Requirements of data quality management in IoT;
- Functional components to support data quality management.

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/Y.2060 (2013), *Overview of the Internet of things*.

3 Definitions

3.1 Terms defined elsewhere

This Recommendation uses the following term defined elsewhere:

3.1.1 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.

3.2 Terms defined in this Recommendation

This Recommendation defines the following terms:

3.2.1 critical data: The data to be required for the successful completion of a task in an application or service within a specific business context. It is characterized by defined attributes and priorities.

3.2.2 data quality: The degree to which the characteristics of data satisfy stated and implied needs when used under specified conditions.

3.2.3 non-critical data: Low business value and impact data.

3.2.4 poor data: The data classified as low quality during a data quality assessment process.

4 Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

AI	Artificial Intelligence
DL	Deep Learning
DQM	Data Quality Management
IoT	Internet of Things
ML	Machine Learning
PII	Personally Identifiable Information

5 Conventions

In this Recommendation:

The keywords "**is required to**" indicate a requirement which must be strictly followed and from which no deviation is permitted if conformance to this document is to be claimed.

6 Overview of data quality

6.1 Concept of data quality

For data that is collected through sensing to be fit for use, it should possess certain features so that it can satisfy a set of system requirements.

There is an increasing awareness of the criticality of data to making informed decisions and of how inaccurate data can lead to disastrous consequences. The challenge lies in ensuring that enterprises collect relevant data for their businesses, manage or govern that data in a meaningful and sustainable way, ensure high quality for critical data, and analyse the high quality data to accomplish stated business objectives.

The data quality will be attributed to a quality supporting business processes using analysis techniques, and it will rise according to whether a data quality of the existing data would be worthwhile or plausible. Thus, data quality is necessarily designed, measured and assessed with this consideration in mind, and the possible risks of deploying this data in business will be overcome.

6.2 Data quality issues

Data quality is very important for product or information consumers because without high data quality, a business operator or service provider will not be able to provide the requested service capabilities. This is because the characteristics of the data are not related to satisfying the stated requirements of a service. Furthermore, data quality cannot be specified as the degree to which the characteristics of the data satisfy the stated and implied needs when used under specified conditions.

Many data quality issues have been raised, and common issues are listed in Table 6-1.

Table 6-1 – Common issues in data quality

Data quality issues	Description
Loss of event	Gaps in the data, such as the data for some time period is missing
Out of range values	The physiological sensors' values are out of range with respect to the domain. These issues could be in individual time series data and in aggregated and mean data.