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**Blockchain and distributed ledger technologies ~~—~~ — Data flow models for blockchain and DLT use cases**

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## 143 Foreword

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 146 through ISO technical committees. Each member body interested in a subject for which a technical  
 147 committee has been established has the right to be represented on that committee. International  
 148 organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO  
 149 collaborates closely with the International Electrotechnical Commission (IEC) on all matters of  
 150 electrotechnical standardization.

151 The procedures used to develop this document and those intended for its further maintenance are  
 152 described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the  
 153 different types of ISO ~~documents~~document should be noted. This document was drafted in accordance  
 154 with the editorial rules of the ISO/IEC Directives, Part ~~—~~2 (see  
 155 [www.iso.org/directives](http://www.iso.org/directives)~~www.iso.org/directives~~).

156 ~~Attention is drawn~~ISO draws attention to the possibility that ~~some of the~~elementsimplementation of this  
 157 document may ~~be involve~~ the ~~subject~~use of (a) patent(s). ISO takes no position concerning the evidence,  
 158 ~~validity or applicability~~ of any claimed patent rights. ~~in respect thereof. As of the date of publication of~~  
 159 ~~this document, ISO had not received notice of (a) patent(s) which may be required to implement this~~  
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165 Any trade name used in this document is information given for the convenience of users and does not  
 166 constitute an endorsement.

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 168 expressions related to conformity assessment, as well as information about ISO's adherence to the World  
 169 Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see ~~77~~  
 170 [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html)~~www.iso.org/iso/foreword.html~~.

171 This document was prepared by ISO Technical Committee ~~ISO/TC 307, Blockchain and DLT—WG6~~  
 172 ~~Blockchain and DLT use cases~~*distributed ledger technologies*.

173 Any feedback or questions on this document should be directed to the user's national standards body. A  
 174 complete listing of these bodies can be found at  
 175 [www.iso.org/members.html](http://www.iso.org/members.html)~~www.iso.org/members.html~~.



## 176 Introduction

177 This document consolidates a set of system-level models from ISO 23257:2022 and ISO/TR 3242:2022  
 178 to give a data-flow-centric description framework for blockchain and distributed ledger technology  
 179 (DLT) use cases. The framework enables a data flow analysis approach for blockchain and DLT use cases  
 180 which has been defined in ISO 23257:2022, successfully applied across all use cases in  
 181 ISO/TR\_3242:2022, and extended in this document to display more detailed information on data flows.

182 The robust descriptive capabilities provided by this framework can help to improve blockchain and DLT  
 183 application design and enhance interoperability. It can be beneficial for:

- 184 — clear understanding of data types and data flows in distributed ledger systems that allows for better-  
 185 designed, fit-for-purpose systems;
- 186 — better governance and risk management;
- 187 — a sound basis for interoperability ~~modeling~~modelling for the use cases that require data exchange in  
 188 hybrid or orchestrated systems environment.

189 Understanding data flows can be a necessary foundation for DLT users to ensure data privacy and data  
 190 confidentiality in DLT use cases, or a decision-making basis when implementing technology selection or  
 191 scheme assessment. From this perspective, data flow analysis is especially essential to scenarios which  
 192 ~~involve~~ frequently involve data flows among stakeholders or devices. To illustrate the features of data  
 193 flows in DLT use cases with above characteristics, this document provides ~~3~~three uses cases which apply  
 194 the description framework to unfold data flows among devices, data flows along with business process,  
 195 as well as data flows between physical and virtual spaces. These use cases can also provide an insight into  
 196 the role of data flow analysis in balancing business value maximization and risk controls.

197 This document is organized as follows: ~~Clause 5:~~

- 198 — Clause 5 presents an overview of DLT data flows, including data flow categories, data categories,  
 199 roles/subroles and considerations related to data flow. ~~Clause 6 and Clause 7 provide analysis of~~  
 200 ~~typical intra-system and inter-system data flows for DLT systems. Clause 8 provides 3 DLT use cases~~  
 201 ~~based on a descriptive and visualization template focusing on data flows.~~

202

- Clause 6 and Clause 7 provide analysis of typical intra-system and inter-system data flows for DLT systems.
- Clause 8 provides three DLT use cases based on a descriptive and visualization template focusing on data flows.

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# Blockchain and distributed ledger technologies — Data flow models for blockchain and DLT use cases

## 1 Scope

This document uses a set of models that describe the flows of different types of data between ~~DLT~~ distributed ledger technologies (DLT) and related systems, as well as between different DLT nodes.

It provides a descriptive analysis of data flows in the development of use cases, as well as the basis for understanding the characteristics of DLT data flows, ~~so as~~ to support DLT application design and system analysis.

The models referenced are in accordance with ISO 23257:2022 and the use case analysis approach provided in ISO/TR 3242:2022. ~~The document contains three use cases.~~

## 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 22739, *Blockchain and distributed ledger technologies — Vocabulary*

ISO 23257, *Blockchain and distributed ledger technologies — Reference architecture*

## 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 22739, ISO 23257:2022 and the following apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>~~https://www.iso.org/obp~~
- IEC Electropedia: available at <https://www.electropedia.org/>~~https://www.electropedia.org/~~

### 3.1

#### cloud computing

paradigm for enabling network access to a scalable and elastic pool of shareable physical or virtual resources with self-service provisioning and administration on-demand

Note 1 to entry: Examples of resources include servers, operating systems, networks, software, applications, and storage equipment.

[SOURCE: ISO/IEC 22123-1:2021, 3.2.1]2023, 3.1.1, modified — Note 2 to entry deleted.]

### 3.2

#### data category

class of data items that are closely related from a formal or semantic point of view

[SOURCE: ISO 30042:2019, 3.8], modified — Example and Notes to entry deleted.]

### 3.3

#### data flow

movement of data through the active parts of a data processing system in the course of the performance of specific work

## ISO/DTR 6277:(E)

[SOURCE: ISO/IEC TS 20748-3:2020, 3.5]

### 3.4

#### **decentralized identifier**

##### **DID**

identifier that is issued and managed in a decentralized system and designed to be unique within a context

Note\_1\_to\_entry:- Decentralized identifiers are used in systems that do not rely on central registration authorities.

Note\_2\_to\_entry:- Decentralized identifiers are often cryptographically verifiable.

[SOURCE: ISO ~~DIS-22739:2023:—1~~, 3.18], modified — Note 2 to entry added.]

### 3.5

#### **derived data**

data created as a result of processing that involves steps other than or in addition to direct retrieval and validation of information from data functions

[SOURCE: ISO/IEC ~~19944-1:2020(en)~~, ~~20926:2009~~, 3.1.217]

### 3.6

#### DLT account

##### **distributed ledger technology account**

##### ~~DLT account~~

representation of an entity participating in a transaction in a DLT system

Note\_1\_to\_entry:- A smart contract, digital asset, or one or more private keys, for example, can be associated with a DLT account.

[SOURCE: ISO 22739:~~2020, 3.24~~:—, 3.25, modified — Note 1 to entry added.]

### 3.7

#### **edge**

boundary between pertinent digital and physical entities delineated by networked sensors and actuators

Note\_1\_to\_entry:- Pertinent digital entities means that the digital entities which need to be considered can vary depending on the system under consideration and the context in which those entities are used.

[SOURCE: ISO/IEC TR 23188:2020. 3.1.2]

### 3.8

#### **edge computing**

~~distributed computing in which processing and storage takes place at or near the edge where the nearness is defined by the system's requirements~~

[SOURCE: ISO/IEC TR 23188:2020. 3.1.3]

### 3.9

#### **end user identifiable information**

##### ~~EUUI~~

##### EUII

derived data associated with a user that is captured or generated from the use of the service by that user

---

<sup>1</sup> Under preparation. Stage at the time of publication: ISO/FDIS 22739:2023.

Note\_1\_to entry:-Data that is linked to the user but is not DLT user data.

Note\_2\_to entry:-End user identifiable information includes connectivity data, usage data,~~etc.~~

[SOURCE: ISO/IEC ~~20926:2009(en)~~,19944-1:2020, 3.171.2, modified, ~~—~~ Notes 1 and 2 to entry added].]

### ~~3.109~~

#### ~~execution context~~

~~<service-oriented architecture> set of technical and business elements that form a path between those with needs and those with capabilities and that permit service providers and consumers to interact~~

~~Note 1 to entry: The execution context of a service interaction is the set of infrastructure elements, process entities, policy assertions and agreements that are identified as part of an instantiated service interaction, and thus forms a path between those with needs and those with capabilities.~~

~~[SOURCE: ISO/IEC TR 30102:2012, 2.1.10]~~

### ~~3.11~~

#### ~~role~~

~~set of activities that ~~serves~~ serves a common purpose~~

~~[SOURCE: ISO/IEC ~~17789:2014~~22123-1:2023, 3.2.71.10]~~

### ~~3.1210~~

#### ~~peer-to-peer~~

##### ~~P2P~~

~~relating to, using, or being a network of equal peers that share information and resources with each other directly without relying on a central entity~~

~~[SOURCE: ISO 22739:2020, ~~—~~, 3.5670]~~

### ~~3.1311~~

#### ~~smart contract~~

~~computer program stored in a distributed ledger technology system wherein the outcome of any execution of the program is recorded on the distributed ledger~~

~~Note\_1\_to entry:-A smart contract can represent terms in a contract in law and create a legally enforceable obligation under the legislation of an applicable jurisdiction.~~

~~[SOURCE: ISO 22739:2020, ~~—~~, 3.7288]~~

### ~~3.1412~~

#### ~~sub-role~~

~~subset of the activities of a given role~~

~~[SOURCE: ISO/IEC ~~17789:2014~~22123-1:2023, 3.2.9]~~

### ~~3.1511]~~

### ~~3.13~~

#### ~~transaction record~~

~~record documenting a transaction of any type~~

~~Note\_1\_to entry:-Transaction records can be included in, or referred to, in a ledger recordsrecord.~~

~~Note\_2\_to entry:-Transaction records can include the result of a transaction.~~

[SOURCE: ISO 22739:2020, 3.7995]

## **4 Abbreviated terms**

~~API~~ — ~~Application Programming Interface~~

~~DID~~ — ~~Decentralized Identifier~~

~~DLT~~ — ~~Distributed Ledger Technology~~

~~ICT~~ — ~~Information and Communications Technology~~

~~IoT~~ — ~~Internet of things~~

~~n.e.c.~~ — ~~Not Elsewhere Classified~~

~~PoC~~ — ~~Proof of Concept~~

~~SDG~~ — ~~Sustainable Development Goal~~

~~SME~~ — ~~Small and Medium-sized Enterprise~~

~~VC~~ — ~~Verifiable Credential~~

API     Application programming interface

DID     Decentralized identifier

DLT     Distributed ledger technology

ICT     Information and communications technology

IoT     Internet of things

n.e.c.     Not elsewhere classified

PII     Personal identifiable information

PoC     Proof of concept

SDG     Sustainable development goal

SME     Small and medium-sized enterprise

VC     Verifiable credential

## **5 Overview of data flow for DLT**

### **5.1 -General**

The impetus for introducing DLT-specific data flow models is to support technical and business process analysis. The models mentioned in this document are in accordance with ISO 23257:2022 and applied across all use cases in ISO/TR 3242:2022 combined with the behavioural UML models. The focus on the approach in this document is exploring diverse ways of applying it to data flow analysis on DLT use cases. The approach taken in this document, derives from architectural approaches in cloud computing and service-oriented design. If a service model is a collection of components that represents a business service, a data flow model that is described across component-based view of a system can help bring clarity to both technical and business objectives in system design.

It can be seen in ISO/TR 3242:2022 and elsewhere that applications and systems deploy blockchain and DLT to provide robust and purposeful system transparency in highly distributed, multi-party systems, on