DRAFT FOR DEVELOPMENT

DD CEN/TS 28701:2010

Road transport and traffic telematics — Public transport — Identification of fixed objects in public transport

ICS 35.240.60

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A list of organizations represented on this committee can be obtained on request to its secretary.

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TECHNICAL SPECIFICATION

SPÉCIFICATION TECHNIQUE

TECHNISCHE SPEZIFIKATION

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January 2010

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English Version

Road transport and traffic telematics - Public transport - Identification of fixed objects in public transport

Télématique des transports routiers et de la circulation - Transports publics - Identification des objets fixes dans les transports publics

Öffentlicher Verkehr - Identifizierung fester Objekte im Öffentlichen Verkehr (IFOPT)

This Technical Specification (CEN/TS) was approved by CEN on 21 July 2008 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.

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Foreword

This document (CEN/TS 28701:2010) has been prepared by Technical Committee CEN/TC 278 “Road transport and traffic telematics”, the secretariat of which is held by NEN.

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Introduction

Information systems for Public Transport (PT) need information related to objects or events of the real world, such as bus stops, beacons, points of interest, access points to train stations, vehicles, traffic lights, accidents, works, etc.

It is possible to classify these data into three families:

— Fixed objects: bus stops, beacons, points of interest, roads, etc.;

— Mobile objects: vehicles, on board validators, etc.;

— Events: accidents, works, and situations affecting parts of the network, etc.

Subsets of these objects are of particular importance for certain functional domains of Public Transport. For instance, Automatic Vehicle Monitoring systems are concerned with the mobile objects (vehicles) and their positions relative to the infrastructure.

Passenger Information systems are concerned with:

— Information provision and exchange about the network services (timetables, etc.);

— Optimization of passenger trips (trip proposals made according to specific criteria,etc.);

— Management of Public Transport resources (sales points, validators, passenger information devices, etc.).

These systems need all types of data, but information related to the fixed objects is crucial, in particular about the Public Transport stops, their unambiguous identification, their accurate description, and their location in space.

Several particular problems apply to such data. One of them is the fact that the same fixed objects (stops, interchanges) are often used by several operators or several modes and appear with different descriptions and identifiers, so that complex correspondence tables have to be set up and maintained to ensure inter-modal trip planning, for instance, where it is important to uniquely identify the stops.

Another problem appears when apparently the same fixed objects (e.g. a train station, a bus stop) are considered as simple (points) or complex (clusters of points or areas) depending on the viewpoint of a subsystem (for instance, precision of the map). This aspect is often solved by the identification of several objects as one single object (a type of projection), but engenders at the same time the problem of the location referencing of the complex object that has been considered as simple, without a precise method for locating it in space.

Another aspect of the problem of referencing fixed objects for Public Transport is that they are often related to urban infrastructure. The latter is often relevant and used for the description of these objects. Topographical descriptors are introduced to characterise objects that are specific to Public Transport and, furthermore, knowledge of the access points to buildings and other infrastructure objects may be relevant for journey planning. In this case, if any change of the urban infrastructure occurs, Public Transport specific data should be updated and, in a multi-operator context, a certain incoherence of information is likely to appear.

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All these reasons have led to several national programs to provide solutions to address at least parts of the problem particularly relevant for Passenger Information. The UK-NaPTAN system focuses on Public Transport stops, their unambiguous identification, their location in space and their description, choosing a certain level of detail. In Germany DELFI and VDV-Datenmodel deal with similar issues. The Swedish "Samtrafikens transportformat" provides topographical identification including addresses, Public Transport stops with localization and path links for passengers.

Other European standards that exchange PT data, such as TPEG or TRIDENT, ALERT C, ILOC, EU-Spirit, Transmodel or SIRI, aim at the description of location referencing of stops, but do not provide a comprehensive solution for all the problems.

Another important recent study has been the French CERTU's "Étude des systèmes de localisation pour les transports – Clarification des concepts liés aux ârrets de transports en commun" which makes a systematic study of stop location concepts and furthermore relates them to the existing concepts of the Transmodel standard. This "Identification of Fixed Objects" document draws heavily on the CERTU study, which was carried out by the leading French Transmodel experts.

The identification of fixed objects needs to be managed at a national level and the standard should take into account the respective national organisational models for administering data. Because of the large number of stops and their geographical dispersal, this will typically involve a distributed process with a number of parties needing to be coordinated.

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1 Scope

1.1 General

This Technical Specification defines a model and identification principles for the main fixed objects related to public access to Public Transport (e.g. stop points, stop areas, stations, connection links, entrances, etc.), in particular:

— To identify the relevant functions which need a unique identification of fixed objects especially for the Passenger Information domain in a multi-modal, multi-operator context;

— To identify the main fixed objects related to the Public Transport system, choosing a certain viewpoint, i.e. considering a certain level of detail ("granularity") of the given description taking into account the needs of the identified functions;

— To give a typology of these objects together with definitions;

— To present relationships between the identified Public Transport objects;

— To unambiguously describe these objects through their main properties (attributes);

— To describe how to locate these objects in space through coordinates and through the link to topographic objects with a clear separation between the "Public Transport layer" and the "topographic layer" described in its turn by geographic objects;

— To enable the assignment of data administration (responsibility for data maintenance) of each fixed object.

Geospatial location referencing techniques of PT objects (e.g. use of satellites, roadside equipment for positioning) or representation techniques on maps (projections) are outside the scope of this standard.

1.2 Explicit Exclusions from Scope

In order to limit the scope for this version of the Fixed Object Standard, certain types of potential Fixed Object have been excluded for the time being, but will be proposed for inclusion in a second or subsequent part of the standard. These include:

— Roadside Equipment such as Traffic Signals and Traffic Lights and approach information for Urban Traffic Management and Control Systems;

— Road crossings and interchange data (though Access links may project onto tracks in other models that consider these, such as the EuroRoads project);

— Parking: A Car Park Model defines the availability and nature of car, bicycle and other parking. IFOPT includes only a rudimentary Parking model to indicate the relationship of the car parks to the rest of the Stop Place model;

— Relationships with the location referencing requirements of DATEX2 and TPEG.

Fixed Objects are concerned primarily with physical infrastructure and equipment as referenced by information services. Concepts that relate to fixed points that belong to other information layers, such as the structure of Tariff Zones or Fare stages (which belong to the fares layer of Transmodel) are not covered.

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IFOPT describes a generic structure for classifying Points of Interest, for example Museums, Stadiums, etc., but does not set out a recommended informative value set of Point Of Interest Categories.

1.3 Exclusions from Terminology

For the convenience of readers, the Terms and Definitions section of the IFOPT specification repeats definitions of certain key Transmodel concepts that are fundamental to understanding the IFOPT model. It does not repeat definitions of a number of other related Transmodel elements that are part of other Transmodel information layers, i.e. not specific to the Fixed Object layer, for example LINE, DESTINATION DISPLAY, PASSING TIME, or are not within the direct scope of the Fixed Object models, such as RAILWAY ELEMENT, RAILWAY JUNCTION, ROAD ELEMENT, ROAD JUNCTION.

1.4 Approach – Modularisation

1.4.1 General

This Technical Specification builds on the Transmodel Standard to define four related sub models; See Figure 1.

Each model is described as a set of entities, attributes and relationships with other models.

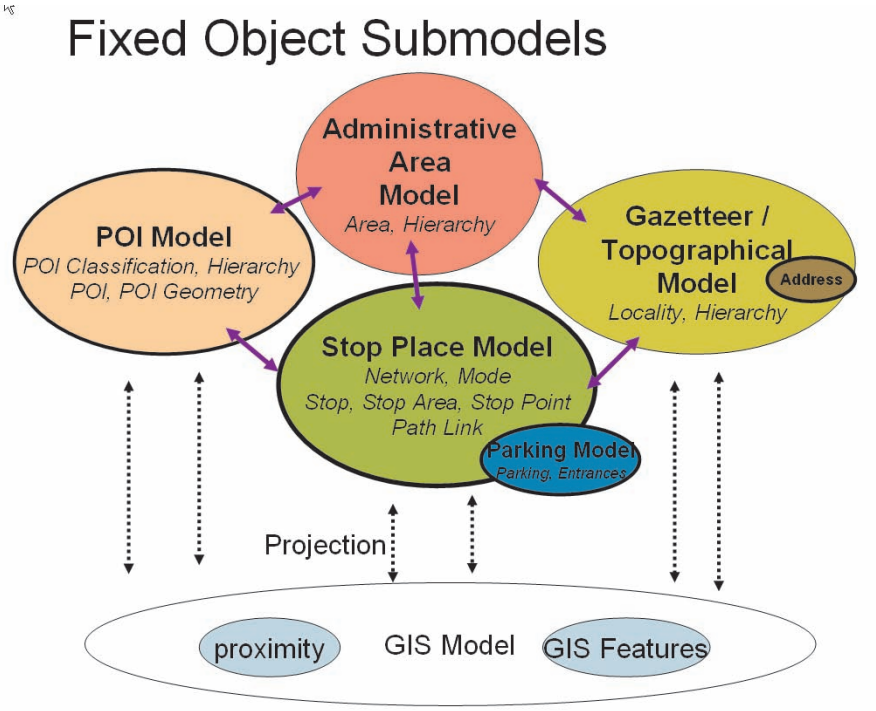

Figure 1 — Fixed Object Submodels

These constituent models of the Fixed Object model are enumerated as follows:

— **Stop Place Model:** Describes the detailed structure of a STOP PLACE (that is station, airport, etc) including physical points of access to vehicles and the paths between the points, including ACCESSIBILITY.

NOTE The concept of stops and the links between them in the Stop Place Model is distinct from the STOP POINT and CONNECTION LINK concepts used in Transmodel to describe the logical stopping points and

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connections of journey patterns for timetables: the Stop Place model describes the stops and paths as actual physical locations in space.

— **Point of Interest Model:** Describes the structure of a POINT OF INTEREST including physical points of access, i.e. ENTRANCES. Also provides a model for a standardised POINT OF INTEREST CLASSIFICATION hierarchy – a means of providing a taxonomy of different types of POINT OF INTEREST relevant for journey planning.

— **Gazetteer Topographical Model:** Provides a topographical representation of the settlements (cities, towns, villages, etc.) between which people travel. It is used to associate Stop and Station elements with the appropriate topographic names and concepts to support the functions of journey planning, stop finding, etc. The TOPOGRAPHICAL PLACE entities in the Gazetteer model may be referenced by the Stop Place and Point of Interest Model but do not reference the elements of those models.

— **Administrative Model:** Provides an organisational model for assigning responsibility to create and maintain data as a collaborative process involving distributed stakeholders. Includes namespace management to manage the decentralised issuing of unique identifiers.

The Stop Place Model is the mandatory part of the Fixed Object model. The other models are ancillary and may be implemented on an optional basis

1.4.2 Motivation for Modularisation

This partitioning of Fixed Object into distinct sub-models is in particular of significance for data exchange. For data exchange, a model held on one computer system must typically be serialised into an XML document or other flat file format and then, after transmission, be de-serialised and re-referenced back into another model on a different system. In order to exchange data efficiently it must be possible to partition the data of a large model (for example all the bus stops in a country) into smaller coherent subsets (for example all the bus stops in a single area within a country) that include references to objects that are not included in the export (for example stops in adjacent areas, or the full definitions of the areas). This raises considerations for ensuring integrity of reference and in particular for the management of the identifiers that are used to implement the reference across different systems.

In practice the coherent subsets of data that are needed for efficient exchange must reflect the operational processes and frequency of change of the data. The four Fixed Object submodels represent four primary sets of data that usually will be exchanged as distinct documents between different parties on different timescales. Thus for example, the Administrative model is a small model that typically needs to be set up centrally with a view to coordinating the work of different stakeholders; once created, its data will change only occasionally, but it will be extensively referenced by other documents. At the other extreme, the Point of Interest and Stop Place models will need to be managed as discrete large data sets for each locality, each requiring detailed geographical surveying and local access knowledge for its creation and maintenance.

A second reason for modularisation is that it allows a more flexible and incremental approach to adoption of the standards.

1.5 Approach – Modelling

1.5.1 Relationship to Transmodel

The Fixed Object model is developed from the existing Transmodel as follows:

— A number of existing Transmodel entities are referenced. In addition, the same separation of concerns and use of distinct layers for different levels of discourse is followed as in Transmodel.

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— Some new entities and attributes are added that are not present in Transmodel 5.1.

— A few existing Transmodel entities are refined or their semantics clarified, notably that the Transmodel STOP POINT is actually a SCHEDULED STOP POINT and should be renamed as such.

The Fixed Object submodels are expressed as an abstract model as per Transmodel, using the UML notation and the relationships of "association" or "inheritance" between named entities. This is the normative expression.

An example XML schema is provided as an informative concrete representation.

1.5.2 Level of Detail & Use of Partially Populated models

Different applications will be concerned to describe a STOP PLACE to different levels of detail. The model is designed so that it may be used in sparsely or partially populated instances, as well as in fully or densely populated implementations. For example, the model should still be useful if only data for the Platforms of a Station are available, as opposed to a full data set that includes every access space, entrance and accessibility. This enables an incremental approach to capturing data over time.

For journey planning applications it is in any case necessary to reduce the complicated structure of a large interchange into a computationally tractable representation, and the model is designed to support an efficient computation by reducing an interchange to a small number of nodes and edges for the computation of navigation paths.

Thus there may be a difference between the data capture representation of a Stop Place, which aims to describe the full physical details of a terminus in a general purpose representation suitable for arbitrary data exchange, and a journey planning representation, which might be an optimised statically computed simplification of the full model to reduce a full set of links to a simplified graph for computing journeys and that is correlated with GIS, schedule and other data from other information layers. The fixed object model is concerned to describe the data capture model, but to do this in a way that is structured to meet the way that journey planners need to process and collate the captured data to create their own efficient representations.

1.5.3 Data Administration

On a national scale, instances of a fixed object model can include large data sets (e.g. millions of locations, hundreds of thousands of stop places) that need to be gathered and managed on a distributed basis. The model should take into account how data can be partitioned into appropriate small subsets for the purposes of exchange as the payload of generic data exchange services. The IFOPT administrative model will support this.

Table 1 gives approximate total numbers of different types of fixed object nodes in an average European country (the number of links to each node will be much larger). The numbers of instances of different types of stop is significant both for their administration (it is the large data sets that must be partitioned), and for the schemes used to identify instances for public reference. The length of the public facing code should be large enough to handle the number of instances, yet should be as short as possible in order to be usable by humans. Textual names of objects are also subject to usability considerations. For some types of stop – for example airports or rail stations – the number of instances is quite small and there are intuitive names (typically the town name) that can be used for them. For other type of node, in particular bus stops and Points of Interest, there will be many more than can be named or easily remembered and there will be a need to describe a stop in several different ways, and with various qualifiers, to support stop finding and name discrimination tasks.

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Table 1 — Indicative numbers of Access points

	Indicative number of Fixed Object Entities per country	
City, Town or District Names	0-100 000	City, Town or District Names
Rail Stations	0-20 000	City or Towns
Bus /Tram Stops	50 000-500 000	Local Point Name
Ports & Ferry piers	2 000-20 000	City or Town Names or Local Name
Airports	0-500	Major Towns
Coach Stops	10 000-200 000	City or Town Names
Points of Interest	1 000 000-10 000 000	Local Point Name & National names
Data Administration Jurisdictions	10-500	State, County names
Topographic Localities	10 000-500 000	State, County, City, Parish names

The informative XML XSD schema appended to this document gives an example of serialisation into useful packages.

1.5.4 Stop Identification & Labelling

A particular use of Fixed Object model data is to enable stop and place finding by users of journey planners and other on-line applications. This requires the appropriate association of entities with topographical places. The Model is designed to allow for meaningful codes and labels to be constructed according to many different application and usage contexts.

1.5.5 Relationship to GIS Standards

The Fixed Object model has a relationship to other standards describing the geographical features of a country, but is not itself a GIS standard. The Fixed Object model describes the semantic structure of stop places in a way that can be related to the Public Transport universe of discourse of Transmodel. Transmodel and the Fixed Object model exclude the detailed description of geographic features, and use standard GIS model elements to describe the GDF references needed to relate the Fixed Object model entities to the underlying GIS models.

The Location models used in the Fixed Object need to be represented in a way such that they can be projected onto a variety of geospatial representations. The Fixed Object model upholds the principles from Transmodel of separation of information layers and the use of Point and Link representations within the distinct layers which can be used to project elements between the models.

Point and Link and address data sufficient to make this projection are included in Fixed Objects: the choice of coordinate reference systems is open.

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1.5.6 Vertical Levels versus Altitude

Transport interchanges are often complex buildings with many interconnected levels. The labelling and description of the levels is used in describing stops and directions in PT info systems and so needs to be part of the Fixed Object model. This LEVEL is a distinct concept from that of a vertical spatial coordinate in that it is a semantic label (for example "Departures", "Basement", "Floor 1", etc.). Altitude is in effect the z coordinate of a POINT.

1.5.7 Security

The Fixed Object model describes data for exchange between responsible stakeholders. Such data may include information that is for internal operational use rather than general public use. Where appropriate, data can be flagged to indicate that its audience should be restricted.

1.5.8 Scope of Phase 1

This first part of the IFOPT Technical Specification is restricted in its scope to a core set of objects relating to passenger information on public transport. We recognise that in future it may be useful to consider additional fixed objects relevant for traffic and transport such as Traffic lights, pedestrian crossings and Tariff Zones. Discussion of some of these elements needs to be in consultation with other CEN Working Groups

The first part of IFOPT covers the following entities:

— **Stop Model:** Rail Stations, Metro Stations, Bus and Coach Stations, On-street bus, tram coach and trolley bus stops and their associated Equipment. The same model may be used for Airports, Ship and Ferry Ports, Taxi ranks and other access points.

— **Point of Interest Model:** Well known locations to which both Tourists and Residents are likely to wish to Travel, such as Museums, Parks, Stadia, Galleries, Law Courts, Prisons, etc. A classification mechanism is also provided.

— **Topographical model:** Cities, Towns, Hamlets, Suburbs and Quarters and other settlements to which people may wish to travel and whose relation to Stop Places, Points of Interest and Addresses is relevant. It includes an Address model.

— **Administrative Model:** An organisational structure or Administrators, roles and Administrative Areas used to manage other data elements. The Fixed Object models are conceived as discrete models, but share certain common concepts and base data type. Figure 2 indicates the dependencies between the different Fixed Object Models. The Stop Place and Point of Interest Models reference common concepts in the Administration and Topographical Models (though can be used with a minimal implementation of these concepts). Further application views may be constructed that reference some or all of the elements of the models. Further packages that reference these models can be added in future.

The contents of the Stop Place Model and Point of Interest Model may be organised using elements established in the Administrative and Topographical Model. All the models assume the existence and reuse of common Address and generic data type packages. In any concrete implementation of the individual Fixed Object models in XML, these can be based on reusable XML subschema, with the logical dependencies shown in Figure 2. An informative XML schema is separately available at http://www.ifopt.org.uk.

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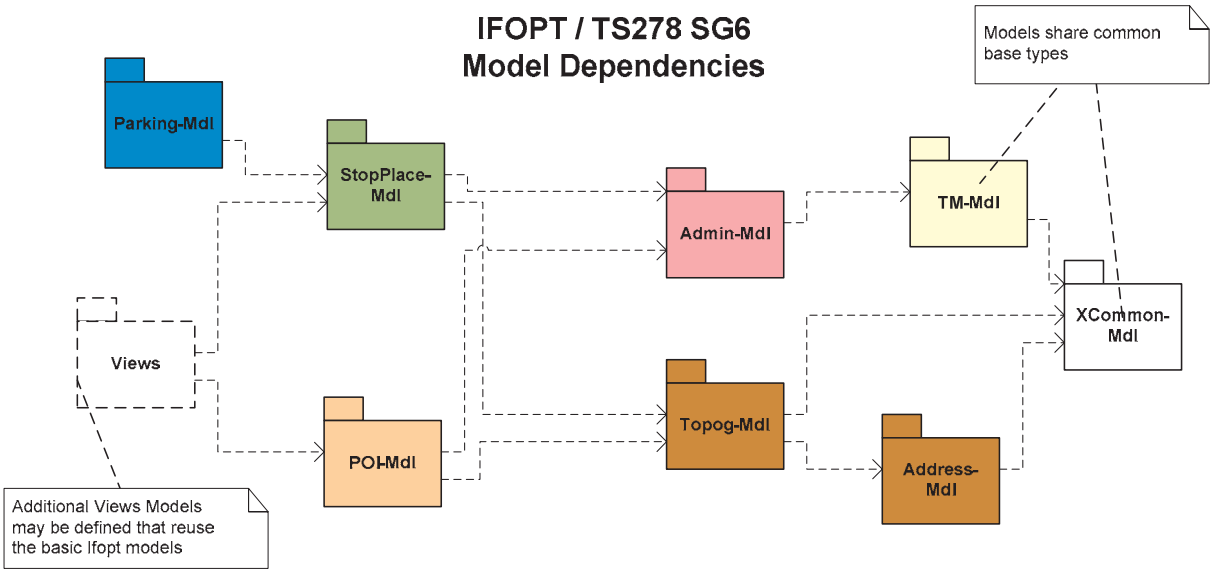

Figure 2 — Dependencies of Fixed Object Models

2 Normative references

The following referenced documents are indispensable for the application 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.

EN 12896:2006, *Road transport and traffic telematics — Public transport — Reference data model*

CEN/TS 15531:2007 (all parts), *Public transport — Service interface for real-time information relating to public transport operations*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 12896:2006, CEN/TS 15531:2007 (all parts) and the following apply.

3.1 Transport Related Terms

NOTE 1 This section includes terms for both PT entities and properties of PT entities used in IFOPT. For each term, it is indicated whether the term derives from Transmodel version 5.1 (EN 12896:2006), another Technical Specification (e.g. SIRI – CEN/TS 15531) or whether the term is specific to IFOPT. Definitions of most common Transmodel and SIRI terms used in IFOPT are not repeated here (for example VEHICLE JOURNEY, JOURNEY PATTERN, CONTROL ACTION), but a few are included where it is considered helpful to the reader (for example STOP POINT).

NOTE 2 The glossary follows the Transmodel convention of using upper case to describe Transmodel entities, for example STOP PLACE. It also uses upper case for IFOPT entities, as these may be regarded as candidates for a future version of Transmodel. It furthermore follows the Transmodel practice of assigning particular semantics to particular English nouns, for example POINT, ZONE and LINK each have connotations of a particular spatial geometry, PLACE has a spatial implication (but not necessarily a topographic one), and GROUP indicates a collective mechanism.

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3.1.1
ACCESS LINK – Transmodel
physical (spatial) possibility for a passenger to access or leave the public transport system

NOTE 1 This link may be used during a trip for:

— The walking movement of a passenger from a PLACE (origin of the trip) to a STOP POINT (origin of the PT TRIP); or

— The walking movement from a STOP POINT (destination of the PT TRIP) to a PLACE (destination of the trip).

NOTE 2 In IFOPT, a STOP PLACE, an ADDRESS, a POINT of INTEREST, a PARKING and a TOPOGRAPHICAL PLACE are all types of PLACE and so an ACCESS LINK may also explicitly connect them.

3.1.2
ACCESS PATH LINK – IFOPT
type of external PATH LINK connecting a PLACE with another PLACE

NOTE 1 A sequence of ACCESS PATH LINKs may project onto an ACCESS LINK.

NOTE 2 Each end of an ACCESS PATH LINK should connect to an entity that is a concrete subtype of PLACE, for example STOP PLACE, POINT OF INTEREST, ADDRESS, ROAD ADDRESS, QUAY, etc. that is an ACCESSIBLE PLACE. Each end of an ACCESS PATH LINK may further have a specific ENTRANCE of the same concrete subtype of PLACE associated with that end, that is, STOP PLACE ENTRANCE, QUAY ENTRANCE, POINT OF INTEREST ENTRANCE, etc.; to indicate the exact entrance to the building.

NOTE 3 Inside a physical STOP PLACE, STOP PATH LINKs should be used instead of ACCESS PATH LINKs.

3.1.3
ACCESS SPACE – IFOPT
passenger area within a STOP PLACE such as a concourse or booking hall, immigration hall or security area that is accessible by passengers, but without a direct access to vehicles

NOTE Direct access to a VEHICLE is always from a QUAY and/or BOARDING POSITION. An ACCESS SPACE may be a Room, Hall, Concourse, Corridor, or bounded open space within a STOP PLACE.

3.1.4
ACCESS SPACE ENTRANCE – IFOPT
entrance or exit for passengers to or from an ACCESS SPACE

NOTE An entrance may be Internal, giving access to another ACCESS SPACE or QUAY, in which case it should connect to some other part of the same STOP PLACE; or External, representing a point of attachment with which to navigate a route to the STOP PLACE.

3.1.5
ACCESS ZONE – Transmodel
ZONE for which the duration to cover any ACCESS LINK to a particular STOP POINT is the same

NOTE The IFOPT Concept of an ACCESS SPACE is distinct from the Transmodel concept of an ACCESS ZONE as an ACCESS SPACE may have different NAVIGATION PATHS whose traversal takes different durations.

3.1.6
ACCESSIBLE PLACE – IFOPT
type of PLACE, such as a STOP PLACE, POINT OF INTEREST or ADDRESS, to which passengers may wish to travel

NOTE An ACCESSIBLE PLACE may be the endpoint of a PATH LINK and can have designated entrances that represent the best point of access for different USER NEEDs.

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3.1.7
ACCESSIBILITY – IFOPT
possibility of a user with a specific USER NEED, such as a disability or encumbrance, to access either fixed or moving Public Transport facilities

3.1.8
ACCESSIBILITY ASSESSMENT – IFOPT
ACCESSIBILITY characteristics of an entity used by passengers such as a STOP PLACE, or a STOP PLACE COMPONENT, described by ACCESSIBILITY LIMITATIONs, and/or a set of SUITABILITies

3.1.9
ACCESSIBILITY LIMITATION – IFOPT
categorisation of the ACCESSIBILITY characteristics of a STOP PLACE COMPONENT such as a STOP PATH LINK, STOP PLACE or ACCESS SPACE to indicate its usability by passengers with specific needs, for example, those needing wheelchair access, step-free access or wanting to avoid confined spaces such as lifts

NOTE A small number of well-defined categories are used that are chosen to allow the consistent capture of data and the efficient computation of routes for different classes of user.

3.1.10
ACCESSIBILITY SUPPORT SERVICES – IFOPT
provision of services to enable guidance of specific classes of user, for example personal or auditory or tactile device assistance for the blind, or visual devices and text announcement for the deaf, or luggage porterage or language services

NOTE In IFOPT these are specified as types of LOCAL SERVICE.

3.1.11
ACTUAL STOP POINT EQUIPMENT – Transmodel
item of equipment of a particular type actually available at an individual STOP POINT (e.g. post, shelter, seats, information display)

NOTE The IFOPT STOP PLACE EQUIPMENT is a generalisation of STOP POINT EQUIPMENT that may include equipment located elsewhere in the STOP PLACE as well as on the QUAY.

3.1.12
ACTUAL VEHICLE EQUIPMENT – Transmodel
item of equipment of a particular type actually available in an individual VEHICLE

3.1.13
ADDRESS – IFOPT
descriptive data associated with a PLACE that can be used to describe the unique geographical context of a PLACE for the purposes of identifying it

NOTE 1 It may be refined as either a ROAD ADDRESS, a POSTAL ADDRESS or both.

NOTE 2 An ADDRESS can be associated with a PLACE or POINT OF INTEREST where a trip can start or end.

3.1.14
ADMINISTRATIVE AREA – IFOPT
grouping of STOP PLACE, PLACE or other managed data for management by a DATA ADMINISTRATOR

NOTE 1 Each administrative area will have a common IDENTIFIER NAMESPACE for allocating identifiers.

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NOTE 2 A distinction can be made between the management of the Transport of an area (the role of an AUTHORITY managing an ADMINISTRATIVE ZONE) and the administration of the Transport related data (the role of a DATA ADMINISTRATOR of an ADMINISTRATIVE AREA) which may be, but is not necessarily, performed by the same body.

3.1.15
ALTERNATIVE COMMON NAME – IFOPT
Passenger Information systems will support the use of one or more names to identify PLACEs, STOP PLACEs, DESTINATIONs, POINTs OF INTEREST, etc. to users in journey planners and other systems

3.1.16
AREA IDENTIFIER NAMESPACE – IFOPT
IDENTIFIER NAMESPACE used to control the unique allocation of stop identifiers for each ADMINISTRATIVE AREA, allowing the distributed management of STOP DATA

3.1.17
AUTHORITY – Transmodel
organisation under which the responsibility of organising the public transport service in a certain area is placed

3.1.18
BOARDING POSITION – IFOPT
location within a QUAY from which passengers may directly board, or onto which passengers may directly alight from, a vehicle

3.1.19
BOARDING POSITION ENTRANCE – IFOPT
entrance or exit for passengers to/from a BOARDING POSITION within a QUAY

3.1.20
CHECKPOINT– IFOPT
characteristics of a STOP PLACE COMPONENT representing a process, such as check-in, security screening, ticket control or immigration, that may potentially incur a time penalty that should be allowed for when journey planning

NOTE Used to mark STOP PATH LINKs to determine transit routes through interchanges.

3.1.21
CHECKPOINT DELAY– IFOPT
delay associated with a specific CHECKPOINT

NOTE The CHECKPOINT DELAY may vary according to time of day as specified by a VALIDITY CONDITION, in line with the passenger processing capacity of the CHECKPOINT and traffic congestion levels.

3.1.22
CHECKPOINT PROCESS – IFOPT
classification of a CHECKPOINT as a particular type due to the process that takes place at it, such as security, ticketing, etc.

3.1.23
COMMON NAME – IFOPT
canonical name given to a STOP PLACE, POINT OF INTEREST, or TOPOGRAPHICAL PLACE that will be used on displays and other media to identify a stop

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3.1.24
COMPASS BEARING – SAE J1939/71 (ENV13149)
heading of an object relative to another in degrees expressed as a floating point number and compliant to SAE J1939/71 (Compatible with ENV13149)

NOTE A BEARING may be stated on the road from a bus or other on street stop to indicate the direction in which the stop serves traffic and is thus an attribute of an on street QUAY.

3.1.25
COMPASS OCTANT – IFOPT
heading of an object relative to another expressed as quadrants of the compass, e.g. SW, N, SE, etc.

3.1.26
COMPLEX FEATURE – Transmodel
aggregate of SIMPLE FEATUREs and/or other COMPLEX FEATUREs

EXAMPLES A STOP AREA: combination of STOP POINTS; a train station: combination of SIMPLE FEATUREs (POINTs, LINKs) and COMPLEX FEATUREs (STOP AREAs).

NOTE An IFOPT STOP PLACE is a type of COMPLEX FEATURE.

3.1.27
CONNECTION LINK – Transmodel
physical (spatial) possibility for a passenger to change from one public transport vehicle to another to continue a trip

NOTE Different transfer times may be necessary to cover interchange over a given connection link, depending on the kind of passenger.

3.1.28
CONNECTION LINK ASSIGNMENT – IFOPT
association of a CONNECTION LINK (e.g. between two journeys of a JOURNEY PATTERN) with a PATH LINK or set of PATH LINKs representing different paths to indicate that the journey connection should be made over that path within the STOP PLACE

NOTE May be subject to a VALIDITY CONDITION.

3.1.29
COUNTRY – General term
<IFOPT> unique name space within which to identify TOPOGRAPHICAL PLACEs, STOP PLACEs, STOP PLACE COMPONENTs, POINTs OF INTEREST, ADDRESSes, etc., according to an ADMINISTRATIVE MODEL

NOTE A STOP PLACE or TOPOGRAPHICAL PLACE may span a jurisdictional boundary, but in this case the entity should be assigned to one or other jurisdiction for the purpose of allocating identifiers.

3.1.30
DATA ADMINISTRATION ROLE – IFOPT
data management function of a DATA ADMINISTRATOR needed for the distributed processing and sharing of data in a STOP PLACE, POINT OF INTEREST or TOPOGRAPHICAL PLACE model

3.1.31
DATA ADMINISTRATOR – IFOPT
organisation responsible for managing data of a specific type, for example TOPOGRAPHICAL PLACE, POINT OF INTEREST, STOP PLACE and STOP POINT data in one or more ADMINISTRATIVE AREAs

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NOTE 1 Administration may be decentralised to many different DATA ADMINISTRATORs, each with responsibility for data of a particular scope. A DATA ADMINISTRATOR may correspond to an ORGANISATIONAL UNIT or may be an external body such as a Local Authority or responsible organisation.

NOTE 2 Within a physical STOP PLACE, different DATA ADMINISTRATORS may be responsible for all or just some of the data, for example different modes may be managed by different administrators.

NOTE 3 Different DATA ADMINISTRATORs may be responsible for different data processing roles such as gathering, aggregating or distributing the data depending on their DATA ADMINISTRATION ROLE. The role of data administrator may be procured by the responsible organisation from a contractor.

NOTE 4 Each DATA ADMINISTRATOR will use a known NAMESPACE for issuing identifiers.

3.1.32
DATA MANAGED OBJECT – IFOPT
entity that is managed by a DATA ADMINISTRATOR as part of a distributed system of data management of objects with well defined identifiers and data ownership

NOTE Such objects conform to the abstract DATA MANAGED OBJECT supertype that defines associations and behaviour for data management.

3.1.33
DATA SYSTEM – Transmodel
origin of operational data referring to one single responsibility

NOTE 1 References to a data system are useful in an interoperated computer system.

NOTE 2 For IFOPT, this entails in particular specific systems for assigning unique identifiers to relevant entities such as STOP POINTS or STOPS, which can be matched to the locally known entities identified by the respective internal operating data. The DATA SYSTEM should be mutually agreed between different systems that exchange data. A DATA SYSTEM has both a data model to describe the entities and their relationships, and a NAMESPACE to describe the unambiguous set of identifier values.

3.1.34
DIRECTION – Transmodel
classification for the general orientation of ROUTEs

NOTE In IFOPT the DIRECTION may be an important aspect of a PATH LINK that may only be traversed one way.

3.1.35
DYNAMIC STOP POINT ASSIGNMENT – IFOPT
dynamic association of a SCHEDULED STOP POINT (i.e. a STOP POINT of a SERVICE PATTERN or JOURNEY PATTERN) with the next available STOP PLACE, QUAY or BOARDING POSITION within a STOP PLACE

NOTE May be subject to a VALIDITY CONDITION.

3.1.36
ENTRANCE – IFOPT
identified point of entry or exit for a passenger to or from a STOP PLACE, ACCESS SPACE or POINT OF INTEREST

NOTE 1 It may or may not have a physical manifestation such as a Door, barrier, turnstile or other obstacle.

NOTE 2 The passenger may be on foot, in a wheelchair, on a bicycle or on some other private mode of transport. The ENTRANCE may have a TRANSPORT MODE to indicate the permitted modes. A door may be marked for use for entry, exit or both.

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3.1.37
ENTRANCE TO VEHICLE – IFOPT
entrance or exit for passengers onto a VEHICLE, usually having a door

NOTE It is distinct from an ENTRANCE FOR VEHICLES, which is for access by a vehicle to a STOP PLACE.

3.1.38
ENTRANCE FOR VEHICLES – IFOPT
entrance for VEHICLEs to a STOP PLACE

NOTE It is distinct from an ENTRANCE TO VEHICLE, which is for passenger access to a vehicle. May be marked for entry, exit use, or both.

3.1.39
EQUIPMENT PLACE – IFOPT
STOP PLACE COMPONENT containing equipment associated with other STOP PLACE COMPONENTs or other places accessible to passengers

3.1.40
EQUIPMENT POSITION – IFOPT
precise position within an EQUIPMENT PLACE where particular equipment is placed

3.1.41
IDENTIFIER NAMESPACE – IFOPT
managed set of unique identifiers used to control the allocation of component identifiers in a distributed administrative model

3.1.42
INFO LINK – IFOPT
element of the STOP PLACE Model that can be used to associate an arbitrary link to an external web resource such as an image or URL with any STOP PLACE COMPONENT

3.1.43
LEVEL – IFOPT
identified storey (ground, first, basement, mezzanine, etc.) within an interchange building on which STOP PLACE COMPONENTs reside

NOTE A STOP PATH LINK may connect components on different levels.

3.1.44
LOCAL SERVICE– IFOPT
named service relating to the use of the STOP PLACE or transport services at a particular location, for example porterage, assistance for disabled users, booking offices, etc.

NOTE The service may have a VALIDITY CONDITION associated with it. A LOCAL SERVICE is treated as a form of non-material EQUIPMENT.

EXAMPLES TICKETING SERVICE, CUSTOMER SERVICE, LEFT LUGGAGE SERVICE, LOST PROPERTY SERVICE, COMPLAINTS SERVICE, LUGGAGE SERVICE, HIRE SERVICE, MONEY SERVICE, REFRESHMENT SERVICE, COMMUNICATION SERVICE.

3.1.45
LOCATING SYSTEM – Transmodel
system used as reference for the location and graphical representation of the network and other spatial objects

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3.1.46
MONITORING POINT– SIRI
point at which real-time status is reported, normally corresponding to a STOP POINT

NOTE In IFOPT only a minimal representation of MONITORING POINTs is made sufficient to relate their location to the STOP PLACE and its components.

3.1.47
MONITORING POINT ASSIGNMENT– IFOPT
MONITORING POINT ASSIGNMENT associates a MONITORING POINT with a specific SCHEDULED STOP POINT

3.1.48
NAVIGATION PATH – IFOPT
representation of a detailed pathway that a passenger may take between two PLACEs within a STOP PLACE, or between STOP PLACE, POINT OF INTEREST, etc.

NOTE 1 A NAVIGATION PATH can be made up of an ordered set of PATH LINKs IN SEQUENCE, an ordered set of ACCESSIBLE PLACEs IN SEQUENCE or both – a POINT or a LINK representation may be useful for different applications.

NOTE 2 There may be multiple NAVIGATION PATHs between the same STOP PLACE COMPONENTs or other PLACEs, reflecting different physical paths and with particular ACCESSIBILITY ASSESSMENTs. NAVIGATION PATHs may be predefined, or be computed dynamically from the underlying set of STOP PLACE COMPONENTs and other PLACE and LINK types.

NOTE 3 The same PATH LINK may occur in different sequences in different NAVIGATION PATHs.

3.1.49
OPERATOR – Transmodel
organisation in charge of the operation of some or all transport services within a particular area

3.1.50
ORGANISATIONAL UNIT – Transmodel
A grouping of responsibilities in a public transport company for planning and control.

3.1.51
PARKING – IFOPT
designated location for leaving vehicles such as cars, motorcycles and bicycles

3.1.52
PARKING AREA – IFOPT
marked zone within a PARKING containing PARKING BAYs

3.1.53
PARKING BAY – IFOPT
place to park an individual vehicle

3.1.54
PARKING ENTRANCE FOR VEHICLES – IFOPT
entrance for vehicles to the PARKING from the road

3.1.55
PARKING PASSENGER ENTRANCE – IFOPT
entrance to the PARKING for passengers on foot or other out-of-vehicle mode, such as wheelchair

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3.1.56
PASSENGER ACCESSIBILITY NEEDS – IFOPT
passenger's requirements for ACCESSIBILITY, comprising one or more USER NEEDs

NOTE For example, that they are unable to navigate stairs, or lifts, or have visual or auditory impairments. PASSENGER ACCESSIBILITY NEEDS can be used to derive an accessibility constraint for the passenger, allowing the computation of paths for passengers with specifically constrained mobility.

EXAMPLES Wheelchair, No Lifts, No Stairs.

3.1.57
PASSENGER ENTRANCE TO PARKING - IFOPT
Passenger entrance to a PARKING facility

3.1.58
PASSENGER STOP POINT ASSIGNMENT – IFOPT
allocation of a SCHEDULED STOP POINT (i.e. a STOP POINT of a SERVICE PATTERN or JOURNEY PATTERN) to a specific STOP PLACE, and also possibly a QUAY and BOARDING POSITION

NOTE May be subject to a VALIDITY CONDITION. Assignment may be done in advance, or be done in-real-time as a DYNAMIC STOP POINT ASSIGNMENT made as a result of a CONTROL ACTION. May be accompanied by a VEHICLE STOPPING POINT ASSIGNMENT for the allocation of a VEHICLE to a VEHICLE STOPPING PLACE and VEHICLE STOPPING POSITION.

3.1.59
PATH ASSIGNMENT – IFOPT
allocation of a specific NAVIGATION PATH with which to make a CONNECTION LINK

3.1.60
PATH JUNCTION – IFOPT
designated point, inside or outside of a STOP PLACE or POINT OF INTEREST, at which two or more PATH LINKs may connect

NOTE This allows ACCESS PATH LINKs to be linked together outside of a specific STOP PLACE. Within a STOP PLACE, ACCESS SPACEs are usually used as junction points.

3.1.61
PATH LINK – IFOPT
link between any two STOP PLACEs, STOP PLACE SPACEs (that is, ACCESS SPACEs or QUAYs or BOARDING POSITIONs), POINTs OF INTEREST or PATH JUNCTIONs that represents a step in a possible route for pedestrians, cyclists or other out of vehicle passengers within or between a PLACE

NOTE 1 A STOP PATH LINK is used within a STOP PLACE and may have further properties and attributes derived from its relationship with the STOP PLACE. An ACCESS PATH LINK is used outside of a STOP PLACE.

NOTE 2 It is possible but not mandatory that a PATH LINK projects onto a more detailed set of infrastructure or mapping links that plot the spatial course, allowing it to be represented on maps and to tracking systems.

3.1.62
PATH LINK IN SEQUENCE – IFOPT
step of a NAVIGATION PATH indicating traversal of a particular PATH LINK as part of a recommended route

NOTE The same PATH LINK may occur in different sequences in different NAVIGATION PATHs.

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3.1.63
PATH LINK VIEW – IFOPT
specifies information about which details of a PATH LINK referenced by a PATH LINK IN SEQUENCE should be used when describing a step of a NAVIGATION PATH

3.1.64
PLACE – Transmodel
geographic location of any type which may be specified as the origin or destination of a trip

NOTE 1 A PLACE may be of dimension 0 (a POINT), 1 (a road section) or 2 (a ZONE).

NOTE 2 In IFOPT a PLACE may be of dimension 3 and be further associated with a LEVEL.

3.1.65
PLATFORM CHANGE – IFOPT
CONTROL ACTION of interest to passengers marking the reassignment of a SCHEDULED STOP POINT from one designated QUAY and or BOARDING POSITION to another

3.1.66
POINT OF INTEREST – IFOPT
type of PLACE to or through which passengers may wish to navigate as part of their journey and which is modelled in detail by journey planners

NOTE A POINT OF INTEREST may further have a complex spatial substructure with constrained POINT OF INTEREST ENTRANCEs and access pathways described using ACCESS PATH LINKs. A journey planner will normally provide an optimised route from a STOP PLACE to a POINT OF INTEREST ENTRANCE using a NAVIGATION PATH comprising one or more PATH LINKs IN SEQUENCE.

3.1.67
POINT OF INTEREST CLASSIFICATION – IFOPT
category used to classify a POINT OF INTEREST by nature of interest using a systematic taxonomy, for example *Museum, Football Stadium*

3.1.68
POINT OF INTEREST CLASSIFICATION HIERARCHY– IFOPT
set of multilevel hierarchies used to organise POINT OF INTEREST CLASSIFICATIONs systematically

EXAMPLE 1 *Cultural Attraction – Museum – Art Gallery, or Government Office – Department for Transport*.

EXAMPLE 2 A given *Sports Stadium* can appear as both a *Football Ground* and a *Rugby Ground*.

NOTE A POINT OF INTEREST CLASSIFICATION can belong to more than one hierarchy.

3.1.69
POINT OF INTEREST ENTRANCE – IFOPT
specific located external ENTRANCE to a POINT OF INTEREST

NOTE A journey planner will normally provide an optimised route from a STOP PLACE to a POINT OF INTEREST ENTRANCE as an ACCESS PATH LINK.

3.1.70
POINT OF INTEREST MEMBERSHIP– IFOPT
assignment of a POINT OF INTEREST to one or more POINT OF INTEREST CLASSIFICATIONs

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3.1.71
POSTAL ADDRESS – IFOPT
data associated with a PLACE that can be used to describe the geographical context of a PLACE for the purposes of identifying it

NOTE The POSTAL ADDRESS refines the ADDRESS and uses the attributes used for conventional identification for mail. Comprises variously a building Identifier, Street name, Post code and other descriptors.

3.1.72
QUAY – IFOPT
place such as platform, stance, or quayside where passengers have access to PT vehicles, Taxi cars or other means of transportation

NOTE 1 A QUAY may serve one or more VEHICLE STOPPING PLACEs and be associated with one or more STOP POINTS.

NOTE 2 A QUAY is a recursive structure that may contain other sub QUAYs. A child QUAY must be physically contained within its parent QUAY.

3.1.73
QUAY ENTRANCE – IFOPT
entrance or exit for passengers to/from a QUAY

3.1.74
ROAD ADDRESS – IFOPT
data associated with a PLACE that can be used to describe the geographical context of a PLACE for the purposes of identifying it in terms of the road network

NOTE The ROAD ADDRESS refines the ADDRESS of a PLACE located on a road and uses the attributes such as road number, and name used for conventional identification of a road.

3.1.75
ROUTE – Transmodel
ordered list of located POINTs defining one single path through the road (or rail) network

NOTE 1 A ROUTE may pass through the same POINT more than once.

NOTE 2 Each JOURNEY PATTERN may be associated with a particular ROUTE.

3.1.76
SCHEDULED STOP POINT – Same as Transmodel STOP POINT
POINT in a journey where Passengers can board or alight from vehicles

NOTE SCHEDULED STOP POINT refines the primary Transmodel sense of a STOP POINT, which is that of the logical stop point within a scheduled journey, rather than a physical point in the infrastructure where boarding and alighting, may take place, for which the terms for specific STOP PLACE COMPONENTs such as QUAY or BOARDING POSITION are used. Although the same identifiers are often used for both SCHEDULED STOP POINT and STOP PLACE COMPONENT, a practice which provides significant benefits for data management, they nonetheless represent distinct concepts. A STOP POINT ASSIGNMENT is used to associate a SCHEDULED STOP POINT with a STOP PLACE COMPONENT.

3.1.77
SIMPLE FEATURE – Transmodel
abstract representation of elementary objects related to the spatial representation of the network POINTs (0-dimensional objects), LINKs (1-dimensional objects) and ZONEs (2-dimensional objects) which may be viewed as SIMPLE FEATUREs

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3.1.78
SITUATION – Trident
set of traffic/travel circumstances linked by a causal relationship which apply to a common set of locations

NOTE 1 A situation can be composed of situation elements.

NOTE 2 SITUATION is not a Transmodel term, but is used in Trident and SIRI as a generic term for incidents and planned disruptions.

NOTE 3 In IFOPT the STOP PLACE model provides a precise location model for specifying the scope of an incident and may be referenced by other services such as SIRI.

3.1.79
STOP AREA – Transmodel
group of STOP POINTS close to each other

3.1.80
STOP PATH LINK – IFOPT
path between any two physical STOP PLACE SPACEs within an interchange that represents a step of a possible transfer route for passengers within a STOP PLACE.

NOTE 1 A STOP PATH LINK is a STOP PLACE COMPONENT in its own right and may have ACCESSIBILITY LIMITATIONs and CHECKPOINTs associated with it to indicate impediments that may prevent access or slow a user down. A sequence of one or more STOP PATH LINKs may make up a NAVIGATION PATH.

NOTE 2 Each end of a STOP PATH LINK should connect to an entity that is a concrete subtype of an ABSTRACT STOP PLACE SPACE, that is, ACCESS SPACE or QUAY or BOARDING POSITION. Each end of a STOP PATH LINK may further have a specific ENTRANCE of the same concrete subtype of ABSTRACT STOP PLACE SPACE associated with that end, that is QUAY ENTRANCE, ACCESS SPACE ENTRANCE or BOARDING POSITION ENTRANCE.

NOTE 3 STOP PATH LINKs should be used only within an interchange. ACCESS PATH LINKs should be used for PATH LINKs outside the physical STOP PLACE.

3.1.81
STOP PLACE – IFOPT
place comprising one or more locations where vehicles may stop and where passengers may board or leave vehicles or prepare their trip

NOTE A STOP PLACE will usually have one or more well known names.

3.1.82
STOP PLACE COMPONENT – IFOPT
element of a STOP PLACE describing part of its structure

NOTE STOP PLACE COMPONENTs share common properties for data management, accessibility and other features.

3.1.83
STOP PLACE ENTRANCE – IFOPT
physical entrance or exit to/from a STOP PLACE

NOTE May be a door, barrier, gate or other recognizable point of access.

3.1.84
STOP PLACE EQUIPMENT – IFOPT
item of equipment of a particular type actually available at a location within a STOP PLACE that is itself a place, such as QUAY, ACCESS SPACE or STOP PATH LINK

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NOTE STOP PLACE EQUIPMENT may comprise information equipment; Info Equipment, Passenger Info Equipment, Signage: Stop Sign, Other Sign, Heading Sign, Access Equipment, Queueing Equipment, Stair Equipment, Lift Equipment, Ramp Equipment, Crossing Equipment, Entrance Equipment, Escalator Equipment, Staircase Equipment, Rough Surface, or other service related equipment such as Ticketing Equipment, Trolley Stand Equipment, Waiting Equipment, Passenger Safety Equipment, Luggage Locker Equipment, Shelter Equipment, Waiting Room Equipment, Sanitary Facility Equipment.

3.1.85
STOP PLACE SPACE– IFOPT
physical area within a STOP PLACE, for example a QUAY, BOARDING POSITION, ACCESS SPACE or EQUIPMENT PLACE

3.1.86
SUITABILITY – IFOPT
whether a particular facility such as a STOP PLACE COMPONENT or VEHICLE can be used by a passenger with a particular USER NEED

3.1.87
STOP POINT – Transmodel
POINT in a planned journey where passengers can board or alight from vehicles

NOTE Renamed in IFOPT to SCHEDULED STOP POINT.

3.1.88
TARIFF ZONE – IFOPT
ZONE used to define a zonal fare structure in a zone-counting or zone-matrix system

3.1.89
TIME BAND – Transmodel
period in a day, significant for some aspect of public transport, e.g. similar traffic conditions or fare category

3.1.90
TOPOGRAPHICAL DATA SYSTEM – IFOPT
extended Gazetteer of PLACEs within a geographical area labelled in a consistent manner so as to be suitable for use in different contexts in customer facing services

NOTE Will include associations representing topographical relationships such as hierarchy, adjacency.

3.1.91
TOPOGRAPHICAL PLACE – IFOPT
geographical settlement which provides topographical context when searching for or presenting travel information, for example as the origin or destination of a trip

NOTE 1 It may be of any size (e.g. County, City, Town, Village) and of different specificity, e.g. Greater London, London, West End, Westminster, St James's.

NOTE 2 A TOPOGRAPHICAL PLACE may be associated with a PLACE (including a STOP PLACE), but not all PLACEs are TOPOGRAPHICAL PLACEs. TOPOGRAPHICAL PLACEs may be organised through hierarchical containment and disjoint adjacency relationships.

NOTE 3 A TOPOGRAPHICAL PLACE should always have a canonical gazetteer name. It may be necessary to use the hierarchical topographical relationships of the TOPOGRAPHICAL PLACE to establish a unique context with which to distinguish between two TOPOGRAPHICAL PLACEs with the same name.

3.1.92
TRAIN – Transmodel
vehicle composed of TRAIN ELEMENTs in a certain order, i.e. of wagons assembled together and propelled by a locomotive or one or more of the wagons

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3.1.93
TRAIN BLOCK – Transmodel
composite train formed of several TRAIN BLOCK PARTs coupled together during a certain period

NOTE Any coupling or separation action marks the start of a new TRAIN BLOCK.

3.1.94
TRAIN BLOCK PART – Transmodel
component of a vehicle TRAIN BLOCK

3.1.95
TRAIN ELEMENT – Transmodel
elementary component of a TRAIN

EXAMPLES Wagon or locomotive.

3.1.96
TRAIN STOP POINT ASSIGNMENT– IFOPT
association of a TRAIN, TRAIN BLOCK PART or TRAIN ELEMENT at a SCHEDULED STOP POINT with a specific STOP PLACE and also possibly a QUAY and BOARDING POSITION

3.1.97
TRANSPORT MODE – Transmodel
characterisation of the operation according to the means of transport (e.g. bus, tram, metro, train, ferry, ship)

3.1.98
TYPE OF STOP PLACE – IFOPT
classification of STOP PLACEs, indicating in particular the mode of transport (rail station, airport, etc.)

3.1.99
TYPE OF TOPOGRAPHICAL PLACE – IFOPT
classification of the TOPOGRAPHICAL PLACES according to their size and relevance for different types of journey planning

3.1.100
USER NEED – IFOPT
ACCESSIBILITY requirement of a passenger, for example, that they are unable to navigate stairs, or lifts, or have visual or auditory impairments

3.1.101
VALIDITY CONDITION – Transmodel
condition used in order to characterise a given VERSION of a VERSION FRAME

NOTE A VALIDITY CONDITION consists of a parameter (e.g. date, triggering event, etc.) and its type of application (e.g. for, from, until, etc.).

3.1.102
VEHICLE– Transmodel
public transport vehicle used for carrying passengers

3.1.103
VEHICLE EQUIPMENT PROFILE – Transmodel
each instantiation of this entity gives the number of items of one TYPE OF EQUIPMENT a VEHICLE MODEL should contain for a given PURPOSE OF EQUIPMENT PROFILE

NOTE The set of instantiations for one VEHICLE MODEL and one purpose gives one complete "profile".

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3.1.104
VEHICLE MODEL – Transmodel
classification of public transport vehicles of the same VEHICLE TYPE, e.g. according to equipment specifications or of a particular model

3.1.105
VEHICLE POSITION ALIGNMENT– IFOPT
alignment of a particular BOARDING POSITION with the entrance of a VEHICLE as the result of positioning the VEHICLE at a particular VEHICLE STOPPING PLACE

3.1.106
VEHICLE STOPPING PLACE – IFOPT
place on the vehicle trackway where vehicles stop in order for passengers to board or alight from a vehicle

NOTE A vehicle trackway is located on the respective INFRASTUCTURE LINK for the MODE (RAILWAY ELEMENT of rail network, ROAD ELEMENT of road network, etc.). A VEHICLE STOPPING PLACE may be served by one or more QUAYs.

3.1.107
VEHICLE QUAY ALIGNMENT– IFOPT
alignment of a particular QUAY with a vehicle as the result of positioning a VEHICLE at a particular VEHICLE STOPPING PLACE

3.1.108
VEHICLE STOPPING POINT ASSIGNMENT– IFOPT
association of a SCHEDULED STOP POINT (e.g. a STOP POINT of a SERVICE PATTERN or JOURNEY PATTERN) with a specific VEHICLE STOPPING PLACE, or VEHICLE STOPPING POSITION within a STOP PLACE

NOTE May be subject to a VALIDITY CONDITION.

3.1.109
VEHICLE STOPPING POSITION – IFOPT (SIRI attribute)
stopping position of a vehicle or one of its components as a Location

NOTE 1 May be specified as a ZONE corresponding to the bounding polygon of the vehicle, or one or more POINTs corresponding to parts of the vehicle such as a door.

NOTE 2 If given as a single point, indicates the position for the door relative to an indicated side of the vehicle.

3.1.110
VEHICLE TYPE – Transmodel
classification of public transport vehicles according to the vehicle scheduling requirements in mode and capacity (e.g. standard bus, double-deck)

3.1.111
VERSION– Transmodel
group of operational data instances which share the same VALIDITY CONDITIONs

NOTE 1 A version belongs to a unique VERSION FRAME and is characterised by a unique TYPE OF VERSION, e.g. NETWORK VERSION for Line 12 starting from 2000-01-01.

NOTE 2 In SIRI Interface Versions are also used for software release levels.

3.1.112
VERSION FRAME – Transmodel
set of VERSIONS referring to the same DATA SYSTEM and belonging to the same TYPE OF FRAME

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NOTE 1 A FRAME may be restricted by VALIDITY CONDITIONs.

NOTE 2 In IFOPT, used to group elements such as STOP PLACEs, STOP PLACE SPACEs and PATH LINKs into a common model version when each item does not have its own version.

3.2 Communications & Software Concepts

NOTE This subclause describes Software concepts relevant for describing the representation or exchange of data models. For each term, it is indicated whether the term derives from general software usage, or whether the term is specific to IFOPT.

3.2.1
ABSTRACT CLASS – General Software Term
generic type that describes common properties shared by a number of specific concrete subtypes that conform to the supertype though an inheritance relationship

NOTE Properties of abstract classes, both attributes and methods, are inherited by all their subtypes. In the UML diagrams, abstract classes are shown with names in italics and the inheritance arrow (Open white triangle) is used to indicate a subtyping relationship.

3.2.2
NAMESPACE – General Software Term
well defined named scope within which a set of unambiguous, i.e. unique, identifiers for a given entity type or types may be distinguished

NOTE Separate namespaces are allowed in IFOPT for various types of reference data, for example, STOP PLACE COMPONENTs, POINTS OF INTEREST, ADMINISTRATIVE AREAs. Namespace is also used as a technical term within XML in a related sense, to identify the scope within which XML elements, and attribute names are unique.

4 Symbols (and abbreviated terms)

AVL Automated Vehicle Location

AVMS Automated Vehicle Management System

GIS Geographical Information System

GDF Geographic data format

HTTP HyperText Transfer Protocol

IANA Internet Assigned Numbers Authority

IATA International Air Transport Association

IETF Internet Engineering Task Force

ISO International Standards Organisation

POI Point of Interest

PT Public Transport

SIRI Service Interface for Real-time Information

TRIDENT TRansport Intermodality Data sharing and Exchange NeTworks

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UML	Unified Modelling Language
URL	Universal Resource Locator
VDV	Verband Deutscher Verkehrsunternehmen (D)
W3C	World Wide Web Consortium
WGS	World Geodetic Standard
XHTML	Extensible Hyper Text Mark-up Language
XML	eXtensible Mark-up Language
XSD	XML Schema Document

5 Use Cases for Stop Point Data

5.1 General

Fixed Object data, including Stop, connection path and Point of Interest Data has a very wide variety of uses in PT info systems. The relationship between physical stop points and complex features (i.e. stations and other interchange points) is relevant for timetabling, journey planning and real time operations, both to identify points on the network, and to describe interchange paths. Both exact and approximate stop naming strategies need to be supported.

The following Use Cases illustrate functional cases for using Fixed Object data in PT information systems and provide specific scenarios that the IFOPT model is intended to support.

The Use Cases are organised under

a) Primary Use Cases:

   1) Timetable preparation & Scheduling Systems;

   2) Journey Planning;

   3) AVL systems and real-time information providers;

b) Secondary Use Cases:

   1) Public Transport operations;

   2) Urban Traffic Management Control systems;

   3) Geographic Information Systems Use Cases;

   4) Local Authorities;

   5) Other;

c) General Use Cases;

d) Excluded Use Cases.

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The same use cases may be used both in centralised and in decentralised organisations, for example to plan and manage the exchange of data between a central database or distributed databases. The roles may be undertaken by responsible authorities themselves, or procured from external suppliers.

5.2 Use Cases: Timetable Preparation & Scheduling Systems

5.2.1 General

The following Use Cases describe the use of Fixed Object data for the preparation of timetables and schedules.

5.2.2 SCHED#01 Identifying the stops and connection stops in a PT network when creating a schedule

Schedulers of Public Transport timetables plan and schedule journeys for PT vehicles that will move between designated stops and timing points. To do this the stops and timing points must be given unique identifiers that can be used to reference unambiguously the scheduled stopping points of the journey. The identifiers for internal scheduling and operational use may be different from those given out on the timetable or other information to the public. Public identifiers may comprise a label, a short code, a long code or all three.

EXAMPLE 1 "*London Heathrow", "Heathrow", "LHR",* 4900345671, or *"Kings Cross", "Kings Cross Rail Station", "KGX",* and *"9100KINGX*".

Timing points that are not stops are not normally published to the public but will still need to be identified internally. There may be multiple internal identifiers for the same stop point relating to reservation, operation or control systems.

A scheduled stop point is, in effect, a planned break in the journey for alighting or boarding that may be, but is not necessarily, related to an actual physical stop point. For example, for scheduled stops at large stations the vehicle journey may be additionally assigned to a specific platform or stance within the station.

EXAMPLE 2 *"Kings Cross, Platform 9".*

The scheduled stop point exists independently of this assignment, which may change when the vehicle journey occurs.

To prepare a schedule, a scheduler normally will begin by creating a service pattern, a list of the designated stops points in sequence that defines a route. Where an existing set of reusable stop points already exists, the list will be selected from these existing points. If there is no general system the stops will be assigned arbitrary names on an ad hoc basis, and identifiers allocated from a designated name scope. If the schedule involves a new stop there may be a need to define a stop and allocate new identifiers.

The definition of the route may be identified and exchanged independently of the timetable.

5.2.3 SCHED#02 Identifying the stops in a timetable or for a particular Vehicle Journey when creating a schedule

Once the route and service pattern is established as a list of stops, the scheduler will add timings to create a journey pattern for making each journey, followed by specific vehicle journeys that traverse the route using the journey pattern at a designated times. Default platforms at each stop may be assigned at the same or a later time.

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5.2.4 SCHED#03 Identifying the interchange and connection points in journeys when creating a schedule

Places in the network where there is a possibility of making a transfer may be designated as interchanges and explicitly identified by connection links or other grouping mechanisms that associate stop points. To represent the possibility of transfer between two stop points, schedulers may create Connection Links which may have unique identifiers within the system so that they may be reused. Connections may also be made between services using the same stop point. Connection Links ideally should represent the physical movement between stop points; any contingency time at the connection point to allow for irregular operation of services should be identified separately.

Certain connection points may be favoured over others and be assigned weightings.

5.2.5 SCHED#04 To schedule services between the stops, allowing adequate time for connections

In creating a schedule, schedulers will try to plan the overall timetable for the network so that there are convenient connections between different vehicle journeys on different routes that give sufficient but not excessive buffer times between journeys.

Having identified designated connection points as per SCHED#03, to indicate that there is a planned interchange between vehicle journeys in a timetable, schedulers will create an interchange record that references a connection link and may provide attributes (as to the timing and nature advertised, guaranteed, etc.) of the journey interchange. Depending on the sophistication of the scheduling system, the individual timings required for transfers between different stop areas or stop points within an interchange may be taken into account or just an average time for any transfer at the station may be used.

Journey planners and other applications subsequently may use the interchange and/or connection information to find suitable journeys.

5.2.6 SCHED#05 To plan transfer margins for guaranteed connections between services

The Scheduler may give the connection link and interchange record created in SCHED#04, specific properties to support the management of guaranteed connections. These will be used subsequently by AVMS systems.

5.2.7 SCHED#06 To relate physical stops with complex features such as stations

In preparing a schedule that has a scheduled stop point at a large station or interchange, schedulers may need to give an indication of where in the interchange each stopping point is located. This advice may be given at various levels.

EXAMPLE "Waterloo", "Waterloo East", "Waterloo East platform 6".

In planning schedules, transfer times may be material, in which case normal transfer times for different types of user will need to be recorded.

5.2.8 SCHED#07 To plan use of platforms so that sections of a train may be related to sections of the platform

Accommodation on trains is not always the same in each section − first class seating, catering accommodation, sleeping accommodation, etc. will be allocated to different sections of a train. In some cases trains will be split or combined during the journey − so passengers making journeys between two stopping points may need to be in a particular section of a train. Also on Express trains, tickets are also often pre-assigned to a specific seat in a specific carriage. Both of these situations lead to a need to identify to the public the section(s) of the stopping point (platform) at which a section

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of a train with relevant features will stop. This may be in formats such as "platform 3, front part of the train" or "platform 3, yellow zone" or "Platform 3, section D".

5.2.9 SCHED#08 To plan the shared use by different trains at the same time of the same single platform that is broken down into sectors

At some major rail stations it is possible for a single "platform" to be occupied by more than one separate train, each departing at a different time for different destinations. This is a special version of SCHED#07. The platform may have a secondary split into sectors "platform 4A", "platform 4B", to indicate to passengers where they should stand in order to board their designated carriage efficiently, or to access the correct part of a multi-part train.

5.2.10 SCHED#09 To plan for flexible pick up points for demand responsive and other services

Demand responsive services, and Hail & Ride services, seek to serve passengers by stopping at a location close to their door on a pre-ordained route. That route may be one which is followed regularly, or it may be one that is created dynamically for each journey to meet specific passenger requirements that have been booked in advance. In these cases there are both operational and public information needs to be able to identify stopping places which may represent a linear section of a predetermined route, or a zone of streets, on which the vehicle will stop on one or more occasions as necessary on an individual vehicle journey. There is a need both for codes for such stops and labels that can be used for the public provision of information.

5.2.11 SCHED#10 To assign labels for destinations, places, and stops, for use in destination boards, stops, tickets, on-board displays, announcements, etc.

Schedulers need to assign consistent unambiguous names to stops, and stop points, on all forms of printed and electronic media. Normally there will be a number of canonical labels to use for different media types and footprints, such as a short name (e.g. "*Kings Cross"*), a long name (e.g. "*London Kings Cross Station"*), a name to print on tickets, (e.g. "*London Kings Cross"*)a name to use in SMS messages (e.g. "*KingsX"*), etc. Typically systems will hold a set of definitive labels that follow uniform typographical and spelling conventions for example as to hyphenation, capitalisation, use of abbreviations, etc.

EXAMPLE 1 Frankfurt a. m. vs. Frankfurt am M., or St. Jean-en-Provence vs. St Jean en Provence.

This is to ensure a consistent brand, for the service provider and to make the presentation of lists of similar names ergonomic to the user.

Different delivery systems will need to compose different labels for the same stop in different contexts. Where there are identical or similarly-named elements it may be necessary to include additional qualifiers such as the name of the administrative area to discriminate between them.

Destination displays on buses and on signs at stop points may be constrained to be within a limited number of characters, and formatted in a style which is appropriate to the context of the service being provided. A destination may be described differently between a local service and a long-distance one.

EXAMPLE 2 Consider two services heading for "*Bristol, Marlborough Street Bus Station"* − the local service within Bristol will not state the name of the town, for instance, and just say *"Marlborough Street Bus Station"*, whilst the long-distance service may only state the name of the town and ignore the detail of where in the town the service stops, "*Bristol*".

AVL systems will use these same headings for dynamic displays.

Mechanisms are needed to distribute changes to reflect renaming and the addition of new stops.

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5.3 Use Cases: Journey Planning

5.3.1 General

The following Use Cases describe the use of Fixed Object data for journey planning.

5.3.2 JP#01 To identify Stops and Stations used by PT transport networks

Journey planning systems reference stops and stations in many different ways; both associating them with topographical and address data to support place finding, and describing the scheduled stop points of the journey. Suppliers of journey planning systems typically must assemble topographical address, stop and timetable data into a normalised format in order to transform it into the internal representation used by their journey planning engines. Stop data provides a crucial role in this process as it constitutes a separate and distinct information layer that can be used to relate timetable data to GIS data layers.

5.3.3 JP#02 To find stops and stations for a place (point, locality, or general area)

Passengers using journey planning systems will need to find the nearest points of access to PT for the origin and destination of their trip. They may not necessarily know of the existence of, let alone the name of, the relevant stop or stopping point, and may use a variety of strategies to indicate their location: entering a point of interest name, a place name, an address or postcode, or clicking on a map. The journey planner will use gazetteers and other mechanism to make a location-based search to find the nearest stop or stops that may be relevant In order to be able to do this the journey planner must be able to relate the stop to a GIS context and/or to associate it with a topographical name.

Journey planners may support multiple aliases for both places and stops.

EXAMPLE "London Kings Cross", "Kings Cross", "Kings Cross station".

The precision of the search may vary widely in different contexts. To take a local bus the passenger will be interested in a few stops within easy walking distance. For long-distance travel passengers may tolerate a much larger search area: typically journey planners will support specific PT related concepts of place such as "*London any airport*" or "*London (any mainline station*)".

5.3.4 JP#03 To find PT services available for travelling to or from a place

Often a passenger will be interested in knowing the services available at a specific stop. Having found a stop (either by a location based search or by explicitly entering a name or public stop code), a passenger will be shown the services available at the stop. This could be either as a departure board, or as a list of modes (for example to see how they might travel to an airport). The stop may be identified either by its canonical name, public short code or both − thus providing a means of familiarising passengers with the alternative ways of accessing information about the stop place. The results will also show the destinations of different services as either place names, stop names or Point of Interest names.

5.3.5 JP#04 To find PT services available for travelling to or from a specific POI

The passenger's goal will often be a Point of Interest, not a stop. They may use a stop finder to find the stop nearest to the POI, and then look at the timetable of services to or from that stop, as per JP#03.

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5.3.6 JP#05 To describe the relation of the stop to nearby objects and landmarks to help identify them to the public

A journey planner needs to be able to offer a passenger detailed guidance on how to find a stop. The name of a stop may be additionally labelled or qualified in terms of places or POIs in the immediate vicinity. Map based presentations may show the relative positioning and access paths needed to reach the stop in relation to landmarks and Points of Interest.

5.3.7 JP#06 To relate physical access points (entrances) with complex features such as stations and POIs

Large transport interchanges and POIs may have a number of different entrances, addresses, parking areas etc and a journey planner may need to indicate to the user which entrance they should use and how to identify it in relation to the urban context.

5.3.8 JP#07 To plan journeys between places

Passengers may often wish to use topographical place names to state their travel objectives.

EXAMPLE "Cambridge to Oxford".

The topographical scope may be quite large, for example "London to Paris" reflecting considerable flexibility in the user's choice of stops. The journey planner needs to be able to associate topographical places with stop places at different scales appropriate to the scale and mode of travel, and in accordance with common sense notions of place − for example airports may be outside the physical boundaries of city, but are the air access point stops to the city. A within-city journey would consider local stations, whilst an intercity journey would consider mainline termini as the starting points.

5.3.9 JP#08 To plan journeys to the entrance points of POIs which are large enough to have multiple access points with different journey opportunities

Often a passenger will be interested in knowing the services available to reach a specific POI. They may use the POI as a destination a journey planner. For large POIs the journey planner may consider all the access points to the POI and then offer the passenger a number of journey options to go to all or some of the stops closest to the access points. The passenger may specify additional constraints such as wheelchair use that further limit the journey planning.

5.3.10 JP#09 To describe the stops of a journey or trip

Journey planners provide passengers with both summary and detailed itineraries that describe the way points on their journey. The stop names and any public codes shown on the itinerary should correspond to the signage used on the stops so that users can follow their progress. The departure stop, interchange points and sometimes the arrival stop may also include the platform identifier.

5.3.11 JP#10 To identify stop points when exchanging data between distributed journey planners

For large scale distributed Journey planning, networks of separate regional journey planners exchange queries and results collaboratively in order to establish a multiregional journey plan. In order to do this they must be able to use common identifiers for stops and locations. For efficient computation certain stops or other points in the transport network will be distinguished as points known to both engines.

5.3.12 JP#11 To plan journeys through the network, including detailed connection times

In planning a multi-leg Journey plan through a network, a journey planner will take into account the transfer time needed to transfer between services at an interchange point. Depending on the

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sophistication of the journey planning system and the availability of data, the individual timings required for transfers between different stop areas or stop points within an interchange may be taken into account or just an average time for any transfer at the station may be used.

Journeys may be made passengers on foot, on a bicycle, in a car or using a combination, for example park and ride or kiss and ride. The stop model should support journey planning of intermodal journeys.

5.3.13 JP#12 To plan journeys through the network, including detailed connection times, under different constraints for mobility restricted users

As a refinement to JP#11, in planning a multi-leg trip through a network, a journey planner may additionally take into account the accessibility requirements and different transfer times needed for different types of user, with different walk speeds or other needs, in particular for impaired mobility accessibility. Depending on the sophistication of the journey planning system and the availability of data, the individual timings required for transfers between different stop areas or stop points within an interchange using specifically identified navigation paths and accessibility needs may be taken into account or just an average time for any transfer at the station may be used, scaled to a particular walk speed.

5.3.14 JP#13 To provide detailed guidance for making an interchange between two services over a connection

Journey planners providing journey plans for journeys involving the traversal of large interchanges will be concerned to provide detailed guidance on the navigation of the interchanges, typically as step by step instructions that can be related to the signage found within the interchange. Depending on the sophistication of the journey planning system and the availability of data, the individual paths required for transfers between different stop areas or stop points within an interchange using specifically identified navigation paths and accessibility needs may be given.

5.3.15 JP#14 Stop Finding for complex stop types

Some stops do not have simple point geometries.

EXAMPLE

— Hail and Ride sections: these will typically be a contiguous section of road marked by a start and end point;

— Flexible zones: these will typically be arbitrary polygons;

— Variable bays: these will be dynamically allocated bay assignments within a bus station.

Journey planners will typically use additional mechanism to find such stops and additional labels to describe such stops.

5.4 Use Cases: AVMS and Real-time Information Providers

5.4.1 General

The following Use Cases describe the use of Fixed Object data for real-time AVMS services.

5.4.2 RT#01 To identify monitoring points to the public as stations/stops/platforms

AVL systems will typically make predictions for vehicle progress against agreed monitoring points (i.e. timing points covered by the AVL system). For those monitoring points that are associated with stop places, the public will want to find the departure and arrival boards.

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5.4.3 RT#02 To identify the monitoring points exchanged between different AVL systems

Different AVL systems exchanging information about buses roaming between their respective coverage areas will want to exchange information about arrival and departures at monitoring points and predictions for vehicle progress in order to include roaming buses in stop displays. To do this they need a mutually agreed set of monitoring points that are either the same as, or can be associated with, the known stop places and stop place components.

5.4.4 RT#03 To identify the relationship of the monitoring points to other points in an interchange

In order to provide effective real-time information to the public, AVL systems must understand the relationship between the monitoring points in an interchange and the physical layout of the interchange, including the actual quays and boarding positions.

5.4.5 RT#04 To manage the connections between stop points at an interchange

A particular concern of AVL systems exchanging information about connecting services is to relate the real-time connection information with the relative physical locations of stops in an interchange so as to be able to allow for accurate transfer times. This is especially important for large interchanges where there may be a big difference between near and far transfers.

5.4.6 RT#05 To report progress and predictions against monitoring points for on-board and off-vehicle information systems

One of the ways AVL systems inform passengers is to predict arrival at the calling points of a vehicle journey. This requires a model of the stop points and of their relationship to the monitoring points that can be understood by the passengers

5.4.7 RT#06 To manage guaranteed connections, allowing for connection times at the interchange

Some AVL systems support the automatic management of guaranteed connections with predefined margins of tolerance. To do this they need to exchange information about connecting feeder and distributor services in relation to the interchange's stop points.

5.5 Use Cases: Public Transport Operations

5.5.1 OPS#01 To relate signage and labels to infrastructure management systems

The installation and maintenance of stop and station fixtures includes the provision of stop labels and other signage with which passengers can orient themselves within the physical infrastructure. The work of maintenance teams placing signs is typically supported by asset management databases, which relate Equipment and other assets to the inventory and other systems and the workflow to be performed. Such systems need to be able to access and exchange fixed object data, in particular for Stop Places.

5.5.2 OPS#02 To relate situations to the network and to journeys in the network

Real-time incident capture systems (ICS) gather information about planned and unplanned disruptions to the network as structured situation messages, which are then distributed to dissemination channels such as in-station displays, on-board displays, online travel news, alert systems and journey planners. In order to be able to classify situation data and to associate it with the affected services, stations and lines in a way that downstream computers systems can process the situation content, it is necessary to tag it with appropriate fixed object data such as the stop points or connection links that are affected by the situation. Typically ICS allow the selection of station names and line connections. These are

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then translated to stop point codes and path codes in the situation location model and transmitted to other systems which make use of the same model and code sets to process the situation.

5.6 Use Cases: Urban Traffic Management Control systems

5.6.1 UTMC#01 To manage the traffic for an area including through a particular stop or interchange

Urban Traffic Management Control systems seek to optimise the flow of traffic over a road network, often giving precedence to public transport vehicles which provide a more efficient method of transporting large numbers of users, for example, giving buses priority at traffic lights. The real-time position of the buses in relation to their monitoring points is a useful input to such systems. Real-time data will typically be exchanged in relation to agreed points. The monitoring points and stop points for vehicles are therefore relevant to such systems.

5.6.2 UTMC#02 To report disruptions within the network in relation to specific stops or arrivals at a stop

UTMC systems may be concerned to relate specific disruptions with specific known stops. For example to identify public transport stops affected by traffic disruptions. Real-time data will typically be exchanged in relation to agreed points. Real-time data may include both structured Situation and data as to the real-time progress of vehicles and factors affecting the progress of vehicles at known stop places.

5.7 Use Cases: Geographic Information Systems

5.7.1 GIS#01 To show stops on a map

Stop Places and Stop Points are significant features on maps. Typically geocoded stop point data will be distributed as bulk data files to the map suppliers who will transform it into the representation used in their datasets.

5.7.2 GIS#02 To show signs on maps and Virtual-reality displays

Some kinds of map guidance or personal navigation systems may wish to show the signs or sign textual content that appears to a user at a particular location as part of an interactive visualisation in two or three dimensions.

5.8 Use Cases: Local Authorities

5.8.1 General

The following use cases describe the use of Fixed Object data for transport planning purposes.

5.8.2 LA#01 To plan and understand the PT Coverage of an area

In order to model and plan the adequate supply of Public Transport services within a Region in detail, a precise model of the location of stop places for different public transport modes is needed. This can be used to relate the frequency and timing of transport services with local infrastructure and demographics. Typically geocoded stop point and point of interest data will be distributed as bulk data files for analysis and cross correlation with other data sets.

This may include both immediate access to local points and a larger scale analysis of accessibility of connectivity between areas.

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5.8.3 LA#02 To plan and understand the accessibility of an area

In order to plan the adequate accessibility on the PT service within a region, a detailed model of actual accessibility is needed.

5.8.4 LA#03 To show the available PT points for Tourist and Residential Attractions

Information services have a very common requirement to give advice on the use of public transport to reach both tourist attractions and places of interest to residents, such as universities, law courts, police stations, etc. This requires stop data, point of interest data and information about the access links which connect them. Data will be disseminated to users by on-line self-service systems using maps and journey planners, printed material prepared from databases, and by call- and information-centre staff with access to systems. Particular uses include:

— Available PT points for workers to reach their work places;

— Available PT points for pupils and students to reach schools and universities;

— Available PT points for shopper to reach shopping facilities;

— Available PT points to reach leisure areas.

5.9 Use Cases: Other

5.9.1 OTH#01 Estate Agents − to show the relationship between stops and properties

Access to public transport is an important consideration for many house purchases and real-estate agents and information services have a common requirement to be able to show the relationship of properties to access points to public transport services and to Points of Interest. Typically the stop data sets will be included in the map data sets that are used to provide particulars for houses.

5.9.2 OTH#02 To show the relationship between stops and business premises

Access to public transport is of importance to a variety of businesses in order to inform current and future employees of transportation options and to inform customers of the business location related to the PT network.

5.10 General Use Cases

5.10.1 General

Some general use cases are common to many other cases and include the following.

5.10.2 GEN#01 Distributed assignment of responsibility for Data Management

The data sets covered by IFOPT are large and belong to many different stakeholders. The task of gathering, collating and aggregating the data necessarily must be distributed among many different organisations. Some degree of central coordination is needed to agree who is responsible for which type of data, to agree common interfaces, and to agree the partition of code namespaces so that data coded to a common standard can be aggregated without clashes as to the unique identifiers.

5.10.3 GEN#02 Temporal Change in Stop Availability

Systems must allow for the temporal change of stop availability or accessibility, through the addition or closing of stops or the reassigning of scheduled stop points from one physical location to another – the

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moving of stops, or by alterations to accessibility. Typically such changes are planned in advance and can be distributed with a validity condition along with other updates to the stop data.

5.10.4 GEN#03 National Language Support

Systems that display or accept textual labels may need to allow for alternative names in different National languages for textual names for entities and their terms of relationship. Typically systems will be coded in a primary language and aliases will be added for other languages, tagged with a language code.

5.10.5 GEN#04 Stop Finding

The task of Stop finding and disambiguation using text or map interfaces is common to many different type of online-systems, and the Fixed Object models should facilitate the reuse of common consistent components. Typically a given journey planner will use a consistent stop finder component for finding places. Similar consistency is needed on paper based presentations that will use standard labels and abbreviations for stops.

5.10.6 GEN#05 Incremental Data Exchange

Fixed object data sets involve large qualities of data collected from many different systems. To coordinate the management of such data it is normal practice to use change attributes to allow the reconciliation of changes made in different places. This enables the incremental exchange of data.

5.11 Excluded Use Cases

The Fixed Object Standard does not yet consider the following uses which will be considered for inclusion in a subsequent Part of this technical standard: See discussion in 1.2.

— Traffic Light prioritisation and control of Roadside Traffic Management Equipment;

— Road crossings and road interchange data;

— Detailed use of Parking for passengers and vehicles;

— Complex relation of Fare or Tariff Zones to Stops and Stop Points.

The use cases defined in 5.2– 5.10 may also be updated in subsequent parts of this Technical Specification to achieve further harmonisation with DATEX2 and TPEG.

6 Stop Place Model

6.1 General

The Stop Place Model describes the detailed physical structure of a Transport Interchange as a conceptual model of nodes and links that can be used to compute a navigable path for a passenger.

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6.2 Physical Models

6.2.1 Example: Modelling a Railway Station

6.2.1.1 General

Figure 3, and its more detailed diagrams, Figure 4, Figure 5 and Figure 6, show an example of the physical layout of a Railway Station, a typically complex type of STOP PLACE that has both rail, bus and taxi components. The interchange has a TYPE OF STOP PLACE of "railway station". It can be considered to be made up of two distinct sets of elements: those modelling the PT vehicle and trackways: and those modelling the passenger areas.

a) The ***PT Vehicle Area*** model comprises elements concerned with Vehicles and Trackways:

   1) RAILWAY ELEMENTs (linking to the Rail Network infrastructure model as described in Transmodel by RAILWAY JUNCTION, etc.), and ROAD ELEMENTS, including ENTRANCEs FOR VEHICLES, VEHICLE STOPPING PLACEs, and VEHICLE STOPPING POSITIONs within the stop place;

   2) Movable PT elements including VEHICLEs (and their more specialised TRAIN & TRAIN ELEMENT entities), which may also have ENTRANCEs TO VEHICLE that are the boarding points, and VEHICLE EQUIPMENT (such as low floors, etc., relevant for accessibility);

b) The ***Passenger Area*** model comprises two main types of STOP PLACE SPACE component reflecting the physical structure of a station: QUAYs (providing access to PT Vehicles), and ACCESS SPACEs (providing access to QUAYs and urban infrastructure, but no direct access to PT VEHICLEs):

   1) QUAYs may also contain other QUAYs, thus there might be a parent QUAY for the whole surface, and then child QUAYs for each edge or even part of an edge;

   2) Within QUAYs there may be designated BOARDING POSITIONs;

   3) QUAYs and ACCESS SPACEs may have designated QUAY ENTRANCEs and ACCESS SPACE ENTRANCEs respectively. The modes of access of ENTRANCES (e.g. foot, cycle, taxi) may be specified;

   4) Possible routes between STOP PLACE SPACEs are represented by STOP PATH LINKs, which connect QUAYs, ACCESS SPACEs and BOARDING POSITIONs. STOP PATH LINKs may have transit duration times associated with them including those relevant to ACCESSIBILITY LIMITATION or CHECKPOINTs. There may be more than one STOP PATH LINK between the same pair of STOP PLACE SPACEs, reflecting different routes, with different accessibility and other impediments;

   5) Not all STOP PATH LINKs or STOP PLACE SPACEs may be suitable for transit by all types of user. ACCESSIBILITY LIMITATIONs may be associated with a STOP PATH LINK to indicate the nature of the ACCESSIBILITY, for example, "*No Wheelchair Access, Step Use Required, Lift Use Required, Escalator Use Required, Lift Available, Escalator Available*". The values are chosen so that a planner efficiently ascertains whether the route can be navigated

      i) by a wheelchair;

      ii) by someone requiring step-free access;

      iii) by someone unable to use lifts;

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iv) by someone unable to use moving travelators.

Within the Station two NAVIGATION PATHs are shown that connect a sequence of ACCESS SPACEs, and QUAYs with STOP PATH LINKs, using specific ENTRANCEs. One path, representing a journey that starts at the STOP PLACE, runs from an external entrance.

6.2.1.2 Example: Illustration of a Hypothetical Rail Station

Schematic examples of a hypothetical station with areas labelled with the Fixed Object element are shown in the following four diagrams:

— Figure 3: Overview diagram of physical layout a Station with multimodal interchange;

— Figure 4: Detail diagram of part of TRACK and QUAY area;

— Figure 5: Detail diagram of part of Set-down, Entrance and Booking hall access spaces;

— Figure 6: Detail of Taxi Rank and Concourse Area.

Illustrations of a station with areas labelled with the Fixed Object element are shown in the following four diagrams.

6.2.1.3 Example: Illustrations of Actual Rail Stations

Some real-world examples of rail station maps at a number of different scales show particular aspects of the Stop Place Model in a realistic context.

— Figure 7: shows a Rail and bus station interchange for *Gelsenkirchen* at a high level;

— Figure 8: shows a more detailed view of an external entrance and access space for *Gelsenkirchen*;

— Figure 11: shows an internal path link between an ACCESS SPACE and a QUAY entrance at Gelsenkirchen main station;

— Figure 12: shows multimodal navigation from a Rail Station – the main rail station in Gothenburg.

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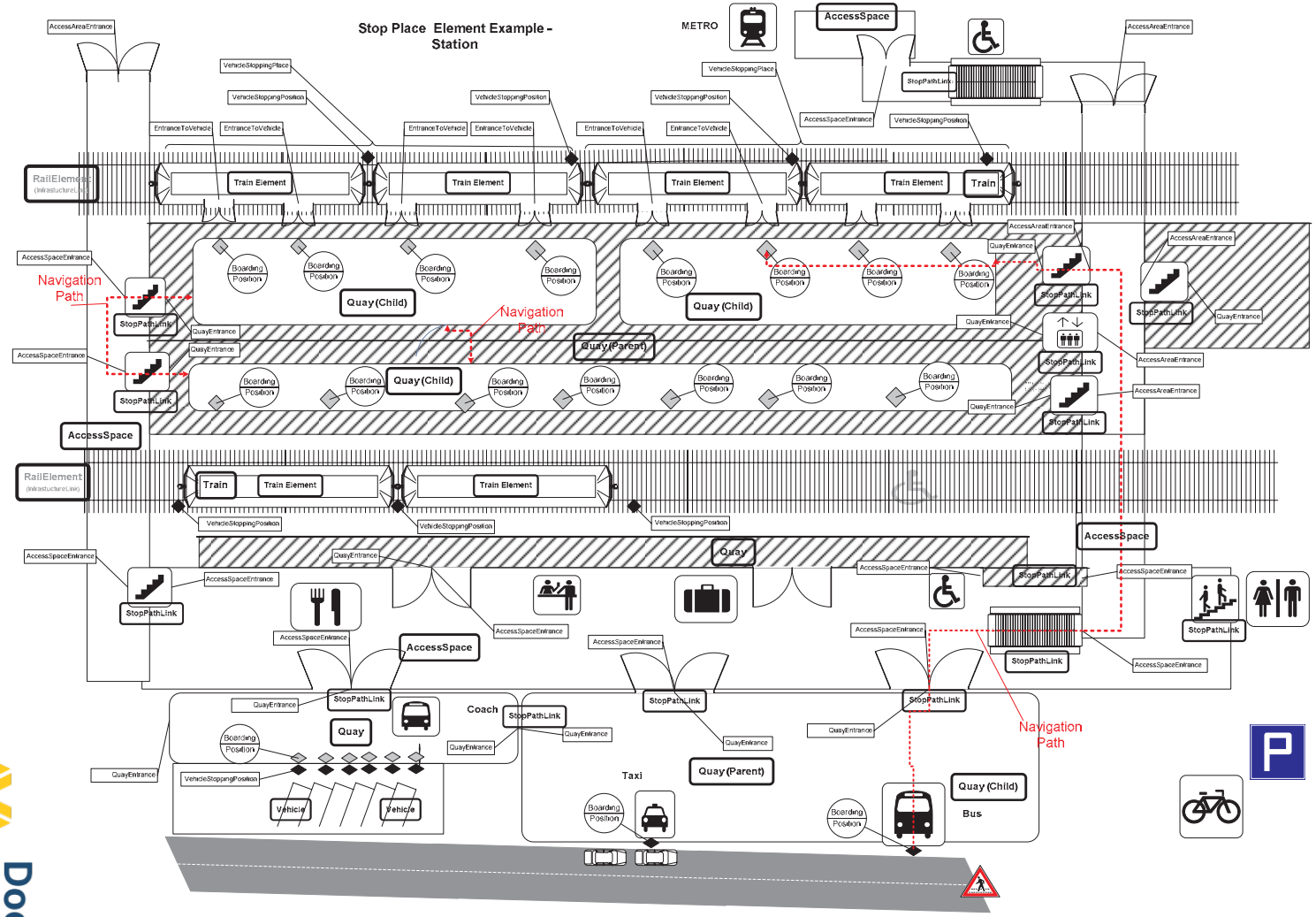

Figure 3 — Stop Place Example Physical layout

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