**PUBLIC TRANSPORT
NETWORK TIMETABLE EXCHANGE
(NeTEx)**

SUPPORT FOR ACCESSIBILITY IN NeTEx

CEN TC278/WG3/SG9 NeTEx PT001

Kasia Bourée

OCTOBER 2015

TABLE OF CONTENTS

INTRODUCTION

The NeTEx (Network Timetable Exchange) is a CEN standard for exchanging public transport data. This short paper provides an overview of how the accessibility aspects of a public transport network are represented in NeTEx. The paper builds on the concepts for Networks described in the white papers on Network [W6] and Flexible Networks [W7] and on Timetables [W8].

By 'accessibility' we mean the various considerations affecting access to stops, and vehicles by passengers whose personal mobility is restricted e.g. by a wheelchair, push baggage, etc. Accessibility data can be used in journey planners and in applications which describe the accessibility of stops, interchanges or services.

AUDIENCE

This paper is intended to convey a high level view sufficient for a technical manager to appreciate the capabilities of the CEN standard NeTEx for describing accessibility, and omits all detailed considerations that can be found in the detailed documentation (see [N1], [N2], [N3]).

SCOPE

The NeTEx public transport network representation can be used for any mode of transport, including rail, bus, metro, ferry etc. (see [W6]). The same model elements can be used in different ways in different views, for example ranging from a high level schematic view of the network for passengers, to a stop by stop sequence of a route for a specific scheduled journey (see [W8]). Among the properties that can be described are accessibility and facilities. Thus both for of locations on the network (stations, airports bus stops etc), and transport services (on trains, buses etc) it is possible to specify accessibility data, including physical limitations, facilities and assistance services.

CORRESPONDING NeTEx DOCUMENTATION

A detailed specification of NeTEx capabilities as regards the public transport network representation and exchange can be found in [N1].

In particular the accessibility properties of the network are mainly described as additional (space-related) aspects of the basic network ([W6]) and also apply to various (time-related) aspects of the JOURNEYs described in [W8], as summarised here:

The NeTEx Framework (section 1 of [N1]) includes some generic components describing accessibility that are reused in other sections (see also [N2], [N3]), such as:

- Generic accessibility components: USER NEEDs, LIMITATIONS, SUITABILITIES, ACCESSBILITY ASSE-SMENTs describe different types of user accessibility requirements (Wheelchair, Pushchair, Guide dog, Visual Impairment, Medical condition etc) as a standardized set of categories that can be used uniformly
- VEHICLEs and VEHICLE TYPEs which can have their accessibility described through an EQUIPMENT PROFILE
- EQUIPMENT: specific accessibility properties of SITES and VEHICLEs (for example Wheelchair accessible Toilets, Lifts etc.), can be described using EQUIPMENT elements. These can be specialised in other sections of NeTEx to create specific types of equipment
- VALIDITY CONDITIONs can be used to set temporal and other conditions on availability.

Public Transport Network Topology (section 2 of [N1]), describes elements of the Network to which accessibility can be applied:

- Sites in the Network: STOP PLACEs, POINTs OF INTEREST, PARKINGs etc and their subcomponents (QUAYs, ENTRANCES, etc), as well as the paths (NAVIGATION PATHs) within them.
- Transfer points: TRANSFERs, CONNECTIONs, INTERCHANGEs.

Accessibility concepts also apply to some of the journey related entities described in [7]):

- Journeys: SERVICE JOURNEYs and JOURNEY PARTs may have facilities or EQUIPMENT associated with them that describes the accessibility features of a journey or part of a journey.

NeTEx METHODOLOGY

NeTEx uses a "model driven design", i.e. the development starts from a conceptual model, from which a physical UML model and an XML implementation is derived.

The European Public Transport Reference Data Model, known as Transmodel, is the conceptual basis for the development (see [T1], [T2], [T3] and also [T4] which provides a detailed physical model of stops).

APPROACH

NeTEx aims to use a uniform and standardized set of attributes to describe the accessibility properties of the network; this makes it possible to use such data in journey planners to compute consistent results across the network.

Specifying all the possible accessibility characteristics of a network requires a sustained long term effort to gather what is a large and quite complex data set; such a set will typically only be gathered incrementally and unevenly over a network. Furthermore, the mandatory requirements for providing accessibility data are subject to different legal requirements in different European countries, so are likely to be achieved at different rates. The NeTEx model is accordingly designed to be usable at different levels of detail; it can be populated sparsely at a high level to achieve a useful basic level of function and then populated more richly to over time. When fully populated it enables a high level of functionality including a detailed step by step representation of a path through an interchange.

To describe accessibility, NeTEx models as separate and distinct aspects:

(a) the description of the USER's NEEDs – for example wheelchair, hearing impaired, vision impaired, lift-averse, etc; and
(b) the ACCESSIBILITY LIMITATION, of the location i.e. description of the limitations of a SITE ELE MENT to support a specific need, for example Wheelchair, Step free, Escalator free, Lift free.

These aspects can be grouped together as an ACCESSIBILITY ASSESSMENT and associated with various NeTEx EN-TITies.

ACCESSIBILITY OF SITES

NeTEx/Transmodel supports a detailed description of the accessibility of a SITE, i.e. of a location to which passengers may wish to travel such as a station (STOP PLACE) or POINT OF INTEREST (the latter can be used to describe accessibility of public buildings, parks and other locations that are not public transport nodes).

The accessibility of SITE components is described using an ACCESSIBILITY ASSESSMENT: this allows any SITE component to be described either in terms of suitability for specific user needs or in terms of accessibility limitations of the SITE, or both.

This can be used in applications in various ways:

- for journey planners when calculating a journey that meets a given set of user criteria, to choose stations or paths that are, for instance, wheelchair accessible when planning a point-to-point journey
- for trip preparation to show the exact properties of a given location, part of a planned trip so that users may make their own judgement about the opportunity to access this specific location.

In addition to the accessibility of SITEs, further information relevant for detailed accessibility is contained on many of the different EQUIPMENT elements, for example, lift dimensions and controls, step heights, handrails and the number of steps in a staircase, ramp gradients, whether barriers are wheelchair passable, etc LOCATION SERVICEs can be used to describe, ASSISTANCE SERVICES, porterage that may be invoked to assist travellers, including information on how to book them.

Information can be specified at a detailed SITE COMPONENT level and also at a summary level so that an overall indication can be given for a SITE.

ACCESSIBILITY AND CONNECTIONS

In order for a journey to be accessible, it must be possible not only to access a stop despite any mobility restrictions, but also to change services at each intermediate stop where a connection is made between journeys. Users with mobility restrictions may need extra time to make a connection, either because they move slower, or because they have to take a different path within the transfer site. NeTEx allows accessibility and time conditions to be specified on individual connections so that precise journey plans can be computed that reflect the layout of complex interchanges such as major stations, where there can be material differences in the time needed to according to the specific interchange. Generic defaults for a mode be used as a fall-back or useful approximation when exact data is not available.

We note that in colloquial usage, the terms 'interchange', 'transfer', 'connection', 'access' are commonly used in the context of journey planning, but often with overlapping or ambiguous senses. To remove this ambiguity, Transmodel and thus NeTEx (as elsewhere) use each term for a distinct, well defined concept so that the different aspects of journey interchanging can be modelled and computed over. In particular, the spatial passenger-oriented aspects are clearly separated from operation and time-related aspects.

- The terms TRANSFER, ACCESS and CONNECTION are passenger-oriented and space–related concepts against which time constraints for a passenger to change from one public transport vehicle to another to continue the trip are expressed
- INTERCHANGE is an operation–oriented time-related term expressing scheduled time constraints to be respected between vehicle journeys.

Thus, to describe the characteristics of the network and its topology TRANSFER, ACCESS and CONNECTION are used. More precisely, a TRANSFER represents any pair of points located sufficiently near that there is a possibility of a passenger moving between them on a timescale which is realistic for carrying out a trip.

- A CONNECTION is a type of TRANSFER between two SCHEDULED STOP POINTs or STOP AREAs
- An ACCESS is a type of TRANSFER that represents the walking movement of a passenger at the beginning or end of the trip from their origin/destination to a stop where he will board a public transport vehicle.

It is possible to specify detailed timings and accessibility attributes for ACCESSEs and CONNECTIONs so that journey planners can make use of them.

ACCESSIBILITY OF NAVIGATION PATHS

ACCESSEs and CONNECTIONs specify the possibility of a transfer but do not define the precise physical paths to be taken. The specific ways of traversing a site are described by NAVIGATION PATHs between any two points; these may be annotated with their accessibility characteristics so that a journey planner can choose an accessible path.

Several different NAVIGATION PATHs may be associated with the same CONNECTION, representing alternative paths by which the CONNECTION can be walked;
Both concepts (CONNECTION and NAVIGATION PATH) allow to record times, but:

- CONNECTION transfer times relate to the timetabled connection times (and can be used without reference to actual platforms)
- NAVIGATION PATH transfer times relate to the known times to traverse between physical stops.

A NAVIGATION PATH is made up of PATH LINKs, each recording the accessibility characteristics of an individual section in the path. These can include information on lifts, steps, lighting, handrails, surfaces (cobbled, tactile surfaces for the blind, etc) and other properties of interest to different classes of passenger. In order to make use of the information about accessibility in ACCESSEs, the PATH LINKs must typically be integrated with information about the wider geospatial context within which the NAVIGATION PATH is connected, i.e. with the characteristics of the related road elements. This part is not considered in detail in the model, only some of the infrastructure-related characteristics are explicitly mentioned.

ACCESSIBILITY OF JOURNEYS

The accessibility of a journey may also depend on the facilities of the actual vehicles used and on the assistance services provided by the operator to mobility impaired users.

- SERVICE JOURNEYs and JOURNEY PARTs may have facilities or EQUIPMENT associated with them that describe the accessibility features of a journey or part of a journey. These may be derived from a VEHICLE TYPE and its EQUIPMENT PROFILE, or be specified on a specific journey. If facilities are only available at certain times VALIDITY CONDITIONS can be used to specify this
- The accessibility of specific services and VEHICLE JOURNEYs, (e.g. low floor access, on board wheelchair spaces, wheelchair hosts) can be described using equipment elements such as VEHICLE ACCESS EQUIPMENT and WHEELCHAIR ACCESS EQUIPMENT. In addition a number of other equipment types have some accessibility attributes. A LOCAL SERVICE can be used to describe assistance services.

NeTEx can cover complex cases such as when only a specific part of the platform gives access to a train, or where a stop is only accessible if a specific vehicle type is used.

ACKNOWLEDGEMENT

FURTHER READING

THE NeTEx STANDARD

[N1]   NeTEx-Part 1: *Public Transport Network Topology exchange format, CEN/TS 16614-1:2014*
[N2]   NeTEx-Part 2: *Public Transport Scheduled Timetables exchange format, CEN/TS 16614-2:2014*
[N3]   NeTEx-Part 3: *Fare Information exchange format, CEN/TS 16614-3:2014*

OTHER NeTEx WHITE PAPERS

[W1]   NeTEx *Introduction* - White Paper
[W2]   NeTEx *Getting Started* - White Paper
[W3]   NeTEx *Design Methodology* - White Paper
[W4]   NeTEx *Framework* - White Paper
[W5]   NeTEx *Reusable Components* - White Paper
[W6]   NeTEx *Networks* - White Paper
[W7]   NeTEx *Flexible Networks and Multimodality* - White Paper
[W8]   NeTEx *Timetable* - White Paper
[W9]   NeTEx *Fares* - White Paper

OTHER REFERENCES

[T1]   *Public Transport Reference Data Model – Part 1: Common Concepts (Transmodel)*, EN12896-1
[T2]   *Public Transport Reference Data Model – Part 2: Public Transport Network (Transmodel)*, EN12896-2
[T3]   *Public Transport Reference Data Model – Part 3: Timing Information and Vehicle Scheduling (Transmodel)*, EN12896-3
[T4]   *Identification of Fixed Objects for Public Transport*, EN28701

FURTHER INFORMATION

NeTEx website: **www. netex-cen.eu**
Enquiries / email: **info@netex-cen.eu**