

# ETSI GS PDL 026 V1.1.1 (2024-05)



GROUP SPECIFICATION

## Permissioned Distributed Ledgers (PDL); PDL in Settlement of Usage-Based Services

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## Foreword

This Group Specification (GS) has been produced by ETSI Industry Specification Group (ISG) Permitted Distributed Ledger (PDL).

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## Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the [ETSI Drafting Rules](#) (Verbal forms for the expression of provisions).

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## Executive summary

The application and use of PDL in settlement of usage-based services is discussed and analysed resulting in specifications, requirements and recommendations related to management of data sources, processes and actions related to commercial and commercial affecting attributes. The present document is broken down to three main parts: Data management, PDL node management and Settlement process, including Rating of usage records, discrepancy and dispute management and reconciliation, invoicing, and commercial settlement.

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## Introduction

Usage-based services are consumed in a manner that can be measured by units of measurement such as time, distance, speed, volume, temperature, pressure, and many other measurable attributes. An example of a measurable service would be a telephone call where the duration, destination and quality of the call can all be measured (each with a certain degree of accuracy). An in-depth discussion of measurable attributes related to the ICT sector can be found in MEF-74 "Commercial Affecting Attributes" [i.1].

A commercial rate can be applied to a measurement of a service giving the measurement a commercial value. Taking the example of a telephone call: Suppose the agreed rate between a buyer and a seller of telephony service is USD 0,50 per minute of call destined to the USA, and the buyer places a call whose duration is measured to be three minutes, the usage-based fee for such call would be USD 1,50.

A similar logic can be applied to other services in most areas of life:

- Household water consumption and the municipal water supply service.
- Agricultural produce and the wholesale/retail supply chain from the field to the consumer.
- Data Centre computation and storage capacity and the users of such services.
- Toll road usage, the toll road operators and the drivers of vehicles on such roads.
- And many more.

Once a record of usage has been established it may go through commercial processes of:

- **Rating** (see clause 6 herewith)
- **Dispute management and Reconciliation** (see clauses 7 and 9 herewith)
- **Invoicing** (see clause 8 herewith)
- **Settlement** (see clause 10 herewith)

Usage-based services differ from other consumables in that the amount of use of such service is not known until it had been actually used. This affects the way such services are billed for.

Payment for services may be performed in advance (when the service will only become available to the buyer after payment had been made) or in arrears (where payment is made after the service has been consumed). Regular services, that are not usage based, would be billed the same amount whether they are billed in advance or in arrears (e.g. some bridge or tunnel tolls are charge upon entry ad some upon exist). Usage-based services, however, will be treated differently if they are charged in advance, where the buyer will buy some balance in advance and will be able to use such service until their balance depletes (e.g. a pre-paid calling card) or in arrears, where the buyer pays for whatever service was consumed (e.g. a monthly telephone bill).

The present document discusses the application and use of PDL in settlement of usage-based services. It defines specifications, requirements and recommendations related to management of data sources, processes and actions related to commercial and commercial affecting attributes of such services.

The present document is broken down to three main parts: Data management, PDL node management, and Settlement process, including Rating of usage records, discrepancy and dispute management and reconciliation, invoicing and commercial settlement.

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# 1 Scope

## 1.1 Introduction

The present document discusses and specifies the processes and methods of utilizing PDL in settlement of usage based services.

## 1.2 In scope

- a) Definitions of processes.
- b) Definitions and requirements related to PDL node management.
- c) Definitions of commercial and data management terms and operational methods.
- d) Definitions and specifications of dispute resolution stages and processes.

## 1.3 Out of scope

- a) Specific reconciliation and dispute resolution algorithms.
- b) Commercial agreements.
- c) Commercial data.

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# 2 References

## 2.1 Normative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

Referenced documents which are not found to be publicly available in the expected location might be found at <https://docbox.etsi.org/Reference>.

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The following referenced documents are necessary for the application of the present document.

Not applicable.

## 2.2 Informative references

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NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

[i.1] MEF Forum, MEF-74, December 2018: "Commercial Affecting attributes".

- [i.2] ETSI GS PDL 012 (V1.2.1): "Permissioned Distributed Ledger (PDL); Reference Architecture".
- [i.3] ETSI GS PDL 022 (V1.1.1): "Permissioned Distributed Ledgers (PDL); PDL in Wholesale Supply Chain Management".

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## 3 Definition of terms, symbols and abbreviations

### 3.1 Terms

For the purposes of the present document, the following terms apply:

**billing:** commercial process of invoicing, reconciliation, and settlement of amounts due by Buyer, Seller or bidirectional trading partners

NOTE: See MEF 74 [i.1].

**buyer:** entity that buys a service from a Seller of which it is an immediate neighbour in the Supply Chain

**Call Details Record ("CDR"):** digital record containing information related to a telephone call traversing a telephone network

**commercial agreement:** agreement between two parties allowing for buying services, selling services between them or both

**compute:** act of manipulating data or acting based on data using a computing resource

**connectivity:** act of transporting data through space

**data:** information related to the characteristics and usage of services

NOTE: This term is generic and may have other interpretations in other documents. This definition is specific to the context of the present document.

**data service:** service that combines one or more of the following:

- Connectivity service
- Compute service
- Storage service

**domain:** group of ICT elements administered and operated by an entity and subject to specific rules, regulations and procedures

**gas cost:** cost of performing a blockchain transaction

**Internet of Things ("IoT"):** network of physical objects that are embedded with sensors, software and other technologies for the purpose of connecting and exchanging data with other devices and systems over the internet

**invoicing:** process in which the Seller generates and sends an invoice to the Buyer for the amount stipulated by an agreement and based on utilization information and SLA or other credits as applicable based on agreement

**multi-domain environment:** ICT environment where multiple domains exist and are managed by different entities

**netting:** subtracting amounts due by two parties to each other resulting in a net amount owed by one party to the other and a zero amount owed by the other party

**rating:** application of a commercial rate to a usage record

**reconciliation:** process of reaching agreement in case of a dispute

NOTE: See MEF 74 [i.1].

**seller:** entity that sells goods or a service to a Buyer of which it is an immediate neighbour in the Supply Chain

**Service Level Agreement (SLA):** contract between the Buyer and Seller specifying the service level commitments and related business agreements and penalties related to failure to meet such service level for a service

**settlement:** transfer of monetary funds between parties based on billing and reconciliation

**supply chain:** collection of entities that in combination deliver one or more goods or end-to-end services through bilateral agreements

**transaction point:** physical or virtual meeting place between a buyer and seller where transactions are being performed

## 3.2 Symbols

Void.

## 3.3 Abbreviations

For the purposes of the present document, the following abbreviations apply:

CDR	Call Details Record
CPU	Central Processing Unit
DLT	Distributed Ledger Technology
ETSI	European Telecommunications Standards Institute
GDPR	General Data Protection Regulation
GUI	Graphical User Interface
ICT	Information and Communications Technology
ID	Identification/Identity Document
IoT	Internet of Things
ISG	Industry Specification Group
MBPS	MegaBits Per Second
MEF	MEF Forum

NOTE: Formerly known as "Metro Ethernet Forum".

PDL	Permissioned Distributed Ledger
PoC	Proof of Concept
SLA	Service Level Agreement
USD	United States Dollar
VAT	Value Added Tax

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# 4 Management of Data in a multi-domain environment

## 4.1 Introduction

When handling data in a multi-domain environment the following aspects should be considered:

The source of data:

- How is it measured?
- By whom?
- Can the data be measured by more than one entity or in more than one point?

The different characteristics of data:

- The direct or derived commercial value of the data or that the data defines/describes.
- The volume of data.
- The cost of transacting the data.

The following clauses discuss the above in detail.

## 4.2 Sources of data

### 4.2.1 Single-Sourced data

In many instances there is only a single source of data. In such events even when multiple parties use such data, they are all dependent on that single source and in the event of dispute the different parties cannot provide alternative data to contradict that single source of data. There may be disputes on interpretation of data or on assignment of a commercial value to such data, but the data itself cannot be disputed.

**EXAMPLE:** When a mobile device is roaming from its home operator to a hosting operator the measurement of call duration and data consumption is done by the hosting operator. The roaming user and the home operator both do not have the ability to measure call duration or data consumption thus are unable to provide alternative measurements to contradict the measurements of the hosting operator. There may be a dispute over the rates applied to the measured data (e.g. the home operator may argue that the hosting operator has applied a higher per-minute or per-kilobit rate than agreed) but there is no way for the home operator to prove a possible claim that the duration of calls or volume of data consumed by the roaming user was different than the measurements made by the hosting operator.

### 4.2.2 Multi-Sourced data

When data can be measured by more than one entity and/or in more than one location, it is considered Multi-Sourced. There may be discrepancies between data generated for a certain event by different sources. The reasons for such discrepancies can be:

- a) Different measurement methods.
- b) Different Measurement equipment/calibration.
- c) Measurements at different points along the path of flow of information/matter which may be subject to data loss/corruption.
- d) Others.

When different entities can present different measurements for the same event - each entity may dispute the measurements presented by the other entity. In such event the parties may choose to go through a dispute resolution process and reconcile.

**EXAMPLE:** When a telecom carrier routes an international telephone call to another telecom carrier each carrier generates a Call Details Record ("CDR") for that call. The CDR includes certain data such as call duration, originating number of the call, destination number of the call. Such attributes determine the commercial value of that call: the monetary amount that the sending carrier is obligated to pay to the receiving carrier for extending the call to its destination. There may be instances where the CDRs generated by the sending carrier and the receiving carrier differ (e.g. the call duration does not match). In such instances the carriers may debate until they reconcile and agree on a value (or a monetary amount) to be used for settlement of the CDR.

Figure 1 herewith depicts the differences between Single-Sourced and Multi-Sourced data.