SLOVENSKI STANDARD
kSIST-TS FprCEN/TS 17370:2026

01-julij-2026

Javni prevoz - Neobdelani operativni podatki in izmenjava statističnih podatkov

Public transport - Operating raw data and statistics exchange

Öffentlicher Verkehr - Betriebliche Rohdaten und statistischer Austausch

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35.240.60	Uporabniške rešitve IT v prometu	IT applications in transport

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TECHNICAL SPECIFICATION

SPÉCIFICATION TECHNIQUE

TECHNISCHE SPEZIFIKATION

FINAL DRAFT
FprCEN/TS 17370

May 2026

ICS

Will supersede CEN/TR 17370:2019

English Version

Public transport - Operating raw data and statistics exchange

Öffentlicher Verkehr - Betriebliche Rohdaten und statistischer Austausch

This draft Technical Specification is submitted to CEN members for Vote. It has been drawn up by the Technical Committee CEN/TC 278.

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European foreword

This document (FprCEN/TS 17370:2025) has been prepared by Technical Committee CEN/TC 278 “Intelligent transport systems”, the secretariat of which is held by NEN.

This document is currently submitted to the Vote on TS.

This document will supersede CEN/TR 17370:2019.

This document has been prepared under a standardization request addressed to CEN by the European Commission. The Standing Committee of the EFTA States subsequently approves these requests for its Member States.

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Introduction

General

The Public Transport (PT) sector, particularly for Public Transport Operators (PTO) and Public Transport Authorities (PTA), has identified the necessity to develop a data strategy, based on cost and value, focusing on the strategic benefits of data. It is crucial that mobility stakeholders are not only able to compete against potential new market entrants but also benefit from a suitable environment to develop new business models and services. Public transport is becoming a data-enabled or data-driven business and needs to answer different local conditions.

This led to the need to standardize data analysis in Public Transport, to understand formally how information can be created as added value, and indicator calculation can facilitate moving from a qualitative analysis of the PT service towards a quantitative one.

With this perspective in mind, OpRa (Operating raw data and statistics exchange) defines a minimum set of Public Transport raw data needed as PT quantitative analysis enabling factor.

Transport modes

OpRa takes most public transport modes, except air transport, into account. This specifically includes rail, bus, metro, tramway, trolleybus, ferry, coach, funicular railway, suspension railway, and rack railway.

OpRa management information

Management information deals with functions analysing production data, in order to evaluate the service quality or to take corrective measures in planning and managing operations. In PT, for instance, the study of operational data (e.g. observed run times, passenger load) collected during service operations is an input for strategic planning (e.g. how and when to amend the schedules), tactical planning (e.g. when to undertake a certain control action), quality follow-up, etc.

Management information uses, therefore, two main types of data:

— data resulting from the planning stages, i.e. theoretical data on the production orders (e.g. timetables, run times, driver rosters, etc.);

— data describing the daily actual production (e.g. observed passing times, actual number of passengers, missed interchanges, modifications operated to the plan, etc).

Advances in technology, in particular high density data storage, allow the creation and retention of all the necessary underlying data in production databases, against which the desired requests can be made by PT managers. Consistent data structures for management data will make the design of such requests easier, and offer the flexibility required to OpRa exchange PT raw data, enabling indicator calculation. Raw data is identified according to specific use cases and, where applicable, defined and described in Transmodel (EN 12896) compliant structures. In this perspective, the exchange will be performed using similar NeTEx modalities, for compatibility reasons.

OpRa exchanging data modality

Similar to NeTEx, the primary software resource for implementing an OpRa interface is based on XML schema.

Two main variants of the schema are available, each providing a different protocol for embedding the same content model subschemas.

— Simple OpRa documents exchange (see NeTEx _publication.xsd): a schema to use with NeTEx documents input or output by a system that are exchanged as files using FTP, email etc;

— OpRa document exchange using SIRI HTTP requests (see NeTEx_siri_SG.xsd): a schema that embeds the OpRa elements in a sequence of HTTP messages that define request/response and publish/subscribe interchanges for exchanging data. Requests use OpRa elements to specify the

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desired data. Responses wrap in version frames. The messages are specialisations of the SIRI framework.

Motivation

Measured Public Transport data describing the public transport network fulfilment are essential for studies, control, service improvement and contractual relations between stakeholders. It is important that they can be shared among PTO, PTA, engineering and design office, researchers, and other actors in a clear and unambiguous way, to provide accurate and intelligible information.
Furthermore, the OpRa covered scope is fully complementary to other existing exchange standards and allows covering one of the remaining gaps of public transport standardisation, with references to Transmodel, NeTEx and SIRI.
NeTEx (CEN TS 16614-1/-2/-3) [8] is an exchange protocol dedicated to scheduled public transport data, based on the Transmodel (EN 12896) conceptual data model. NeTEx supports the exchange of information relevant to public transport services for passenger information and automated vehicle management systems (AVMSs) and is divided into three parts:

— Part 1: network topology exchange;

— Part 2: timetables exchange;

— Part 3: fare information exchange.

SIRI (EN 15531-1/-2/-3 and TS 15531-4/-5) is complementary with NeTEx and provides operators and manufacturers with a standard framework for exchanging data concerning public transport real-time information, along with a set of functional services for specific types of real-time data. As for NeTEx, the underlying conceptual definitions used by SIRI are provided by Transmodel. SIRI and NeTEx share the same communication protocol.
Using these standards, scheduled and real-time information can be made available for passenger information, and for operations and for process review. However, there is still one final aspect missing, just after real-time: to provide information about what has been performed, with the same overall view as for scheduled information. Such data allows a feedback loop to improve existing services.
The OpRa standard is therefore about operating raw data and statistics, regularly requested by PTA, aims to meet that need.

CEN Standards context

OpRa has been developed under the aegis of CEN and draws on several existing national Public Transport Service scenarios and EU standards.
The keystone is the Transmodel standard, a conceptual model that names and represents PT info concepts for a wide set of functional areas and can be used to compare and understand different models. Transmodel project outputs have been used both to underpin several CEN concrete data standards such as NeTEx, SIRI or IFOPT[1] . It underpins many national standards to allow for harmonization and interoperability. Transmodel generic model has been used to develop OpRa and OpRa-specific requirements itself being updated to include OpRa additions provided also some of Transmodel enhancements (present in prEN 12896-8, concerning Management Information and Statistics).

[1] IFOPT has been included in Transmodel Part 2: Public Transport Network (EN 12896-2) and is no more a standalone standard.

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1 Scope

The OpRa scope is the definition of a minimum set of Public Transport raw data needed to enable PT quantitative analysis.
OpRa does not go into the domain of service quality measurement and reporting: service quality analysis will use data provided by OpRa, but quality definition remains a contractual level issue between a Public Transport Authority and a Public Transport Operator or an operator's internal choice for a purely private service. OpRa reports unbiased actual data (i.e. measured or observed), described and aggregated in a shared and understandable way.
OpRa focuses mainly on observed/measured and registered information, i.e. information which cannot be changed anymore in the future. This information is mainly an output of the domain "operations monitoring & control" as defined by Transmodel.
Based on the actual service, including delays and cancelled vehicle journeys, etc., OpRa considers the recorded reality of operation, either through individual observed and registered data at a given sampling interval (raw data) or in an aggregate way (indicators) and provides the data exchange format.
The approach documented in detail in this document is coherent with EU Directive 2010/40. It relates to the Article 4 of the Delegated Regulation EU 2017/1926 [16], as regards the historic data. OpRa proposes to complement NeTEx (dedicated to the static scheduled information), for the historic data, based on the underlying conceptual data reference model Transmodel EN 12896, similarly to the requirement of the Delegated Regulation EU 2017/1926 referring to the static scheduled information[2].

2 Normative references

Sample Document

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.

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EN 12896-8:-[3], *Public transport - Reference data model - Part 8: Management information & statistics*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in prEN 12896-8 apply.

4 Symbols and Abbreviations

The common symbols and abbreviations used in this document set are presented in EN 12896 (series).
In addition, the following terms are used:

API Application programming interface
AVLS AVL system
AVL Automated vehicle location
AVMS Automated vehicle management system
CEN Comité Européen de Normalization
CSI customer satisfaction index
EA Enterprise Architect
EFTA European Free Trade Association
EF Explicit Frame

[2] For what concerns the exchange of static scheduled data (such as public transport, long distance coach and maritime including ferry), the relevant data in the national access point should use the CEN data exchange standard NeTEx CEN TS 16614 [8] based on the underlying conceptual data reference model Transmodel EN 12896:2006 and subsequent upgraded version.
[3] Under preparation. Stage at time of publication: prEN 12896-2:2026.

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EN European Norm / standard identifier context
ERA European Union Agency for Railways
EX Expected Number of Passengers
FD Fleet Dimensions
FTP not defined in the visible text
GA Generic Aggregations
GML Geographic Mark-up Language
HTTP Hypertext Transfer Protocol
IEC International Electrotechnical Commission
IFOPT Identification of fixed objects in public transport
ISO International Standards Organization
ITS Intelligent transport systems
KPI Key performance indicator
MI Management Information
MMTIS multimodal travel information services
MTBF Mean Time Between Failure
NeTEx Network and Timetable Exchange
O/D Origin/Destination
OJP Open Journey Planner
OpRa Operating raw data and statistic exchange
PT Public transport
PTA Public transport authority
PTO Public transport operator
QoS Quality of service
REST Representational State Transfer (API)
RFC Request for Change
SD Service Dimensions
SI Service Intensity
SIRI Service Interface for Real-time Information
SLA Service Level Agreement
TC Technical Committee
TR Technical Report
UC Use case
UIC International Union of Railways
UITP International Association of Public Transport
UML Unified Modelling Language
UPT Urban Public Transport
UTC Coordinated Universal Time
WGS World Geodetic Standard
WSDL Web Services Description Language
XML Extensible Markup Language
XMI XML Metadata Interchange
XSD XML schema document

5 Notation of XML-Elements and XML-Structures

5.1 General

The OpRa interfaces presented in this document are defined using XML schemas. Thus, the objects that are exchanged over the interface exist as XML elements. The description of XML elements are displayed in tabular form in the current document, which originated from SIRI (EN 15531-3). It is very compact and clearly arranged and provides a range of structural information reflecting the XML scheme

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definition. Section 5.4 describes the notation of the table format which is used more intensively afterwards.
All element names, data types and attributes are written in English to make exchange with European partners more convenient.

5.2 Display of XML Elements in the Text

This document is intended to provide consistent notation of XML elements to make technically important information available to the reader.

- Transmodel logical model concepts: ALL CAPS
- Transmodel logical model attributes: ***UpperCamelCase bold italic***
- Physical implementation (XSD/XML) identifiers: *lowerCamelCase (collections) italic, UpperCamelCase italic*
- File names: **small caps bold**
- Data types are displayed italics, e.g. : *xsd:boolean*.
- Code examples are displayed in the `Courier New font`.

5.3 Display of Relationships

When a dataset described by an object model (ie: a set of object instances) is exchanged as a data request (for example in an XML based API such as OpRa) it will be serialised into a stream of bytes representing both the data values and the relationships between the instances, both marked by delimiters such as XML tags. In practice there are three ways of representing the relationships between object instances when serialised:

- implicit mechanisms,
- explicit internal references, or
- explicit external references

An implicit mechanism is used when one element is contained in another, i.e., grouped spatially within child tags. In this way a direct child relationship can be expressed by immediate proximity. An explicit mechanism, in contrast, indicates a relationship by the use of the key of the referenced object as an explicit reference; an (explicit) internal reference is an object key where the referenced object is also defined in the same document as the referencing object (and so whose scope of uniqueness need only be local to the exchange, e.g., an identifier of a message); an external reference is an object key whose referent is defined outside the document (and whose scope shall be defined by a namespace common to both parties of the exchange, e.g., a persistent stop number). References may consist of compound or composite keys (for more detail see 8.2).
It is helpful to be able to distinguish between the use of an identifier to provide the key of an object as part of the object definition and its use as a reference to indicate a relationship to the object from another object. In OpRa, the following convention is used to do this:

- An identifier is an attribute (i.e., a child element) of the defining element that indicates a primary key for the defining element. These identifiers end with a signal word like “code” or “identifier” (sometimes “number” in SIRI). Example: a journey contains the key ***JourneyCode***.
- If an object is referenced in another object, the referencing element ends with “Ref”. For example, the reference for a journey (from a departure board) is: ***JourneyRef***.

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