TECHNICAL SPECIFICATION

SPÉCIFICATION TECHNIQUE

TECHNISCHE SPEZIFIKATION

CEN/TS 16614-5

June 2022

ICS 35.240.60

English Version

Public transport - Network and timetable exchange (NeTEx) - Part 5: Alternative modes exchange format

Öffentlicher Verkehr - Netzwerk- und Fahrplan-Austausch (NeTEx) - Teil 5: Austauschformate für alternative Modi

This Technical Specification (CEN/TS) was approved by CEN on 27 April 2022 for provisional application.

The period of validity of this CEN/TS is limited initially to three years. After two years the members of CEN will be requested to submit their comments, particularly on the question whether the CEN/TS can be converted into a European Standard.

CEN members are required to announce the existence of this CEN/TS in the same way as for an EN and to make the CEN/TS available promptly at national level in an appropriate form. It is permissible to keep conflicting national standards in force (in parallel to the CEN/TS) until the final decision about the possible conversion of the CEN/TS into an EN is reached.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.

CEN/TS 16614-5:2022 - Preview only Copy via ILNAS e-Shop



EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

© 2022 CEN All rights of exploitation in any form and by any means reserved worldwide for CEN national Members.

Ref. No. CEN/TS 16614-5:2022 E

Contents

Page

European foreword 4
0 Introduction 5
1 Scope 6
1.1 General 6
1.2 Alternative Modes Scope 6
1.3 Transport modes 7
1.4 Products and prices 7
2 Normative references 7
3 Terms and definitions 8
4 Symbols and abbreviations 11
5 Use Cases for Alternative Modes of Operation 11
5.1 General 11
5.2 Network Description 12
5.3 Integrated all Mode Trip Planning 12
5.4 Trip Information 13
6 Functional Description of the Alternative Modes 14
6.1 General 14
6.2 Geofencing and Areas of Permitted Use 14
7 Generic Physical Model and XSD Mapping Rules 14
8 Alternative modes – Data model 15
8.1 General 15
8.2 Data Model 15
8.3 Reusable Components 19
8.4 Topology for Alternative Mode Networks 58
8.5 Single Journey Services for Alternative Modes 96
8.6 Fare Management for Alternative Modes 109
8.7 Customer Transactions for Alternative Modes 190
8.8 Passenger Information for Alternative Modes 209
8.9 Frames for Alternative Modes 226
9 NM Enhancements to NeTEx Part1 – Generic Framework 232
9.1 Utility Types 232
9.2 Data Souce 243
9.3 Generic Organisation 244
9.4 Timeband 258
10 NM Enhancements to NeTEx Part1 – Reusable Components 261
11 NM Enhancements to NeTEx Part1 321
11.1 Taxi Place model 321
11.2 Equipment 327
11.3 Facilities 342
12 NM Enhancements to NeTEx Part1 – ND 382
12.1 Route Restriction Assessment 382

CEN/TS 16614-5:2022 - Preview only Copy via ILNAS e-Shop

13 NM Enhancements to NeTEx Part1 – TP 387
13.1 Alternative Mode Connections 387

14 NM Enhancements to NeTEx Part3 – FM 395
14.1 Medium Access Device model 395
14.2 Customer Payment Means Model 403
14.3 Customer Purchase Package 407

Annex A (informative) Functional Description of Alternative Modes (from Transmodel) 423
A.1 Categorisation of Modes of Transport 423
A.2 Limits of the Specification 426
A.3 Functions and Aspects related to the Alternative Modes 426
A.4 Cycling 431
A.5 Car Sharing 433
A.6 Carpooling 436

Annex B (informative) GBFS mapping - to NeTEx and SIRI 443
B.1 GBFS Data Specification (GBFS) 443
B.2 GBFS Outline Mapping to NeTEx and SIRI 447
B.3 GBFS to NeTEx Mapping tables 449
B.4 GBFS to SIRI Mapping tables 460
B.5 GBFS to SIRI Comments respecting the Mapping Table 464
B.6 Examples of Mapping - GBFS 465
B.7 Examples of mapping – GBFS to SIRI 482

Annex C (informative) IXSI mapping to NeTEx New Modes 488
C.1 IXSI Interface for X Sharing Information Car Sharing AOI 488
C.2 *IXSI mapping to NeTEx New Modes* 488
C.3 *Scope* 488
C.4 *Examples of* mapping – IXSI to NeTEx 489

Annex D (informative) Interoperability Summary 494
D.1 Introduction 494
D.2 Stakeholders 494
D.3 Other Formats 495

Annex E (informative) Revisions of PT1711 (CEN/TS 17413:2020) to implement NeTEx 499
E.1 Introduction 499
E.2 Transmodel/NeTEx Revisions of PT1711 499
E.3 Additions 502
E.4 Noted as missing from Transmodel 6.0 – outside NeTEx 502
E.5 Events and Log Entries for Alternative Modes 502

Annex F (informative) Alternative Mode Trip Model 505
F.1 Passenger Trip 505
F.2 Vehicle Location 509

Annex G (informative) Other enhancements in V1.2.2 of NeTEx 511
G.1 Introduction 511
G.2 Changes 511

CEN/TS 16614-5:2022 - Preview only Copy via ILNAS e-Shop

European foreword

This document (CEN/TS 16614-5:2022) has been prepared by Technical Committee CEN/TC 278 "Intelligent Transport Systems", the secretariat of which is held by NEN.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document has been prepared under a Standardization Request given to CEN by the European Commission and the European Free Trade Association and supports essential requirements of EU Directive(s) /Regulation(s).

In addition, it supports the fundamental requirements for Urban Rail of CEN-CENELEC Guide 26.

This document presents Part 5 of the European Technical Specification known as "NeTEx". NeTEx provides a framework for specifying communications and data exchange protocols for organisations wishing to exchange scheduled information relating to public transport operations.

The full NeTEx Technical Specification is made up of five parts defining a single European Standard series, which provides a complete exchange format for public transport networks, timetable description and fare information.

- Part 1 is the description of the public transport network topology exchange format. It also contains use cases shared with part 2, and modelling rules and the description of a framework shared by all parts.
- Part 2 is the description of the scheduled timetables exchange format.
- Part 3 is the description of the fare information exchange format.
- Part 4 is the description of the passenger information European profile.
- Part 5 (this document) is the description of the alternative modes exchange format.

Part 1 is fully standalone, and parts 2 and 3, 4 and 5 rely on part 1.

The XML schema can be downloaded from http://netex-cen.eu, along with available guidance on its use, example XML files, and case studies of national and local deployments.

This document is highly technical, and a special care has been taken to keep the text readable. In particular a set of formatting conventions is followed that enhances the usual CEN writing rules in order to distinguish references to elements of the formal models within text:

- Transmodel terms and NeTEx conceptual model elements are in capital letters (JOURNEY PATTERN for example).
- NeTEx physical model names are in bold italic font and use CamelCase style with no spaces (**JourneyPattern,** for example).
- NeTEx physical model attribute types are in italic font and use CamelCase style with no spaces (*TypeOfEntity,* for example).

Any feedback and questions on this document should be directed to the users' national standards body. A complete listing of these bodies can be found on the CEN website.

According to the CEN/CENELEC Internal Regulations, the national standards organisations of the following countries are bound to announce this Technical Specification: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

CEN/TS 16614-5:2022 - Preview only Copy via ILNAS e-Shop

0 Introduction

Public transport services rely increasingly on information systems to ensure reliable, efficient operation and widely accessible, accurate passenger information. These systems are used for a range of specific purposes: setting schedules and timetables; managing vehicle fleets; publicising fares, issuing tickets and receipts; providing real-time information on service running, and so on.

Services already present in the urban environment such as multimodal information and traffic management and control are already well understood. Reference data models and data exchange formats for the use of these services, in particular data sets describing the public transport offer, are already standardised and available. However, there is a need for reference data models to accommodate emerging modes of transport to allow seamless transitions for the traveller between all available modes. Examples of these new modes include car and cycle sharing, car-pooling, and intelligent parking (Park & Ride).

The first three parts of the European Technical Specification NeTEx specify a Network, Timetable, and Fare Exchange format for Public Transport. The purpose of NeTEx is to exchange data relating to scheduled public transport between the systems of PT organisations. It can be seen as complementary to the SIRI (Service Interface for Real-time Information) standard, as SIRI needs a prior exchange of reference data from NeTEx's scope to provide the necessary context for the subsequent exchange of a real-time data. A fourth part describes a profile for using NeTEx for the cross-border exchange of timetable data (European Passenger Information profile – EPIP).

This document (NeTEx – Part 5) specifies exchanges of data for alternative transport modes between systems and organisations. It encompasses alternative (i.e. non-traditional) modes of personal use of transport (such as cycle sharing, car-pooling, rental, etc.) often provided as mobility services. Such services may be provided by organisations other than conventional transport operators and use of them may involve the passengers themselves steering the vehicles and determining the exact route. Part 5 describes some extensions and additions to the prior NeTEx model. It is a complement to Parts 1, 2, 3 in the sense that it uses a subset of the concepts defined there.

Well-defined, open interfaces have a crucial role in improving the economic and technical viability of Public Transport Information Systems of all kinds. Using standardised interfaces, systems can be implemented as discrete pluggable modules that can be chosen from a wide variety of suppliers in a competitive market, rather than as monolithic proprietary systems from a single supplier. Different data sets can be integrated and systems linked together to provide services that cover a wide area and proved advanced multimodal function for travellers. Interfaces also allow the systematic automated testing of each functional module, vital for managing the complexity of increasing large and dynamic systems. Furthermore, individual functional modules can be replaced or evolved, without unexpected breakages of obscurely dependent function.

This standard will improve the ease of integration of public transport information with other modes of transport making it easier to provide service that allow passengers to plan and make multi-modal journeys that seamlessly combine legs made on both conventional public transport and self-guided modes.

By generalising and extending a standard already in place, the standard is able to reuse an existing context and many existing components, minimizing the effort required to deploy it.

CEN/TS 16614-5:2022 - Preview only Copy via ILNAS e-Shop

1 Scope

1.1 General

NeTEx is dedicated to the exchange of scheduled data (network, timetable and fare information). It is based on Transmodel European reference model for PT data. The most recent version of NeTEx v1.1 is based on the most recent version of Transmodel, V6.0 (EN 12986 1/2/3/4/5/6), which now incorporates the prior IFOPT (EN 28701). NeTEx also relates to SIRI (CEN 15531-1/2/3/4) and supports the exchange of information of relevance for passenger information about public transport services and also for running Automated Vehicle Monitoring Systems (AVMS).

NOTE NeTEx is an implementation of a subset of Transmodel (including IFOPT); the definitions and explanations of its concepts are extracted directly from Transmodel and reused in NeTEx, sometimes with adaptations in order to fit the NeTEx context. Although the data exchanges targeted by NeTEx Parts 1 to 5 are predominantly oriented towards provisioning passenger information systems, AVMS and fare systems with data from transit scheduling systems, it is not restricted to this purpose and NeTEx can also provide an effective solution to many other use cases for transport data exchange.

1.2 Alternative Modes Scope

This Part 5 of NeTEx is specifically concerned with the exchange of reference data to support “new” alternative modes for mobility services, adding certain new concepts to the NeTEx schema (indicated as NeTEx v1.2.2), but also to a high degree making use of existing schema elements defined in NeTEx Parts 1, 2 and 3.

The high-level design for alternative modes support is derived from a conceptual model for alternative modes CEN PT1711 (CEN/TS 17413:2020) prepared by CEN working group TC278 WG17. This CEN Technical Specification describes a conceptual model for alternative modes as an extension to Transmodel V6.0 and based on a detailed set of use cases taken from CEN PT1711 and given in Appendix A.

The NeTEx format is concerned with a subset of the use cases for reference data (real-time use cases are covered by dynamic protocols such as SIRI and DATEX II). Overall, it is concerned with data for the following purposes:

- to be able to integrate legs made on alternative modes with conventional mode legs in seamless trip plans;
- to describe the coverage areas of alternative mode mobility services so that trip planning engines and others can make passengers aware of the possibility of using them, and provide appropriate links to invoke the dynamic services;
- to be able to find the locations of access points for alternative mode services, such as parking points, pooling stations, etc. including their relation to access points for conventional modes;
- to be able to indicate the costs of the mobility services for specific trip legs. Where operators offer a bundle of modes services (for example free cycle use with metro use) to be able to include the “fare product” for alternative mode legs in the sales offer;
- to be able to indicate how to book, purchase and pay for mobility services, and how to access them.

NeTEx is primarily concerned with the exchange of reference data to allow the integration of new modes with other data; it does not describe dynamic services. The PT1711 specification indicates the nature of some of these services such as trip planning.

CEN/TS 16614-5:2022 - Preview only Copy via ILNAS e-Shop

1.3 Transport modes

All mass public transport modes are taken into account by NeTEx, including train, bus, coach, metro, tramway, ferry, air, and their submodes. Such modes are provided by transport operators, who may operate one or more modes.

NeTEx part 5 widens the concept of an operator to include providers of other forms of transport, and introduces the separate concept of a "mode of operation" to classify the way services are provided: conventional, flexible, pooling, sharing, etc.

1.4 Products and prices

The overall approach for the definition of products for alternative modes within NeTEx Part 5 Alternative modes) follows the approach used by Transmodel v6.0 Part5 (Fare Management data model), namely through the definition of access rights rather than of just products. Prices are separated from the things they price. The existing model also allows for dynamic prices to be fetched from a pricing engine.

This approach of using the access rights related to the urban public transport (for all urban modes) can be applied to any mode, including long-distance rail and alternative modes.

Exchange protocols

The exchange of data in NeTEx format can be undertaken using a variety of protocols. For example: through dedicated web services, through data file exchanges by FTP or otherwise, or by using the SIRI exchange protocol as described in part 2 of the SIRI documentation. NeTEx adds additional services using the common SIRI transport mechanisms.

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.

CEN/TS 16614-1, *Public transport — Network and timetable exchange (NeTEx) — Part 1: Public transport network topology exchange format*

CEN/TS 16614-2, *Public transport — Network and timetable exchange (NeTEx) — Part 2: Public transport timetable exchange format*

CEN/TS 16614-3, *Public transport — Network and timetable exchange (NeTEx) — Part 3: Public transport fares exchange format*

CEN/TS 17413:2020[1], *Intelligent transport systems — Urban ITS — Models and definitions for new modes*

prEN 12896-10, *Public transport — Reference data model — Part 10: Alternative modes*

[1] This TS has been drafted by the Project Team PT1711 and is often referred to as PT1711; note that this TS is currently being integrated in Transmodel Part 10, and will be replaced.

CEN/TS 16614-5:2022 - Preview only Copy via ILNAS e-Shop