

Recommendation

ITU-T Y.4608 (03/2025)

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

Capability and functional architecture of blockchain of things peers

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Global information infrastructure, Internet protocol aspects, next-generation networks, Internet of Things and smart cities

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Recommendation ITU-T Y.4608

Capability and functional architecture of blockchain of things peers

Summary

Recommendation ITU-T Y.4464 "*Framework of blockchain of things as decentralized service platform*", introduces a decentralized Internet of things (IoT) service platform, blockchain of things (BoT), and provides its common capabilities and functionalities. A BoT entity is a functional entity or physical entity (e.g., IoT server, IoT device, IoT gateway and end user device) that participates in the activities performed in a BoT. A BoT peer is a logic function of a BoT entity to perform BoT-related functionalities in the processes of communications, consensus-making, and transactions and management. BoT peers are participants of BoTs which create and maintain BoTs.

Recommendation ITU-T Y.4608 presents common capabilities, functional architecture and general interactions of blockchain of things peers.

History*

Edition	Recommendation	Approval	Study Group	Unique ID
1.0	ITU-T Y.4608	2025-03-01	20	11.1002/1000/16213

Keywords

Blockchain of things, capability, functional architecture, peer.

* To access the Recommendation, type the URL <https://handle.itu.int/> in the address field of your web browser, followed by the Recommendation's unique ID.

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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.4608

Capability and functional architecture of blockchain of things peers

1 Scope

This Recommendation presents common capabilities, functional architecture and general interactions of blockchain of things (BoT) peers.

The scope of this Recommendation includes:

- technical characteristics and common capabilities of blockchain of things peers;
- functional architecture of blockchain of things peers, including relevant general interactions.

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 X.1400] Recommendation ITU-T X.1400 (2020), *Terms and definitions for distributed ledger technology*.
- [ITU-T Y.4000] Recommendation ITU-T Y.4000/Y.2060 (2012), *Overview of the Internet of things*.
- [ITU-T Y.4451] Recommendation ITU-T Y.4451 (2016), *Framework of constrained device networking in the IoT environments*.
- [ITU-T Y.4464] Recommendation ITU-T Y.4464 (2020), *Framework of blockchain of things as decentralized service platform*.

3 Definitions

3.1 Terms defined elsewhere

This Recommendation uses the following terms defined elsewhere:

3.1.1 address [b-ITU-T Y.2091]: An address is the identifier for a specific termination point and is used for routing to this termination point.

3.1.2 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.

3.1.3 blockchain [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.

3.1.4 blockchain of things (BoT) [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.

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

3.1.6 blockchain of things (BoT) entity [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.

3.1.7 blockchain of things (BoT) peer [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 the processes of communications, consensus-making, and transactions and management.

3.1.8 blockchain of things (BoT) transaction [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).

3.1.9 consensus [ITU-T X.1400]: Agreement that a set of transactions is valid.

3.1.10 constrained device [ITU-T Y.4451]: A device that has constraints on characteristics such as limited processing capability, small memory capability, limited battery power, short range, and low bit rate.

3.1.11 decentralized application (dApp) [ITU-T X.1400]: Application that runs in a distributed and decentralized computing environment.

3.1.12 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.

3.1.13 Internet of things [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.

3.1.14 smart contract [ITU-T X.1400]: A program written on a distributed ledger system which encodes the rules for specific types of distributed ledger system transactions in a way that can be validated, and triggered by specific conditions.

3.1.15 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 the communication networks.

3.2 Terms defined in this Recommendation

None.

4 Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

BoT	Blockchain of Things
dApp	Decentralized Application
FC	Functional Component