SLOVENSKI STANDARD
SIST EN 15531-1:2015

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Javni prevoz - Vmesnik za informiranje v realnem času za potrebe delovanja javnega prevoza - 1. del: Skladnost in okvir

Public transport - Service interface for real-time information relating to public transport operations - Part 1: Context and framework

Öffentlicher Verkehr - Serviceschnittstelle für Echtzeitinformationen bezogen auf Operationen im öffentlichen Verkehr - Teil 1: Kontext und Grundstruktur

Transport public - Interface de service pour les informations en temps réel relatives aux opérations de transport public - Partie 1 : Cadre et contexte

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ICS:

35.240.60	Uporabniške rešitve IT v transportu in trgovini	IT applications in transport and trade

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

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Supersedes CEN/TS 15531-1:2007

English Version

Public transport - Service interface for real-time information relating to public transport operations - Part 1: Context and framework

Transport public - Interface de service pour les informations en temps réel relatives aux opérations de transport public - Partie 1 : Cadre et contexte

Öffentlicher Verkehr - Serviceschnittstelle für Echtzeitinformationen bezogen auf Operationen im öffentlichen Verkehr - Teil 1: Kontext und Grundstruktur

This European Standard was approved by CEN on 20 June 2015.

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

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European foreword

This document (EN 15531-1:2015) has been prepared by Technical Committee CEN/TC 278 “Intelligent transport systems”, the secretariat of which is held by NEN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by February 2016 and conflicting national standards shall be withdrawn at the latest by February 2016.

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

This document supersedes CEN/TS 15531-1:2007.

SIRI (CEN/TS 15531-1:2007) has been a CEN Technical Specification since 2007 and has been widely used in Europe and elsewhere and proven its usefulness. This document proposes a revised version of SIRI as a CEN European Standard, and is currently submitted to the Formal Vote. The proposed revisions are minor enhancements arising from experience of the deployment of SIRI in many live systems. This document also clarifies the relationship of SIRI to NeTEx, the new CEN Technical Standard for the XML exchange of Public Transport Reference data based on the Transmodel CEN European Standard.

This document presents Part 1 of the European Standard known as “SIRI”. SIRI provides a framework for specifying communications and data exchange protocols for organizations wishing to exchange Real-time Information (RTI) relating to public transport operations.

The SIRI European Standard is presented in three parts:

— context and framework, including background, scope and role, normative references, terms and definitions, symbols and abbreviations, business context and use cases (Part 1),

— the mechanisms to be adopted for data exchange communications links (Part 2),

— data structures for a series of individual application interface modules PT, ET, ST, SM, VM, CT, CM, GM (Part 3).

Two additional parts define additional functional services as CEN Technical Specifications:

— additional data structures for additional application interface module FM (Part 4),

— additional data structures for additional application interface module SX (Part 5).

The XML schema can be downloaded from http://www.siri.org.uk/, along with available guidance on its use, example XML files, and case studies of national and local deployments.

It is recognized that SIRI is not complete as it stands, and from time to time will need to continue to be enhanced to add additional capabilities. It is therefore intended that a SIRI Management Group should continue to exist, at European level, based on the composition of SG7.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Introduction

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

This European Standard specifies a Service Interface for Real-time Information (SIRI) about Public Transport. It is intended to be used to exchange information between servers containing real-time public transport vehicle or journey time data. These include the control centres of transport operators and information systems that utilize real-time vehicle information, for example, to deliver services such as travel information.

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

This European Standard will improve a number of features of public transport information and service management:

— Interoperability – the European Standard will facilitate interoperability between information processing systems of the transport operators by: (i) introducing common architectures for message exchange; (ii) introducing a modular set of compatible information services for real-time vehicle information; (iii) using common data models and schemas for the messages exchanged for each service; and (iv) introducing a consistent approach to data management.

— Improved operations management – the European Standard will assist in better vehicle management by (i) allowing the precise tracking of both local and roaming vehicles; (ii) providing data that can be used to improve performance, such as the measurement of schedule adherence; and (iii) allowing the distribution of schedule updates and other messages in real-time.

— Delivery of real-time information to end-users – the European Standard will assist the economic provision of improved data by; (i) enabling the gathering and exchange of real-time data between AVMS systems; (ii) providing standardized, well defined interfaces that can be used to deliver data to a wide variety of distribution channels. Version 2.0 of SIRI includes a new Simple Web Service designed to support the widespread, massively scalable use of mobile devices and web browsers and other applications to display public transport data directly to users.

Technical advantages include the following:

— Reusing a common communication layer for all the various technical services enables cost-effective implementations, and makes the European Standard readily extensible in future.

History

Version 1.0 of SIRI was developed in 2004-2005 and submitted to vote, eventually passing through the CEN process to become an approved CEN Technical Specification in 2007. As well as the normative Version 1.0 XSD schema, successive informal working versions of the schema (v 1.1 – 1.4) were released to allow for fixes and to implement some very minor enhancements agreed by the working group. A WSDL version was also developed.

Version 2.0 of SIRI was developed in 2012 to coincide with making the SIRI standard a full CEN norm.

The changes in SIRI version 2.0 include:

a) consolidating the fixes and minor changes from SIRI in the informal working schemas;

b) dropping the flat groups provided for VDV;

NOTE Not backwards compatible.

c) clarifying a number of points of interpretation;

d) a small number of functional enhancements to the ET, PT, ST, SM, and VM services as agreed by the SIRI Working Group. See Readme for further details. For example for Prediction Quality. All such enhancements are marked ‘SIRI v2.0’ in this document;

e) updating and clarifying the use of terminology to relate to NeTEx and revised Transmodel usage;

f) adding the SIRI Simple Web Services “SIRI-LITE” as additional transport method;

g) adding a WSDL document literal version and a WSDL2 version;

h) revising the internal modularization of SIRI packages to improve maintainability, and a number of minor corrections to types;

i) reviewing the documentation to correct a number minor inconsistencies and errors.

Compatibility with previous versions

All changes except #2 above are intended to be fully backwards compatible, that is to say, existing documents that validate against earlier versions of the schema will also validate against the 2.0 schema without alteration (other than to schema version numbers), and version 2.0 documents that do not use new features will validate against earlier versions. Version 2.0 documents that use new features will not be backwards compatible.

1 Scope

1.1 Interfaces specified by this standard

1.1.1 Business context

Real-time information may be exchanged between a number of different organizations, or between different systems belonging to the same organization. Key interfaces include the following:

— Between public transport vehicle control centres – generally, for fleet and network management.

— Between a control centre and an information provision system – generally, to provide operational information for presentation to the public.

— Between information provision systems – generally, sharing information to ensure that publicly available information is complete and comprehensive.

— Between information provision systems – and data aggregation systems that collect and integrate data from many different sources and different types of data supplier and then distribute it onwards.

— Between information provision systems and passenger information devices such as mobile phones, web browsers, etc.

Annex B describes the business context for SIRI in more detail.

SIRI is intended for wide scale, distributed deployment by a wide variety of installations. In such circumstances it is often not practical to upgrade all the systems at the same time. SIRI therefore includes a formal versioning system that allows for the concurrent operation of different levels at the same time and a disciplined upgrade process.

In this general framework, SIRI defines a specific set of concrete functional services. The services separate the communication protocols from the message content (‘functional services’). This allows the same functional content to be exchanged using different transport mechanisms, and different patterns of exchange. Figure 1 below shows this diagrammatically.

1.1.2 SIRI communications

SIRI provides a coherent set of functional services for exchanging data for different aspects of PT operation. A common data model, based on Transmodel 5.1, is used across all services.

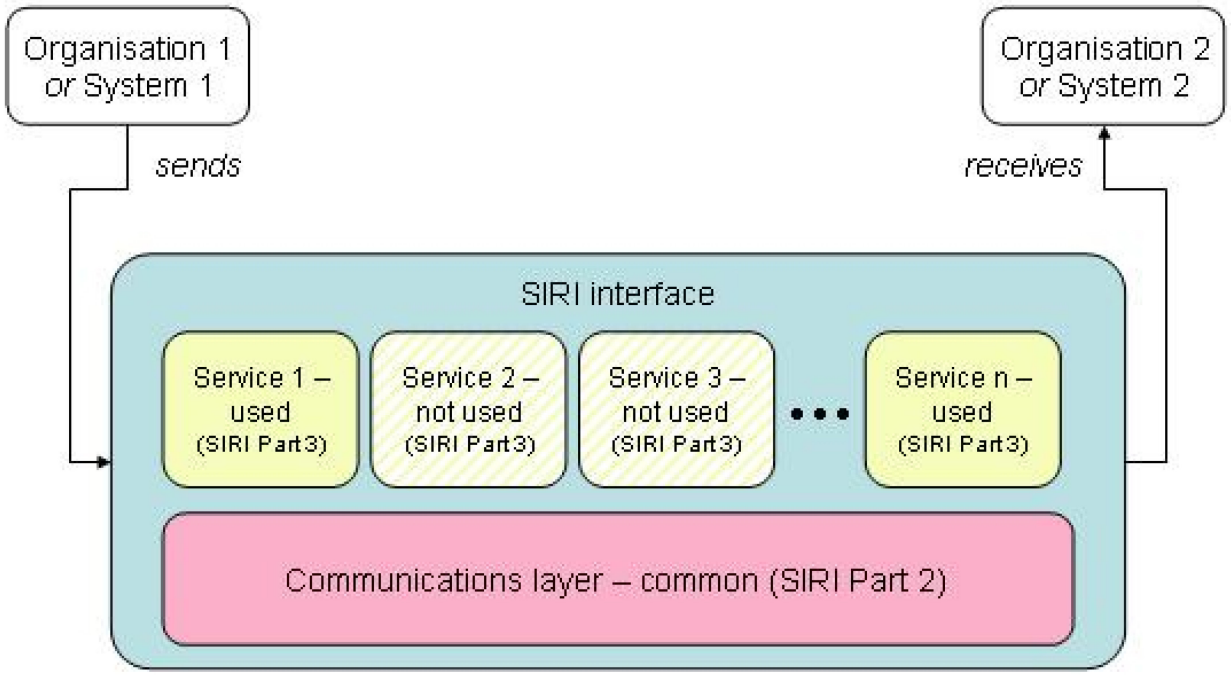

Figure 1 — Structure of SIRI: a set of optional service interface specifications using a common communications layer

A communication layer defines common procedures for the requesting and exchanging of data. Within SIRI, the same general communication protocols are used for all the different concrete functional interfaces, and specify a common infrastructure for message referencing, error handling, reset behaviour and so forth. The communications layer is defined in Part 2 of the SIRI document set.

To allow the most efficient use to be made of bandwidth and processing capacity, the SIRI communications architecture supports several different patterns of interaction. SIRI supports both request/response and publish/subscribe protocols between servers, allowing applications both to pull or to push data.

The SIRI publish/subscribe pattern of interaction follows the paradigm described in the W3C candidate standard 'Publish-Subscribe Notification for Web Services (WS-PubSub)'. SIRI uses the same separation of concerns, and a similar terminology for Publish/Subscribe concepts as is used in WS-PubSub.

For the delivery of data in response to both requests and subscriptions, SIRI supports two common patterns of message exchange as realized in existent national systems:

— one-step 'direct' delivery: allowing the simple rapid delivery of data;

— two-step 'fetched' delivery: allowing a more optimized use of limited resources.

1.1.3 SIRI functional services

SIRI provides specific protocols for the following functional services, defined in Part 3 of the SIRI document set:

— **Production Timetable** (PT) Service: to send daily information on the operational timetable and associated vehicle running information.

— **Estimated Timetable** (ET) Service: to send real-time information on timetable, including changes based on the production service and on actual running conditions.

— **Stop Timetable** (ST) Service: to provide a stop-centric view of timetabled vehicle arrivals and departures at a designated stop.

— **Stop Monitoring** (SM) Service: to send real-time arrival & departure information relating to a specific stop.

— **Vehicle Monitoring** (VM) Service: to send real-time information on the movement and predicted movement of vehicles.

— **Connection Timetable** (CT) Service: to send an operational timetable for a service feeding an interchange, in order to inform departing services of the possible need to wait for connecting passengers.

— **Connection Monitoring** (CM) Service: to send real-time information on the running of a service inbound to an interchange, in order to advise departing services of the need to wait for connecting passengers. This can also be used to send real-time information to assist passengers in planning their onward journey following a connection.

— **General Message** (GM) Service: to exchange informative messages between participants.

Two additional functional services, are provided as additional parts:

— **Facilities Management** (FM) Service: to exchange information on the current status of facilities such as lifts, escalators or ticketing machines (Part 4).

— **Situation Exchange** (SX) Service: to exchange information messages between identified participants in a standardized structured format suitable for travel information services (Part 5).

1.2 Use of the SIRI standard

As a framework standard, it is not necessary for individual systems or specifications to implement the whole of the SIRI standard. Specifically it is intended that individual national bodies may adopt consistent subsets of the standard. However, it should be possible to describe (for those elements of systems, interfaces and specifications which fall within the scope of SIRI):

— the aspects of SIRI that they have adopted;

— the aspects of SIRI that they have chosen not to adopt.

In other words, there is no global statement of which elements are mandatory and which optional (except for key fields which are clearly always mandatory).

SIRI is a modular and expandable standard, and the modules included in this version are only a subset of what might potentially be included. Specifically, the current issue of the SIRI specification excludes the following:

— interfaces with traffic management systems for traffic light priority;

— control action functions, e.g. instructions to a vehicle to change its running;

— functionality of actual systems – SIRI only specifies the interfaces between servers, not how they choose to implement it.

Since its inception SIRI has been enhanced and extended to meet additional requirements. The potential for SIRI to be expended to encompass additional services will continue to be reviewed in future.

Guidance on the implementation and use of SIRI is not part of the specification. It is a matter for individual users and national groupings to provide advice and guidance on how SIRI may be used in support of local practices.

Note also that the SIRI communications layer does not specify the communication bearer technologies to be used. SIRI has been specifically developed to be 'technology independent' in this regard, so that local implementations can select the most cost-effective services for their projects.

Of course different technologies have different characteristics, and this may have an impact on the way that SIRI is used in practice. For example, the latency (time delay imposed by the communications network) of a service such as public GPRS is much higher than that on a dedicated, broadband fixed link using DSL. Therefore, systems based on GPRS will need to use a much higher value for some or all of the hysteresis parameters.

1.3 Limitations on SIRI and possible future developments

The developers of this standard recognize that there is continual development in the business practice of the public transport industry, and that SIRI shall continue to evolve to fulfil its needs. Specifically, there is scope for additional elements to be included in two places:

— Communications (SIRI Part 2). New mechanisms of data communication are constantly becoming available, in particular for areas such as information security and data discovery. SIRI is intended to be in line with prevailing information systems industry practice and Part 2 aims to retain flexibility in use of communications technologies. SIRI 2.0 introduces addition transports in form of the Document Literal WSDL and a RESTful presentation of services.

— Applications (SIRI Part 3, Part 4, Part 5, etc). This standard is based on a specific set of interfaces, representing a subset of practical needs among participant countries. However, new models of business cooperation may arise which necessitate additional application interface specifications. The current functional services are not intended to be a complete set of interfaces and additional modules might be required in future.

— Architectural detail. This standard is based on a very high-level decomposition of public transport operations, and implements only the most common interfaces. This may not fulfil all the needs of an implementer; for example, Scandinavia and the UK both have a relatively high degree of organizational disaggregation, and as a result may need standardization on what would be 'internal' interfaces elsewhere in Europe.

CEN welcomes input from users of this Standard as to where SIRI needs extension or refinement.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 12896, *Road transport and traffic telematics - Public transport - Reference data model*

ISO 639-1, *Codes for the representation of names of languages - Part 1: Alpha-2 code*

ISO 8601, *Data elements and interchange formats - Information interchange - Representation of dates and times*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1 Transport related terms

This section includes terms for both PT entities and properties of PT entities used in SIRI. For each term, it is indicated whether the term derives from Transmodel (EN 12896 version 5.0) or whether the term is specific to SIRI.

Data elements taken from Transmodel are written in capital letters in the text parts of this document (as it is in EN 12896 ex PARKING POINT) to distinguish between terms and Transmodel data elements. Data elements defined in SIRI are written with capital first letters of the nouns (ex: Subscription Identifier) .

3.1.1
bearing
heading of the vehicle in degrees expressed as a floating point number

[SOURCE: CEN/TS 13149-6]

3.1.2
block - Transmodel
work of a vehicle from the time it leaves a PARKING POINT after parking until its next return to park at a PARKING POINT

Note 1 to entry: Any subsequent departure from a PARKING POINT after parking marks the start of a new BLOCK. The period of a BLOCK has to be covered by DUTIES.

3.1.3
call activity – SIRI

activity a passenger may undertake when a VEHICLE calls at a stop; Boarding, Alighting, or Pass Through

3.1.4
call - SIRI / NeTEx
visit by a Vehicle to a specific Scheduled Stop Point as it follows the Journey Pattern of its Vehicle Journey to achieve a set of planned and estimated Passing Times

Note 1 to entry: A Vehicle may make more than one Call to the same stop in the course of a Journey: different Calls may typically be distinguished by a Visit Number count. The Call may have real time data associated with it.

Note 2 to entry: A SIRI Call may be regarded as a useful optimization of a more normalized set of structures that are articulated separately in Transmodel. Call combines the Transmodel elements of Point In Journey Pattern in with Estimated Passing Time, Observed Passing Time, & Target Passing Time, along with real time elements and other stop properties pertaining to the visit. Note that SIRI segregates all elements pertaining to arrival from those pertaining to departure, again facilitating the validation and implementation of actual systems.

3.1.5
change of journey pattern – Transmodel
CONTROL ACTION consisting in assigning a new JOURNEY PATTERN (and the ROUTE supporting it) to a DATED VEHICLE JOURNEY

3.1.6
cleardown – SIRI
act of removing a STOP VISIT from a DISPLAY once a vehicle has arrived at a stop

Note 1 to entry: For improved latency, ‘Direct Cleardown’ may often be done by direct wireless communication between the approaching vehicle and the stop display equipment, as well as by the regular back-end communication

between the Stop Monitoring Producer server and the Stop Monitoring Consumer entity of the client system driving the stop display.

Note 2 to entry: A separate Cleardown identifier may be associated with each STOP VISIT for this purpose, which can be used to reconcile the previous STOP VISIT with the arriving vehicle; typically this will be a short numeric code designed to be efficient for communication over a radio channel of restricted capacity.

3.1.7
connection activity – SIRI
change to the planned arrival to, or departure from, a CONNECTION link for a VEHICLE JOURNEY that is material to passengers intending to make a planned interchange

Note 1 to entry: Events may include a delayed arrival of the FEEDER, a decision to prolong the wait by the DISTRIBUTOR vehicle, a change of the distributor departure point, or cancellation of either of the feeder or distributor journeys.

3.1.8
connection protection – SIRI
coordination of inbound FEEDER and outbound DISTRIBUTOR journeys at an interchange so as to maximize the chances of passengers achieving their journeys

Note 1 to entry: Involves the exchange of information between feeder and distributor to inform dispatchers and passengers of the current situation, and the delaying of distributor vehicles so as to honour GUARANTEED CONNECTIONS.

3.1.9
connection – Transmodel / NeTEx
physical (spatial) possibility for a passenger to change from one public transport vehicle to another to continue a trip

Note 1 to entry: Different transfer times may be necessary to cover interchange over a given CONNECTION link, depending on the kind of passenger.

Note 2 to entry: In SIRI, a Feeder service may arrive at one STOP POINT in the CONNECTION link, and the Distributor may leave from the same or a different stop in the CONNECTION link.

Note 3 to entry: The interchange duration, i.e. transfer time is the time needed to go from SCHEDULED STOP POINT to SCHEDULED STOP POINT across a CONNECTION link. In SIRI, it does not include time needed to board or alight. Several different types of interchange duration may be specified.

Note 4 to entry: CONNECTION LINK has been renamed CONNECTION in NeTEx.

3.1.10
connection monitoring – SIRI
real-time monitoring of FEEDER arrivals at an interchange

3.1.11
control action – Transmodel
action resulting from a decision taken by the controller causing an amendment of the operation planned in the PRODUCTION PLAN

3.1.12
control centre – SIRI / NeTEx
CONTROL CENTRE is an ORGANIZATIONAL UNIT that manages a network or networks of vehicles and their attendant real-time systems

Note 1 to entry: In practice there is often a one-to-one corresponding between a control centre and a SIRI Service Participant. Each CONTROL CENTRE has a unique identifier, (the Control Centre Code), which provides a scope (i.e. unique namespace) for all non-global data references, such as stop identifiers, vehicle identifiers, etc. Within a Control

centre, references have to be unique. VEHICLES and JOURNEYS within the span of control of a given Control Centre are Local; VEHICLES and JOURNEYS within the span of control of an external Control Centre are Foreign.

3.1.13
coupled journey – Transmodel
complete journey operated by a coupled train, composed of two or more VEHICLE JOURNEYs remaining coupled together all along a JOURNEY PATTERN. A COUPLED JOURNEY may be viewed as a single VEHICLE JOURNEY

3.1.14
course of journey– Transmodel
part of a BLOCK, composed of consecutive VEHICLE JOURNEYs defined for the same DAY TYPE, all operated on the *same* LINE. Also sometimes termed a Run

3.1.15
data system – Transmodel
origin of operational data referring to one single responsibility

Note 1 to entry: References to a data system are useful in an interoperated computer system.

Note 2 to entry: For SIRI, this entails in particular specific systems for assigning unique identifiers to relevant entities such as SCHEDULED STOP POINTS or JOURNEYS, about which messages are to be exchanged, and which can be matched to the locally known entities identified by the respective internal operating data. The DATA SYSTEM shall be mutually agreed between Client and Server. 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.

3.1.16
dated vehicle journey – Transmodel
particular journey of a vehicle on a particular OPERATING DAY, including all modifications decided by the control staff

3.1.17
delayed – SIRI
categorization of a VEHICLE JOURNEY for presentation as being late and subject to significant uncertainty caused either by a Disturbance to the transport network or a problem with the VEHICLE itself

3.1.18
delivery variant – NeTEx
variant text of a NOTICE for use in a specific media or delivery channel (voice, printed material, etc.)

3.1.19
destination display – Transmodel (with clarification)
advertised destination of a specific JOURNEY PATTERN, usually displayed on a headsign or at other on-board locations

Note 1 to entry: In SIRI, different values for DESTINATION DISPLAY may be used in the dated timetable, the real-time table, or on individual calls to support stop centric and vehicle centric presentations of information to the customer. If not specified on an individual CALL element, the DESTINATION DISPLAY will be inherited from the most recent previous CALL element. If there are no values on previous calls, it will be inherited from the DATED VEHICLE JOURNEY destination displays.

3.1.20
direction – Transmodel
classification for the general orientation of ROUTEs