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Offentlig transport – Servicegrænseflade til udveksling af realtidsinformation inden for offentlig transport – Del 2: Kommunikationsinfrastruktur

Public transport – Service interface for real-time information relating to public transport operations – Part 2: Communications infrastructure

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Transport public - Interface de service pour les informations en temps réel relatives aux opérations de transport public - Partie 2 : Communications

Öffentlicher Verkehr - Dienstschnittstelle für Echtzeitinformationen bezogen auf Operationen im öffentlichen Verkehr - Teil 2: Kommunikationsinfrastruktur

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Contents

Page

European Foreword 6
Introduction 8
1 Scope 10
2 Normative references 11
3 Terms and definitions 11
4 Symbols and abbreviations 11
5 Common communication aspects 11
5.1 Data Exchange Patterns of Interaction 11
5.1.1 Introduction 11
5.1.2 Request/Response Pattern 11
5.1.3 Publish/Subscribe Pattern 12
5.1.4 Publish/Subscribe with Broker Pattern 13
5.1.5 Request/Response – Compound Requests 14
5.1.6 Publish/Subscribe – Compound Subscriptions 15
5.2 Delivery Patterns 15
5.2.1 Introduction 15
5.2.2 Direct Delivery 15
5.2.3 Fetched Delivery 16
5.2.4 Data Horizon for Fetched Delivery 17
5.2.5 Get Current Message 18
5.2.6 Multipart Despatch of a Delivery 18
5.2.7 Multipart Despatch of a Fetched Delivery – MoreData 19
5.3 Mediation Behaviour 20
5.3.1 Introduction 20
5.3.2 Mediation Behaviour – Maintaining Subscription Last Updated State 20
5.3.3 Mediation Behaviour – Subscription Filters 23
5.4 Recovery Considerations for Publish Subscribe 25
5.4.1 Introduction 25
5.4.2 Check Status – Polling 25
5.4.3 Heartbeat – Pinging 25
5.4.4 Degrees of Failure 26
5.4.5 Detecting a Failure of the Producer 26
5.4.6 Detecting a Failure of the Consumer 28
5.5 Recovery Considerations for Direct Delivery 29
5.6 Request Parameters and Interactions 29
5.7 Error Conditions for Requests 32
5.8 Versioning 34
5.8.1 Introduction 34
5.8.2 The Overall SIRI Framework Version Level 34
5.8.3 The SIRI Functional Service Type Version Level 34
5.9 Access Controls: Security and Authentication 34
5.9.1 Introduction 34
5.9.2 System Mechanisms External to SIRI Messages 35
5.10 Service Discovery 36
5.10.1 Introduction 36
5.10.2 Discovery of Servers that Support SIRI Services 36
5.10.3 Discovery of the Capabilities of a SIRI Server 36
5.10.4 Discovery of the Coverage of a Given SIRI Functional Service 36

This is a preview of "DS/EN 15531-2:2022". Click here to purchase the full version from the ANSI store.

5.11 Capability Matrix ... 37
5.11.1 Introduction ... 37
5.11.2 SIRI General Capabilities ... 38

6 Request/Response ... 39
6.1 Making a Direct Request ... 39
6.1.1 Introduction ... 39
6.1.2 ServiceRequest Message — Element ... 39
6.1.3 The ServiceRequestContext — Element ... 41
6.1.4 Common Properties of ServiceRequest Messages — Element ... 43
6.1.5 ServiceRequest — Example ... 44
6.1.6 Access Controls on a Request ... 44
6.2 Receiving a Data Delivery ... 45
6.2.1 Introduction ... 45
6.2.2 ServiceDelivery ... 46

7 Subscriptions ... 50
7.1 Setting up Subscriptions ... 50
7.1.1 Introduction ... 50
7.1.2 SubscriptionRequest ... 51
7.1.3 SubscriptionResponse ... 54
7.2 Subscription Validity ... 57
7.3 Terminating Subscriptions ... 57
7.3.1 Introduction ... 57
7.3.2 The TerminateSubscriptionRequest ... 57
7.3.3 The TerminateSubscriptionResponse ... 58
7.3.4 The SubscriptionTerminatedNotification (+SIRI 2.0) ... 60

8 Delivering data ... 62
8.1 Direct Delivery ... 62
8.1.1 Introduction ... 62
8.1.2 Acknowledging Receipt of Data (DataReceivedAcknowledgement) ... 62
8.2 Fetched Delivery ... 63
8.2.1 Introduction ... 63
8.2.2 Signalling Data Availability (DataReadyNotification / DataReadyResponse) ... 63
8.2.3 Polling Data (DataSupplyRequest/ServiceDelivery) ... 65
8.3 Delegated Delivery +SIRI 2.0 ... 67

9 Recovery from system failure ... 67
9.1 Introduction ... 67
9.2 Recovery after Client Failure ... 67
9.3 Recovery after Server Failure ... 68
9.4 Reset after Interruption of Communication ... 68
9.5 Alive Handling ... 69
9.5.1 Introduction ... 69
9.5.2 CheckStatusRequest ... 69
9.5.3 CheckStatusResponse ... 70
9.5.4 HeartbeatNotification ... 71
9.6 Additional Failure modes for delegated delivery (+SIRI v2.0) ... 72

10 Transport of SIRI messages ... 73
10.1 Separation of Addressing from Transport Protocol ... 73
10.2 Logical Endpoint Addresses ... 73
10.2.1 Endpoint Addresses ... 73
10.2.2 Endpoint Address — Examples ... 74
10.3 Parallelism and Endpoint Addresses ... 75
10.4 Encoding of XML messages ... 76
10.4.1 Principles ... 76
10.4.2 Encoding of Errors in XML ... 76
10.4.3 Character Set ... 76
10.4.4 Schema Packages ... 76

This is a preview of "DS/EN 15531-2:2022". Click here to purchase the full version from the ANSI store.

10.4.5 Siri.XSD – Use of XML Choice ... 77
10.4.6 SiriSG.XSD – Use of XML Substitution groups ... 78
10.5 Use of SIRI with SOAP / WSDL ... 79
10.5.1 Introduction ... 79
10.5.2 Web Services ... 80
10.5.3 Use of SOAP ... 82
10.5.4 SIRI WSDL ... 82
10.5.5 SIRI WSDL structure ... 83
10.5.6 SIRI RPC WSDL ... 86
10.5.7 SIRI Document WSDL *(+SIRI v2.0)* ... 90
10.5.8 SIRI WSDL 2.0 *(+SIRI v2.0)* ... 91
10.5.9 SIRI WSDL Status ... 91

11 Capability Discovery Requests ... 91
11.1 General ... 91
11.2 Capability Request ... 91
11.3 Service Capability Discovery ... 92
11.3.1 Service Capability Discovery Request — Element ... 92
11.3.2 Service Capability Discovery Response — Element ... 93
11.3.3 Functional Service Capability Discovery Response — Element ... 94
11.3.4 Service Capability Response — Example ... 96
11.4 Functional Service Capability Permission Matrix ... 98
11.4.1 Introduction ... 98
11.4.2 OperatorPermissions — Element ... 99
11.4.3 LinePermissions — Element ... 99
11.4.4 ConnectionLinkPermissions — Element ... 99
11.4.5 StopMonitorPermissions — Element ... 100
11.4.6 VehicleMonitorPermissions — Element ... 100
11.4.7 InfoChannelPermissions — Element ... 101

12 SIRI for Simple Web Services – SIRI Lite (+SIRI v2.0) ... 101
12.1 Introduction ... 101
12.1.1 Existing Implementations ... 102
12.1.2 Using SIRI-LITE services in combination ... 102
12.1.3 Alternative Response Encoding ... 103
12.1.4 Lossless transforms ... 104
12.1.5 Simple transforms ... 104
12.2 Encoding of URL Requests ... 104
12.2.1 Complete Request Encoding in HTTP URL's ... 104
12.2.2 General format of SIRI Lite request URL ... 104
12.2.3 Endpoints and Service Identification ... 105
12.2.4 Encoding of Service Parameters on http request ... 105
12.2.5 Naming of Request Parameters with Hierarchy ... 106
12.2.6 Naming of Parameters with Plural Cardinality ... 106
12.2.7 Handling of invalid request combinations ... 106
12.2.8 Specifying the encoding of the Response ... 106
12.3 Examples ... 106
12.3.1 General ... 106
12.3.2 SIRI-SM Simple Stop Monitoring request to fetch stop departures – SIRI LITE Examples ... 106
12.3.3 SIRI-VM Simple Vehicle Monitoring request to fetch vehicle positions – SIRI Lite examples ... 110
12.3.4 SIRI-VM Complex Vehicle Monitoring to obtain journeys – SIRI Lite examples ... 113
12.3.5 SIRI-SM Stop Monitoring failed request with Exception – SIRI LITE examples ... 120
12.4 Mapping of SIRI XML to Alternative encodings ... 121
12.4.1 Use of syntactic features of alternative rendering formats ... 121
12.4.2 Mapping of SIRI data types to alternative encodings ... 122
12.5 Recommendations for the use of SIRI Simple Web Services ... 122
12.5.1 General ... 122
12.5.2 Services useful for device Passenger Information Services ... 122
12.5.3 Response filtering ... 122

This is a preview of "DS/EN 15531-2:2022". Click here to purchase the full version from the ANSI store.

12.5.4 Incorporation of reference data in responses 123
12.5.5 Multiple functional service deliveries in the same response 123
12.5.6 Support a choice of response encodings 123
12.5.7 Provide reporting identifiers 123

13 Common SIRI elements & Data Types 124
13.1 General 124
13.2 Introduction 125
13.3 Base Data Types 125
13.3.1 W3C Simple Types 125
13.3.2 SIRI Simple Types 126
13.3.3 NationalLanguageStringStructure — Element 127
13.4 Shared Elements & Structures 127
13.4.1 FramedVehicleJourneyRef — Element 127
13.4.2 Location — Element 128
13.4.3 Error — Element 128
13.4.4 JourneyRelation — Element (+SIRI 2.1) 129
13.4.5 Branding — Element (+SIRI 2.1) 133
13.4.6 Extension — Element 133
13.4.7 KeyList — Element (+SIRI 2.1) 134
13.4.8 TypesOfValue — Element (+SIRI 2.1) 134
13.4.9 Train Formation/Composition Model — Element (+SIRI 2.1) 135
13.5 Shared groups of elements 139
13.5.1 ServiceInfoGroup — Group 139
13.5.2 JourneyInfoGroup — Group 140
13.5.3 VehicleJourneyInfoGroup — Group 140
13.5.4 JourneyPatternInfoGroup — Group 142
13.5.5 DisruptionGroup — Group 143
13.5.6 JourneyProgressGroup — Group 146
13.6 OperationalBlockGroup — Group 150
13.7 OperationalInfoGroup — Group 150
13.8 TypeOfValueGroup — Group (+SIRI 2.1) 150
13.9 JourneyRelationInfoGroup — Group (+SIRI 2.1) 151
13.10 JourneyPartViewGroup — Group (+SIRI 2.1) 151
13.11 VehicleTypeGroup — Group (+SIRI 2.1) 152
13.12 TrainFormationReferenceGroup — Group (+SIRI 2.1) 153
13.13 QuayAssignmentGroup — Group (+SIRI 2.1) 153
13.13.1 General 153
13.13.2 TypeOfNestedQuayEnumeration — Allowed Values 154
13.14 BoardingPositionAssignmentGroup — Group (+SIRI 2.1) 155
13.15 FlexibleStopLocationGroup — Group (+SIRI 2.1) 156

This is a preview of "DS/EN 15531-2:2022". Click here to purchase the full version from the ANSI store.

European foreword

This document (EN 15531-2:2022) 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 May 2023, and conflicting national standards shall be withdrawn at the latest by May 2023.

This document supersedes EN 15531-2:2015.

SIRI (CEN/TS 15531-2:2006) 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 2 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:

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/.

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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.

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

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

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

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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 document 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.

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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.

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1 Scope

SIRI uses a consistent set of general communication protocols to exchange information between client and server. The same pattern of message exchange may be used to implement different specific functional interfaces as sets of concrete message content types.

Two well-known specific patterns of client server interaction are used for data exchange in SIRI: *Request/Response* and *Publish/Subscribe*.

- *Request/Response* allows for the ad hoc exchange of data on demand from the client.

- *Publish/Subscribe* allows for the repeated asynchronous push of notifications and data to distribute events and Situations detected by a Real-time Service.

The use of the *Publish/Subscribe* pattern of interaction follows that described in the Publish-Subscribe Notification for Web Services (WS-PubSub) specification, and as far as possible, SIRI uses the same separation of concerns and common terminology for publish/subscribe concepts and interfaces as used in WS-PubSub. WS-PubSub breaks down the server part of the *Publish/Subscribe* pattern into a number of separate named roles and interfaces (for example, Subscriber, Publisher, Notification Producer, and Notification Consumer): in an actual SIRI implementation, certain of these distinct interfaces may be combined and provided by a single entity. Although SIRI is not currently implemented as a full WS-PubSub web service, the use of a WS-PubSub architecture makes this straightforward to do in future.

Publish/Subscribe will not normally be used to support large numbers of end user devices.

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

- A one step 'Direct Delivery', as per the classic client-server paradigm, and normal WS-PubSub publish subscribe usage; and;

- A two-step 'Fetched Delivery' which elaborates the delivery of messages into a sequence of successive messages pairs to first notify the client, and then to send the data when the client is ready. Fetched Delivery is a stateful pattern in its own right.

- Each delivery pattern allows different trade-offs for implementation efficiency to be made as appropriate for different target environments.

- A SIRI implementation may support either or both delivery methods; in order to make the most efficient use of the available computational and communication resources. The delivery method may either be preconfigured and static for a given implementation, or each request or subscription may indicate the delivery method required by the client dynamically as part of the request policy, and the server may refuse a request if it does not support that method, giving an appropriate error code.

- The Interaction patterns and the Delivery patterns are independent aspects of the SIRI protocol and may be used in any combination in different implementations.

- For a given SIRI Functional Service type (Connection Monitoring, Stop Monitoring etc.), the message payload content is the same regardless of whether information is exchanged with a *Request/Response* or *Publish/Subscribe* pattern, or whether it is returned by Direct or Fetched Delivery.

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- The SIRI *Publish/Subscribe* Protocol prescribes particular *mediation* behaviour for reducing the number of notifications and the amount of network traffic arising from subscriptions.

- The mediation groups the various subscriptions from a subscriber into one or more Subscriber Channels, and is able to manage notifications and updates for the aggregate.

- Only partial updates to the data set since the last delivery for the subscription need to be sent.

- The SIRI Communication protocols are designed to fail gracefully. Considerations for resilience and recovery are covered below.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 15531-1, *Public transport - Service interface for real-time information relating to public transport operations - Part 1: Context and framework*