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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 – Definitions and terminologies

Vocabulary for blockchain for supporting Internet of things and smart cities and communities in data processing and management aspects

Recommendation ITU-T Y.4052

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Recommendation ITU-T Y.4052

Vocabulary for blockchain for supporting Internet of things and smart cities and communities in data processing and management aspects

Summary

Recommendation ITU-T Y.4052 contains blockchain-related vocabulary to be used for Internet of things (IoT) and smart cities and communities (SC&C) in aspects of data processing and management (DPM). The vocabulary in this Recommendation is collected from the Recommendations, Supplements and standards published by ITU and ISO. In addition, this Recommendation includes and defines new terms to meet the needs of SC&C work within ITU.

History

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Recommendation ITU-T Y.4052

Vocabulary for blockchain for supporting Internet of things and smart cities and communities in data processing and management aspects

1   Scope

This Recommendation contains blockchain-related terms and definitions to be used for Internet of things (IoT) and smart cities and communities (SC&C) in aspects of data processing and management (DPM). The terms and definitions in this Recommendation are collected from the Recommendations, Supplements and standards published by ITU and ISO. In addition, this Recommendation includes and defines new terms to meet the needs of SC&C works of ITU.

2   References

None.

3   Definitions

3.1   Terms defined elsewhere

This Recommendation uses the following terms defined elsewhere:

3.1.1   blockchain [b-ITU-T X.1400]: A type of distributed ledger which is composed of digitally recorded data arranged as a successively growing chain of blocks with each block cryptographically linked and hardened against tampering and revision.

3.1.2   blockchain of things (BoT) [b-ITU-T Y.4464]: An Internet of things (IoT) service platform with a decentralized working mode where IoT applications and services are executed.

NOTE – BoT uses blockchain-related technologies (such as peer-to-peer communication, decentralized data storage, crowding consensus and transaction) to support a decentralized working mode.

3.1.3   blockchain of things (BoT) data [b-ITU-T Y.4464]: The data within a blockchain of things (BoT), besides the traditional Internet of Things (IoT) data, includes data such as the distributed append-only ledgers, state information, permission policies, etc.

NOTE – BoT data may be distributed and be stored in BoT peers. A BoT peer may store all or part of the data in a BoT.

3.1.4   blockchain of things (BoT) entity [b-ITU-T Y.4464]: A functional entity or physical entity (e.g., Internet of Things (IoT) server, IoT device, IoT gateway and end-user device) that participates in the activities performed in a blockchain of things (BoT).

NOTE – Physical things with constrained capabilities on computation or communication (e.g., constrained IoT devices, ID tags) are usually not BoT entities, but they can be bound to BoT entities in order to be mapped into BoT. Virtual things can be bound to BoT entities in order to be mapped into BoT.

3.1.5   blockchain of things (BoT) peer [b-ITU-T Y.4464]: A logic function of a blockchain of things (BoT) entity to perform BoT-related functionalities (e.g., executing transactions and maintaining BoT data) in processes of communications, consensus-making, transactions and management.

3.1.6   blockchain of things (BoT) transaction [b-ITU-T Y.4464]: An operation (e.g., reading/writing blockchain of things (BoT) data, deploying/invoking smart contracts, and querying results of smart contracts) that is performed by authorized BoT peers.

NOTE – BoT may provide incentive mechanisms (e.g., rewarding fees or tokens) to encourage the participants to contribute to the transaction (e.g., maintaining BoT data, endorsing the transaction).

3.1.7   blockchain platform [b-ITU-T Y.4464]: A platform (or system) that is established based on blockchain-related technologies.

3.1.8   data cleaning [b-ITU-T X.1217]: A process to delete irrelevant data and duplicate data in the original data set, to smooth the noise data, and process missing values and outliers.

3.1.9   data consistency [b-ISO 11519-1]: Feature of data processing and/or communication system where data remain consistent even after being partitioned and differently treated over time and location.

3.1.10   data filtering [b-ITU-T X.1217]: A process to delete irrelevant data and filter the unrelated data in the original data set.

3.1.11   data interoperability [b-ITU-T Y.4563]: The ability of two or more systems or components to exchange data and to use the data that has been exchanged.

3.1.12   data lifecycle [b-ITU-T M.3363]: A whole range of data processing phases including data planning, data acquisition, data storage, data sharing, data usage, data transmission and data disposal.

3.1.13   data management [b-ITU-T M.3363]: A set of functions that control, protect, and enhance the value of data throughout their lifecycles.

3.1.14   data mapping [b-ITU-T X.1217]: A process to map data elements from the source data system to the destination data system.

3.1.15   data merging [b-ITU-T X.1217]: A process to merge the similar data records into one record.

3.1.16   data mining [b-ITU-T X.1217]: A computational process to discover patterns in large data sets involving methods of artificial intelligence, machine learning, statistics, and database systems.

3.1.17   data sampling [b-ITU-T X.1217]: A statistics technique used to process missing values and outliers.

3.1.18   data segmentation [b-ITU-T X.1217]: A process to segment data from different levels.

3.1.19   data sorting [b-ITU-T X.1217]: A process to sort data in a certain order or category.

3.1.20   data transforming [b-ITU-T X.1217]: A process to transform data to a certain format and scale the data to a specified range.

3.1.21   decentralized application [b-ITU-T X.1400] Application that runs in a distributed and decentralized computing environment.

3.1.22   decentralized system [b-ITU-T X.1400]: Distributed system wherein control is distributed among the persons or organizations participating in the operation of the system.

NOTE – In a decentralized system, the distribution of control among persons or organizations participating in the system is determined by the system's design.

3.2.23   digital identity [b-ITU-T X.1252]: A digital representation of the information known about a specific individual, group or organization.

3.2.24   explicit data [b-ITU-T X.1408]: Any data provided directly through interactions with the data owner.

3.1.25   implicit data [b-ITU-T X.1408]: Any data acquired automatically by, for example, sensors of Internet of things (IoT) devices, applications installed in mobile devices, server, or database.

3.1.26   Internet of things [b-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, whilst ensuring that security and privacy requirements are fulfilled.

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

3.1.27 open data [b-ITU-T Y.4472]: Data that can be publicly accessible to all through open standards and protocols or through other means. The use and redistribution of open data can be subject to rules.

3.1.28 smart sustainable city [b-ITU-T Y.4900]: A smart sustainable city (SSC) is an innovative *city* that uses information and communication technologies (ICTs) and other means to improve quality of life, efficiency of urban operation and services, and competitiveness, while ensuring that it meets the needs of present and future generations with respect to economic, social, environmental as well as cultural aspects.

NOTE 1 – City competitiveness refers to policies, institutions, strategies and processes that determine the city's sustainable productivity.

NOTE 2 – 'Smart sustainable city' is also called 'smart city' in some other SDOs.

3.1.29 thing [b-ITU-T Y.4000]: In the Internet of things, an 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.

3.2   Terms defined in this Recommendation

This Recommendation defines the following terms:

3.2.1 blockchain data: The full set of data contained in a blockchain, such as distributed append-only ledgers, state information, permission policies, etc.

NOTE – Blockchain data may be distributed and be stored in blockchain peers. A blockchain peer may store all or part of the data in a blockchain.

3.2.2 blockchain peer: A functional entity or physical entity (e.g., device, gateway or system) that utilizes blockchain-related functionalities (e.g., executing transactions, and maintaining blockchain data) in peer-to-peer communications.

3.2.3 blockchain transaction: An operation (e.g., deploying, invoking and querying results of blockchain contracts) in a blockchain in which an authorized end user performs operations (e.g., reading/writing blockchain data, invoking a blockchain contract).

3.2.4 consortium blockchain: A blockchain platform that is accessible for use only to a consortium whose members establish and maintain the blockchain platform.

3.2.5 closed data: Data that requires access control to be divulgated.

3.2.6 data commercialization: The process of creating commercial value from data.

NOTE – Data commercialization may encompass various activities, including, but not limited to, monetization, valuation, pricing, licensing, distribution, marketing and sales.

3.2.7 data exchange: Accessing, transferring and archiving of data.

3.2.8 data governance: Set of activities aimed to design, implement and monitor a strategic plan for data asset management.

3.2.9 data marketplace: An electronic marketplace whose main product is provisioning of data and/or related services around data.

3.2.10 data sharing: The process of data exchange among different parties with specified conditions.

3.2.11 immutable: A system's property in relation to it being unchanged even after a long period.

3.2.12 private blockchain: A blockchain platform that is accessible for use only to a limited group of entities that participate in its activities.

3.2.13 public blockchain: A blockchain platform that is accessible to the public for use.

NOTE – A public blockchain may be permissioned or permissionless. In a permissioned public blockchain, it provides services only to authorized participants.

4   Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

BoT	Blockchain of Things
DPM	Data Processing and Management
IoT	Internet of Things
SC&C	smart cities and communities

5   Conventions

None.

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