SLOVENSKI STANDARD
SIST-TS CEN/TS 15531-6:2024

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Javni prevoz - Vmesnik za informiranje v realnem času za potrebe delovanja javnega prevoza - 6. del: Vmesniki funkcionalnih storitev: Nadzorni ukrepi

Public transport - Service interface for real-time information relating to public transport operations - Part 6: Functional service interfaces: Control Actions

Öffentlicher Verkehr - Dienstschnittstelle für Echtzeitinformationen bezogen auf Operationen im Öffentlichen Verkehr - Teil 6: Funktionale Dienstschnittstelle - Steuerungsaktion

Transport public - Interface de service pour les informations en temps réel relatives aux opérations de transport public - Partie 6 : Interfaces des services fonctionnels - Actions de régulation

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ICS:

35.240.60	Uporabniške rešitve IT v prometu	IT applications in transport

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TECHNICAL SPECIFICATION

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English Version

Public transport - Service interface for real-time information relating to public transport operations - Part 6: Functional service interfaces: Control Actions

Transport public - Interface de service pour les informations en temps réel relatives aux opérations de transport public - Partie 6 : Interfaces des services fonctionnels - Actions de régulation

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This Technical Specification (CEN/TS) was approved by CEN on 15 April 2024 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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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
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European foreword

This document (CEN/TS 15531-6:2024) has been prepared by Technical Committee CEN/TC 278 “Intelligent transport systems”, the secretariat of which is held by NEN.

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This document has been prepared under a standardization request addressed to CEN by the European Commission. The Standing Committee of the EFTA States subsequently approves these requests for its Member States.

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 announce this Technical Specification: 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.

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.

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 describes the SIRI Control Action (SIRI-CA) is an additional service, part 6, based on the European normative standard known as “SIRI” – Service Interface for Real-time Information. 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 normative standard parts:

— context and framework, including background, scope and role, normative references, terms and definitions, symbols and abbreviations, business context and use cases (EN 15531-1);

— the mechanisms to be adopted for data exchange communications links (EN 15531-2);

— data structures for a series of individual application interface modules PT, ET, ST, SM, VM, CT, CM, GM (EN 15531-3).

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

— additional data structures for additional application interface module FM (CEN/TS 15531-4);

— additional data structures for additional application interface module SX (CEN/TS 15531-5);

— additional data structures for additional application interface module CA (CEN/TS 15531-6).

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.

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 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 document 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.

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/.

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.

The SIRI Control Action (SIRI-CA) service defined in this document enables the exchange of information on Control Actions as managed by operators while operating the mobility services.

A Control Action is a decision made about the management of the operation of a transport system, for example to cancel or alter a planned journey. Such decisions are typically made by controllers in the control rooms of AVMS (Automated Vehicle Monitoring Management Systems) but may also be made automatically by the monitoring processes of the AVMS itself. In a computer system, a Control Action can be explicitly represented by data objects with standardized data structures.

The existing SIRI Situation Exchange Service provides a comprehensive description of events, disruptions, as well as general-purpose information, but is specifically dedicated to exchanging messages for passenger information, and does not provide any structured description of Control Actions themselves, even in situations where the Control Action is the main cause of the Situation . Furthermore, some Control Actions are purely internal and don’t have an external cause or a consequent Situation of interest to passengers.

Both query and publish subscribe interactions are supported.

1 Scope

This document specifies an additional SIRI functional service to exchange information about Control Actions, between monitoring systems and servers containing real-time public transport vehicle or journey time data. These include the control centres of transport operators, as well as information systems that deliver passenger travel information services. As for Transmodel, public transport modes include new modes of transport (vehicle sharing, vehicle pooling, etc.).

This document describes the SIRI Control Action service, one of a modular set of services for the exchange of Real-time information. The Control Action service (SIRI-CA) is concerned with the exchange of information about decision made concerning the real-time management of the operation of a transport system as performed by operators while operating the services.

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 15531-1:2022, *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 15531-1:2022 apply.

4 Symbols and abbreviations

For the purposes of this document, the symbols and abbreviations given in EN 15531-1:2022 apply.

5 Business Context

5.1 General

In the context of the Delegated Act for Multimodal Information Services from the European Commission the number of SIRI implementations is increasing every day. A common feedback comment from such implementations is the need to be able to exchange information to describe CONTROL ACTIONs. The controllers of AVMS (Automated Vehicle Management Systems), who are the main source of real-time information for public transport, typically manage the system using CONTROL ACTIONs prior to deriving passenger information from them.

As is the case for SITUATIONs in the SIRI-SX Service Control Actions are often exchanged in real time but may also be planned in a long time in advance of the start of vehicle journeys. Both use cases are to be managed through this SIRI-CA service. Also note that certain SIRI functional services (such as SIRI Estimated Timetable) can already be used in effect to communicate some type of journey updates such as creation/ cancellation – however the expected time window for Control Action is usually longer than the one expected for Passing Times and can include additional operation information.

5.2 Main use cases and needs

The main use cases handled by a SIRI Control Action service are the following:

— The primary Control Actions to be exchanged are as follows (but this list can, of course, be extended):

  — Vehicle replacement / change / cancellation;

  — Spacing and passing time updates;

  — Journey creation, cancellation and change;

  — Route changes;

  — The blocking of use of stops;

— In most cases, it is the AVMS that must provide this data for aggregation and distribution:

  — To a situation management system => complementing SIRI-SX;

  — To an aggregator that will use it and interpret it to generate passenger information (when necessary);

  — To a Passenger Information System that may use them (but not directly since Control Actions may be hardly understandable for the passengers);

  — To an operational/control centre (for information), usually also managing other modes (road…);

  — To online/digital services;

— The Control Action's structured description will, for example, be used to:

  — Provide information to the operating subsystem;

  — Create corresponding disruption and associated information;

  — Disseminate the consequences to Passenger Information System via SIRI services but also possibly directly to displays, websites, etc. (but probably not the Control Actions themselves since they may be hardly understandable for the passengers);

  — Provide the Control Action information to a concentrator/aggregator which redistributes it to the other systems;

  — Provide the Control Action information to a journey planner.

5.3 System overview and dataflow

Transmodel defines the CONTROL ACTION as being "An action resulting from a decision taken by the controller causing an amendment of the operation planned in the PRODUCTION PLAN."

Therefore, the SIRI Control Action Service is mainly designed for B2B exchanges and does not have any planned usage for B2C communication.

However, as shown in the figures below, CONTROL ACTIONs can be provided to Data Harmonisers, using them as a base to create passenger information disseminated using typically SIRI SX (Situation Exchange) and SIRI ET (Estimated Timetable): CONTROL ACTIONs are most often the operational actions that result in delays (respacing, etc.) cancellations, rerouting, etc. they do have consequences on the passenger information, but are also often hardly understandable by passenger. This is the reason why the Data Harmoniser needs to process the CONTROL ACTIONs description in order to create an easily understandable information for passengers. For example, in a situation following an unplanned driver replacement resulting in several CONTROL ACTIONs (a journey cancellation, driver de-assignment and new driver assignment, a journey creation including the definition of new passing times), the Data Harmoniser will probably generate a single SIRI SX SITUATION saying something like “due to a driver’s illness, the bus is delayed by 10 minutes”, making this set of CONTROL ACTIONs much easier to understand for the passenger. It also has to be noted that not all CONTROL ACTIONs are resulting in some passenger information: for example, the replacement of a VEHICLE before the start of a JOURNEY, or the replacement of a DRIVER will not result in any passenger information since they have no consequences on the offered services.

The figures below describe two possible system designs and data flows. These figures propose the following roles:

— Realtime Data Hub (Aggregator): aggregates the data from multiple sources, just checking for consistency and data quality, but without changing them or inferring new data. The resulting aggregated data set is provided as output allowing to have one single access for multiple data sources;

— Data Harmoniser: analyse the data, merge them when necessary (for example to provide data from multiple providers at a single stop), relates the known scheduled timetables to the received real-time information, process and enrich the received data (connect situation from ICS and EMS to journey information provide bay AVMS, transform CONTROL ACTION in passenger information available via SIRI SX, add translations when necessary, etc.). Note that it often happens that the Data Hub and Data Harmoniser roles are managed by a single system;

— Automated Vehicle Monitoring System (AVMS): operational control of the service, creates and manages CONTROL ACTIONs;

— Event Management System (EMS): creates and manages event information independently from the AVMS;

— Incident Capturing System (ICS): captures and follows events independently from the AVMS.

The first figures describe a system with Data Hub feeding a Data Harmoniser. This is the type a system where merging the Hub and the Harmoniser is quite natural. Also note that a system with just a Hub and no Harmoniser is also possible (this is the situation of quite a lot of National Access Points).

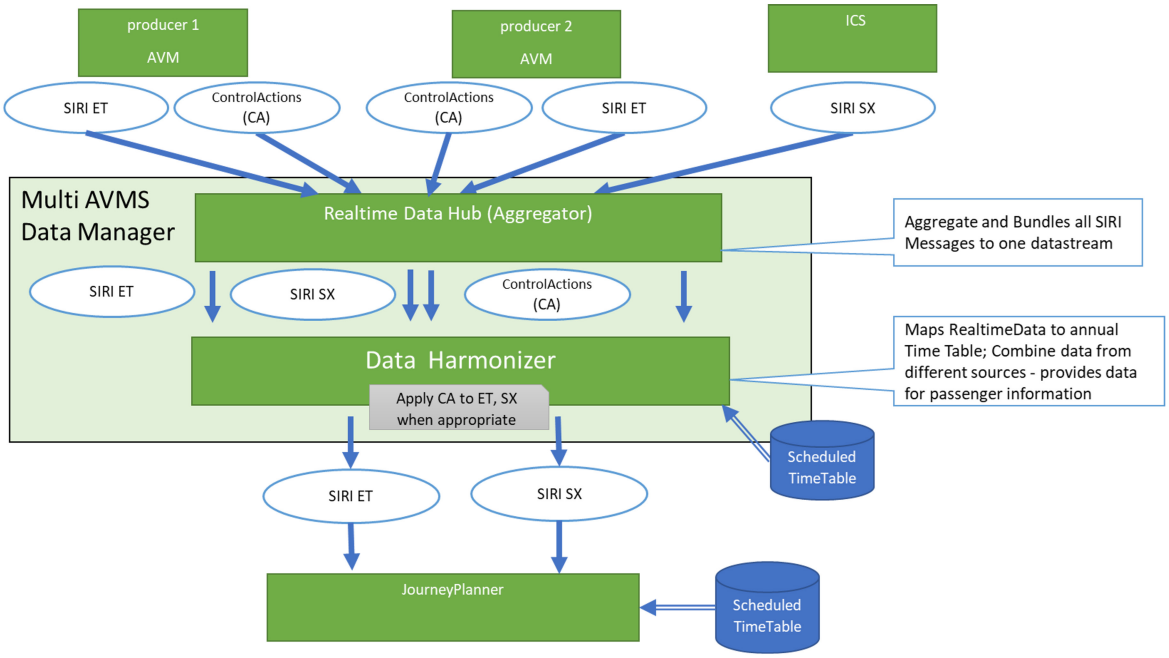

Figure 1 — System with a Data Hub feeding a Data Harmoniser (and using control actions)

The first figures describe a system with multiple Data Harmoniser feeding a Data Hub. This design also shows the possibility of having totally independent EMS and ICS, and an AVMS providing data not harmonized with the other (this is not a recommendation but a situation that may occur in real life, and that can be managed using SIRI).

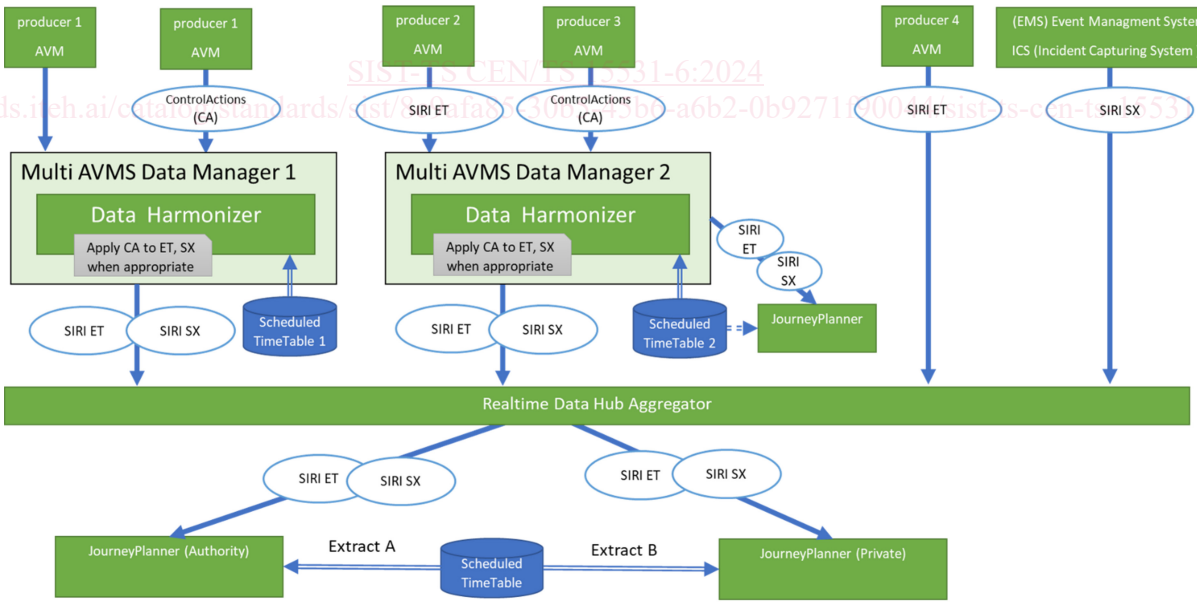

Figure 2 — System with Data Harmonisers feeding a Data Hub (and using control actions)

6 Relation with Transmodel Concepts

6.1 General

The CONTROL ACTIONs in SIRI are, of course, expected to be fully based on Transmodel (note that the use of uppercase for CONTROL ACTION makes here an explicit reference to its Transmodel definition, as this is the case for all specification in the Transmodel's ecosystem).

NOTE The following lines are providing a brief overview of Transmodel's CONTROL ACTION; refer to EN 12896-4, Public transport - Reference data model - Part 4: Operations monitoring and control for a comprehensive description.

Transmodel describes all the necessary scheduled information (exchanged using NeTEx) that may be variously referenced by CONTROL ACTIONs, such as VEHICLE JOURNEYs, VEHICLE ASSIGNMENTs, TIMING POINTs, RUN TIMEs, BLOCKs and VEHICLE SERVICEs, DUTies and DUTY STRETCHs, etc. and more generally the detailed production plan.

The SIRI CONTROL ACTION Service will complement this with real-time information, mainly based on the concepts described by Transmodel.

Transmodel identifies four main groups of CONTROL ACTIONs, as summarized in the following figure.

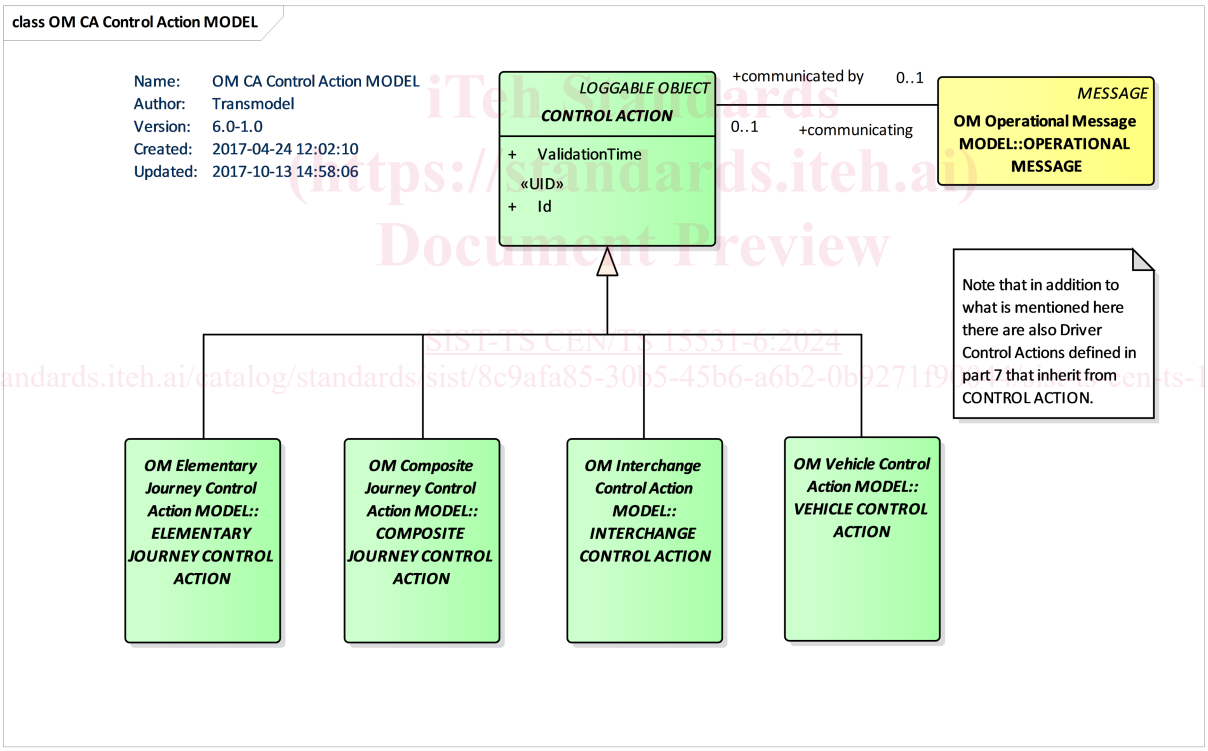

Figure 3 — Transmodel CONTROL ACTION overview