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SERIES F: NON-TELEPHONE TELECOMMUNICATION
SERVICES

Multimedia services

Requirements for distributed ledger systems

Recommendation ITU-T F.751.0

ITU-T

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Recommendation ITU-T F.751.0

Requirements for distributed ledger systems

Summary

Recommendation ITU-T F.751.0 establishes basic and advanced requirements for distributed ledger systems.

History

Edition	Recommendation	Approval	Study Group	Unique ID*
1.0	ITU-T F.751.0	2020-08-13	16	11.1002/1000/14332

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Blockchain, consensus, decentralized ledger technology, non-repudiation, tamper-resistant.

* 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.

NOTE

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Recommendation ITU-T F.751.0

Requirements for distributed ledger systems

1 Scope

This Recommendation establishes requirements for distributed ledger systems, covering:

- a general overview;
- basic requirements;
- advanced requirements.

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.

None.

3 Definitions

3.1 Terms defined elsewhere

This Recommendation uses the following terms defined elsewhere:

3.1.1 digital signature [b-ITU-T X.800]: Data appended to, or a cryptographic transformation of a data unit that allows a recipient of the data unit to prove the source and integrity of the data unit and protect against forgery, e.g., by the recipient.

3.1.2 Internet of things (IoT) [b-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.

3.1.3 private distributed ledger technology system [b-ISO 22739]: DLT system that is accessible for use only to a limited group of DLT users.

3.1.4 public DLT; public distributed ledger system; public distributed ledger technology system [b-ISO 22739]: DLT system which is accessible to the public for use.

3.2 Terms defined in this Recommendation

This Recommendation defines the following terms:

3.2.1 asset: A representation of value. It can be a diamond, a unit of currency, items inside a shipping container, etc. An asset can be physical or virtual.

3.2.2 blockchain: A type of distributed ledger that 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.

NOTE – Adapted from [b-ITU-T TS FG DLT D1.1].

3.2.3 consensus: Agreement that a set of transactions is valid.

NOTE – Originally published in [b-ITU-T TS FG DLT D1.1].



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3.2.4 consensus algorithm: A set of rules that precisely establishes a sequence of operations to reach consensus.

3.2.5 distributed ledger: A type of ledger that is shared, replicated, and synchronized in a distributed and decentralized manner.

NOTE – Originally published in [b-ITU-T TS FG DLT D1.1].

3.2.6 distributed ledger system: A system that implements a distributed ledger.

3.2.7 distributed ledger technology application; ledger application: A client to a distributed ledger technology (DLT) system that is designed to help people perform an activity.

3.2.8 entity: Anything that has a separately identifiable existence (e.g., organization, person, group, smart contract or device). An entity uses distributed ledger technology to solve the problem of its business or information systems.

NOTE – Adapted from [b-ITU-T X.1215].

3.2.9 entity address: Identifier for one or more entities performing transactions or other actions in a blockchain or distributed ledger network.

3.2.10 ledger: Information store that keeps final and definitive (immutable) records of transactions.

NOTE – Originally published in [b-ITU-T TS FG DLT D1.1].

3.2.11 mining: A reward-seeking activity in some consensus mechanisms.

3.2.12 node: Device or process that participates in a distributed ledger network.

NOTE 1 – Nodes can store a complete or partial replica of the distributed ledger.

NOTE 2 – Originally published in [b-ITU-T TS FG DLT D1.1].

3.2.13 P2P: An instantiation of network architectures where all peers have equivalent authority and responsibility, differing completely from that of server and client system.

NOTE – Paraphrased from clause 1 of [b-ITU-T X.1161].

3.2.14 permissioned distributed ledger system: Distributed ledger system in which permissions are required to maintain and operate a node.

NOTE – Originally published in [b-ITU-T TS FG DLT D1.1].

3.2.15 permissionless distributed ledger system: Distributed ledger system where permissions are not required to maintain and operate a node.

NOTE – Originally published in [b-ITU-T TS FG DLT D1.1].

3.2.16 smart contract: Program written on the distributed ledger system that encodes the rules for specific types of distributed ledger system transactions in a way that can be validated, and triggered by specific conditions.

NOTE – Adapted from [b-ITU-T TS FG DLT D1.1].

3.2.17 token: A digital representation of value on a shared distributed ledger that is owned and secured using cryptography to ensure its authenticity and prevent modification or tampering without the owner's consent.

NOTE – Originally published in [b-ITU-T TS FG DLT D1.1].

3.2.18 transaction: An incident or an operation that leads to a change in the status of a ledger, such as adding a record or equivalent exchange based on currency.

4 Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

DDoS Distributed Denial of Service