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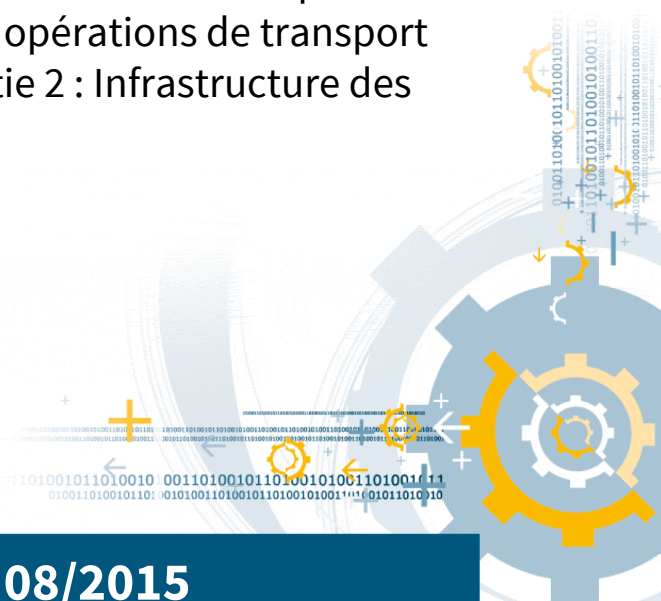
ILNAS-EN 15531-2:2015

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

Öffentlicher Verkehr - Serviceschnittstelle
für Echtzeitinformationen bezogen auf
Operationen im öffentlichen Verkehr -
Teil 2: Kommunikationsstruktur

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

08/2015



National Foreword

This European Standard EN 15531-2:2015 was adopted as Luxembourgish Standard ILNAS-EN 15531-2:2015.

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English Version

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

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

Öffentlicher Verkehr - Serviceschnittstelle für
Echtzeitinformationen bezogen auf Operationen im
öffentlichen Verkehr - Teil 2: Kommunikationsstruktur

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

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. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of 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 United Kingdom.



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European foreword

This document (EN 15531-2:2015) 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 15531-2:2007.

This document presents Part 2 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 may 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, as well as between server and end-user devices like smartphones or web browsers. 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 VAMS systems; (ii) providing standardised, well defined interfaces that can be used to deliver data to a wide variety of distribution channels.

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.

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.

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, 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 15531-1:2015, *Public transport - Service interface for real-time information relating to public transport operations - Part 1: Context and framework*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 15531-1:2015 apply.

4 Symbols and abbreviations

For the purposes of this document, the symbols and abbreviations given in EN 15531-1:2015 apply.

5 Common communication aspects

5.1 Data Exchange Patterns of Interaction

5.1.1 Introduction

There are two main patterns of interaction for Data Exchange in SIRI: *Request/Response* and *Publish/Subscribe*. The patterns are complementary, that is an implementation may support both, and implementers may choose the most efficient pattern according to the nature of their application.

NOTE *Publish/Subscribe* can emulate a *Request/Response* interaction by use of a short subscription. A partial SIRI implementation that supports only *Request/Response* is useful for connecting many types of Public Transport Information System applications to AVMS and other Producer System data.

5.1.2 Request/Response Pattern

The *Request/Response* interaction allows for the immediate fulfilment of one-off data supply requests made by a Requestor to a Service. Pairs of *Request/Response* patterns are also used for the interactions that make up other patterns, such as *Publish/Subscribe*.

In the *Request/Response* interaction used to get data, the Client sends a request message to a Server that offers the required SIRI Functional Service, and immediately receives a Delivery message in response (Figure 1). A Data Delivery may be made as a one-step *Direct Delivery*, or as a two-step *Fetches Delivery* (see later).

The Requestor shall give a unique reference to each request, which will be returned in the matching response.