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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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35.240.60	Uporabniške rešitve IT v prometu	IT applications in transport

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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

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

If this draft becomes a European Standard, CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
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Contents

Page

European foreword

This document (prEN 15531-1:2021) has been prepared by Technical Committee CEN/TC 278 “Intelligent transport systems”, the secretariat of which is held by NEN.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 15531-1:2015.

SIRI (CEN/TS 15531-1:2006) has been a CEN Technical Specification since 2007 and a European normative standard since 2013 and has been widely used in Europe and elsewhere and proven its usefulness. This document proposes a revised version of SIRI as a 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 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 organisations 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 https://github.com/SIRI-CEN/SIRI, guidance on its use, example XML files, and case studies of national and local deployments is located at http://siri-cen.eu/.

It is recognised 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.

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 utilise 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 standardised interfaces, systems can be implemented as discrete pluggable modules that can be chosen from a wide variety of suppliers in a competitive market, rather than as monolithic proprietary systems from a single supplier. 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 standardised, 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.

SIRI includes a Simple Web Services "SIRI-LITE" as an additional transport method and a WSDL document literal version and a WSDL2 version;

Version 2.1 of SIRI was developed in 2020/21 to address lessons from the now widespread implementation of SIRI.

The changes in SIRI version 2.1 include:

- remove the direct relationship with TPEG and other standards to enable support as the other standards change;
- support for new modes in line with TRANSMODEL and NeTEx;
- support for the Reason / Effect / Advice structure for disruptions in SIRI SX;
- increased granularity for occupancy data and Vehicle structures;
- improved subscription renewal options and filtering options;
- additional options and flexibility for STOP POINTS and relationships between journeys;
- migration of XSD to Github to improve access and change control processes.

Compatibility with previous versions

All changes in version 2.1 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 2.1 schema without alteration (other than to schema version numbers), and version 2.1 documents that do not use new features will validate against earlier versions. Version 2.1 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 organisations, or between different systems belonging to the same organisation. 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 6.0, is used across all services.

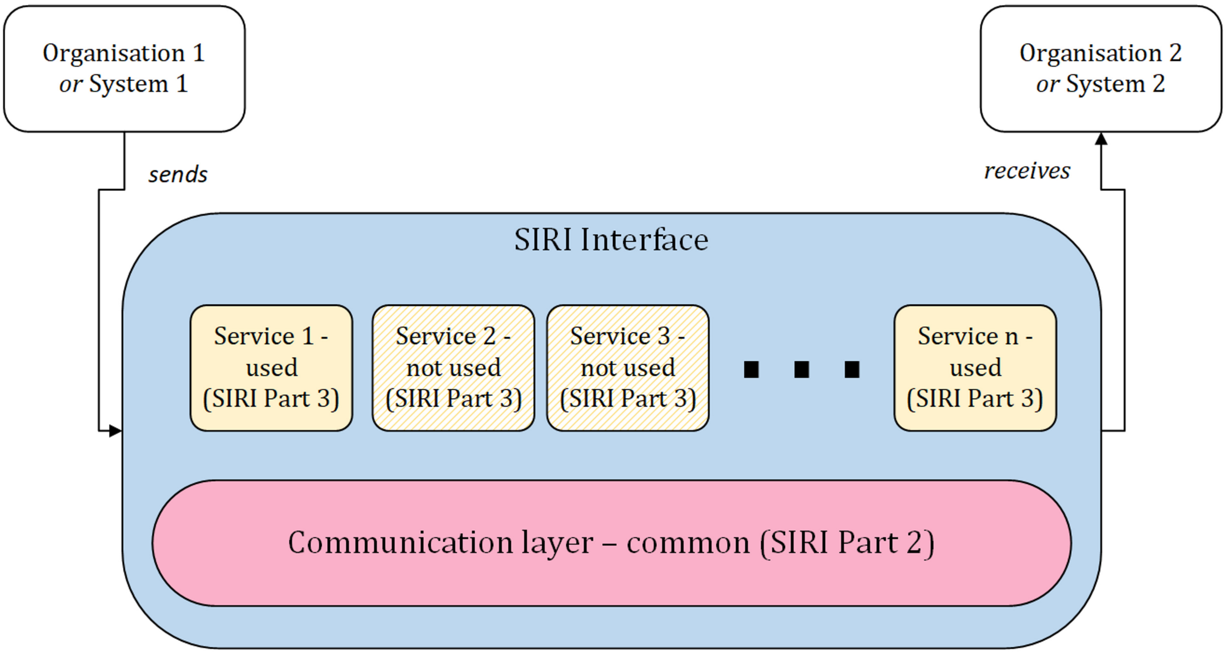

Figure 1 — Structure of SIRI: a set of optional service interface specifications using a common communication layer

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 realised in existent national systems:

- one-step 'direct' delivery: allowing the simple rapid delivery of data;
- two-step 'fetched' delivery: allowing a more optimised 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 standardised 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 recognise that there is continual development in the business practice of the public transport industry, and that SIRI must 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 organisational disaggregation, and as a result may need standardisation 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.

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

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

3 Terms and definitions

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

3.1 Transport Related Terms

NOTE 1 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 6.0) or whether the term is specific to SIRI.

NOTE 2 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

access space – Transmodel

passenger area within a STOP PLACE such as a concourse or booking hall, immigration hall or security area that is accessible by pedestrians, but without a direct access to vehicles

Note 1 to entry: 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.

3.1.2

accessibility – SIRI

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

3.1.3

accessibility assessment – Transmodel

Accessibility characteristics of an entity used by PASSENGERs such as a STOP PLACE, or a STOP PLACE COMPONENT

Note 1 to entry: Described by ACCESSIBILITY LIMITATIONs, and/or a set of SUITABILITies.

3.1.4

accessibility limitation – Transmodel

categories of the mobility characteristics of a STOP PLACE COMPONENT such as a STOP PATH LINK or ACCESS SPACE to indicate its ACCESSIBILITY by mobility constrained users, for example those needing wheelchair access, step-free access or wanting to avoid confined spaces such as lifts

Note 1 to entry: 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.

3.1.5
affects scope – SIRI-SX

scope of a SITUATION ELEMENT or consequence of a SITUATION ELEMENT in terms of the specific entities such as OPERATORs, NETWORKs, LINEs, SCHEDULED STOP POINTs, STOP PLACEs, PLACEs, etc that are affected

3.1.6
base Situation Element – SIRI-SX

original record of a particular SITUATION

Note 1 to entry: This may subsequently be followed by UPDATE SITUATION ELEMENTs that record further changes.

3.1.7
bearing

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

Note 1 to entry: SIRI diverges from the Transmodel definition which specified BEARING as an integer. The SIRI definition predates the Transmodel definition.

3.1.8
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.

3.1.9
boarding Position – Transmodel

location within a QUAY from which passengers may directly board, or onto which passengers may directly alight from a PT vehicle

3.1.10
branding – SIRI (+2.1)

arbitrary marketing classification

3.1.11
call - Transmodel

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 optimisation of a more normalised 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.

3.1.12

call activity – SIRI

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

3.1.13

change of journey pattern – Transmodel

CONTROL ACTION consisting in assigning a new JOURNEY PATTERN (and the ROUTE supporting it) to a DATED VEHICLE JOURNEY.

3.1.14

cleardown – SIRI

act of removing a Stop Visit from a LOGICAL 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.

3.1.15

compound Train – Transmodel (+2.1)

VEHICLE TYPE composed of a sequence of more than one vehicles of the type TRAIN.