

Public transport — Service interface for real-time information relating to public transport operations —

Part 1: Context and framework

ICS 35.240.60

National foreword

This Draft for Development is the UK implementation of CEN/TS 15531-1:2007.

This publication is not to be regarded as a British Standard.

It is being issued in the Draft for Development series of publications and is of a provisional nature. It should be applied on this provisional basis, so that information and experience of its practical application can be obtained.

Comments arising from the use of this Draft for Development are requested so that UK experience can be reported to the European organization responsible for its conversion to a European standard. A review of this publication will be initiated not later than 3 years after its publication by the European organization so that a decision can be taken on its status. Notification of the start of the review period will be made in an announcement in the appropriate issue of *Update Standards*.

According to the replies received by the end of the review period, the responsible BSI Committee will decide whether to support the conversion into a European Standard, to extend the life of the Technical Specification or to withdraw it. Comments should be sent to the Secretary of the responsible BSI Technical Committee at British Standards House, 389 Chiswick High Road, London W4 4AL.

The UK participation in its preparation was entrusted to Technical Committee EPL/278, Road transport informatics.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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English Version

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

Öffentlicher Verkehr - Dienstleitungsschnittstelle für
zeitnahe Informationen zum Betrieb des öffentlichen
Verkehrs - Teil 1: Rahmen und Gerüst

This Technical Specification (CEN/TS) was approved by CEN on 23 October 2006 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.

CEN members are required to announce the existence of this CEN/TS in the same way as for an EN and to make the CEN/TS available promptly at national level in an appropriate form. It is permissible to keep conflicting national standards in force (in parallel to the CEN/TS) until the final decision about the possible conversion of the CEN/TS into an EN is reached.

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Foreword

This document (CEN/TS 15531-1:2007) has been prepared by Technical Committee CEN/TC 278 “Road transport and traffic telematics”, the secretariat of which is held by NEN.

This presents Part 1 of the European Technical Specification 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.

SIRI 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 (Part 3).

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 recognised that SIRI is not complete as it stands, and there will be a substantial amount of work required to continue to develop SIRI over the coming years. 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 announce this CEN Technical Specification: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and 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 Technical Specification 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 Technical Specification will improve a number of features of public transport information and service management:

- Interoperability – the Technical Specification 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; (ii) 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 Technical Specification 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 Technical Specification 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 Technical Specification readily extensible in future.

1 Scope

1.1 Interfaces Specified by this Technical Specification

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.

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.

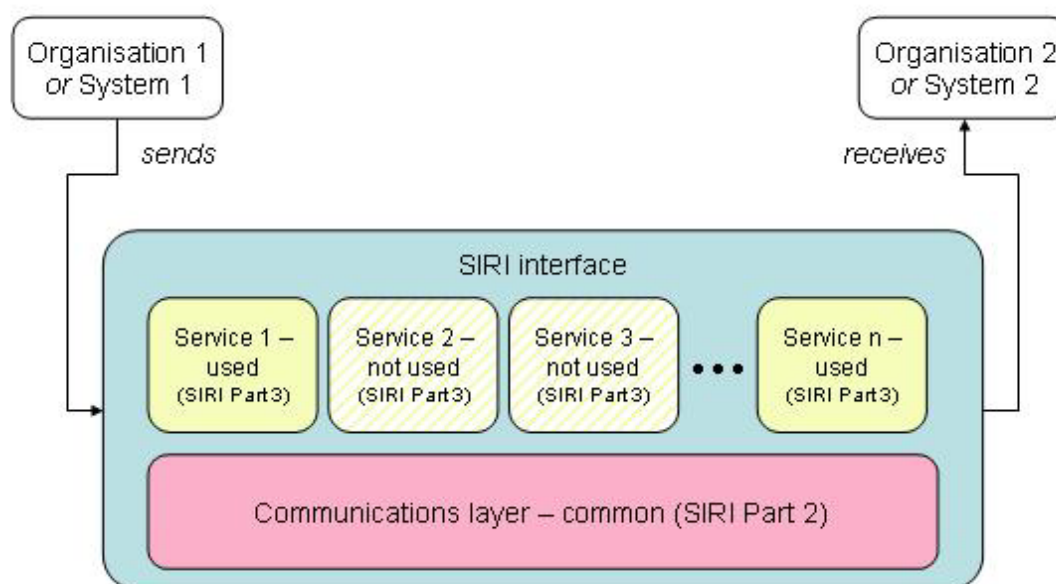


Figure 1 — Structure of SIRI: a set of optional service interface specifications using a common communications layer

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 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.

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 between central systems and individual end-devices – on-bus systems, on-street signs, consumer devices etc.
- Interfaces with traffic management systems.
- Control action functions, e.g. instructions to a vehicle to change its running.
- Data relating to events and situations – in SIRI this is passed via the *GeneralMessage* service.
- Functionality of systems – SIRI only specifies the interfaces between servers.

The potential for SIRI to be expended to encompass additional services, including some of those cited here, is being actively investigated at present.

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 bearer technologies to be used. It 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 technical specification 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.
- Applications (SIRI Part 3). This technical specification 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. Part 3 is not intended to be a complete set of interfaces and additional modules might be required in future.
- Architectural detail. This technical specification 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 Technical Specification as to where SIRI needs extension or refinement.

Additional Information about the relation between SIRI and Transmodel has been produced by a Transmodel compliance study. It can be found at www.siri.org.uk:

- A table describing the exact mapping of each SIRI element to the corresponding Transmodel object.
- An extract of the Transmodel objects underlying SIRI Services.
- A UML Schema definition.

2 Normative references

The following referenced documents are indispensable for the application 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 12896, *Road transport and traffic telematics - Public transport - Reference data model*

CEN/TS 13149-6, *Public transport - Road vehicle scheduling and control systems - Part 6: CAN message content*

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

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.

3.1.1

BEARING – SAE J1939/71 (CEN/TS 13149-6)

the heading of the vehicle in degrees expressed as a floating point number: compliant to SAE J1939/71 (Compatible with CEN/TS 13149-6)

3.1.2

BLOCK – TransModel

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

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

3.1.4

CALL – SIRI

a visit by a VEHICLE to a specific STOP POINT as it follows the JOURNEY PATTERN of its VEHICLE JOURNEY to achieve a set of planned and estimated PASSING TIMES. 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.

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.

3.1.5

CHANGE OF JOURNEY PATTERN – TransModel

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

3.1.6

CLEARDOWN – SIRI

the act of removing a Stop Visit from a DISPLAY once a vehicle has arrived at a stop. 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.

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

a 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. 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

the coordination of inbound feeder and outbound distributor journeys at an interchange so as to maximise the chances of passengers achieving their journeys. 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 LINK – TransModel

the physical (spatial) possibility for a passenger to change from one public transport vehicle to another to continue a trip. Different transfer times may be necessary to cover interchange over a given connection link, depending on the kind of passenger.

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.

The interchange duration, i.e. transfer time is the time needed to go from stop point to 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.

3.1.10**CONNECTION MONITORING – SIRI**

the monitoring of the real-time arrivals and departures at an interchange for changes against the planned schedule

3.1.11**CONTROL ACTION – TransModel**

an 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**

a Control Centre is an ORGANISATIONAL UNIT that manages a network or networks of vehicles and their attendant real-time systems, and corresponding specifically to a SIRI Service Participant. Each Control Centre has a uniquely 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 must 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**

a 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**

a 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**

the origin of operational data referring to one single responsibility. References to a data system are useful in an interoperated computer system.

For SIRI, this entails in particular specific systems for assigning unique identifiers to relevant entities such as 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 must 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**

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

3.1.17**DELAYED – SIRI**

a categorisation 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**DESTINATION DISPLAY – TransModel (with clarification)**

an advertised destination of a specific JOURNEY PATTERN, usually displayed on a headsign or at other on-board locations.

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.

3.1.19

DIRECTION – TransModel

a classification for the general orientation of ROUTES

3.1.20

DISTRIBUTOR – SIRI

the role of the outgoing VEHICLE from a TARGETED INTERCHANGE, which picks up passengers from a CONNECTION LINK who have transferred from a Feeder Service. Sometimes also called a Fetcher.

3.1.21

DISTRIBUTOR DEPARTURE – SIRI

the departure of an outgoing distributor VEHICLE JOURNEY from a CONNECTION LINK

3.1.22

EARLY – SIRI

a categorisation used in data presentations to indicate that the vehicle has been classified as Early against some criteria. The status of Early will be derived from the real-time progress data. This term should be contrasted with SCHEDULE DEVIATION which specifies the deviation from schedule in seconds.

3.1.23

ESTIMATED PASSING TIME – TransModel

time data, calculated from the latest available input, about when a public transport vehicle will pass a particular POINT IN JOURNEY PATTERN on a specified MONITORED VEHICLE JOURNEY. These are mainly used to inform passengers about expected times of arrival and/or departure, but may also be used for monitoring and re-planning. See also OBSERVED (ACTUAL) PASSING TIME, TARGET (AIMED) PASSING TIME and TIMETABLED PASSING TIME.

3.1.24

EVENT – TransModel

an EVENT may be raised in response to the disturbance and over the lifetime of the EVENT one or more CONTROLLER ACTIONS and messages may then be associated with it.

In SIRI, the EVENT is generally avoided in favour of more specific terms for entities

3.1.25

FEEDER – SIRI (Informal TransModel term)

the role of the incoming VEHICLE to and VEHICLE JOURNEY at a TARGETED INTERCHANGE, which feeds passengers to an arrival STOP POINT having a CONNECTION LINK to a departure STOP POINT from where they will board a Distributor Service. A VEHICLE may perform both feeder and distributor roles at the same time, that is, both set down passengers to transfer to other services, and board passengers from other services.

3.1.26

FEEDER ARRIVAL – SIRI

the arrival of an incoming feeder VEHICLE JOURNEY to a CONNECTION LINK

3.1.27

FOREIGN VEHICLE – SIRI (Informal TransModel Term)

a given ORGANISATIONAL UNIT, i.e. SIRI Control Centre system, manages its own set of Local VEHICLES and VEHICLE JOURNEYS, for which it is responsible for provisioning and updating the data. It may also need to manage data for Foreign VEHICLES and VEHICLE JOURNEYS, whose data is originated by a different Control Centre. A Foreign Vehicle is thus a local VEHICLE from one Control Centre that is Roaming into the area managed by another Control Centre.

3.1.28**HEADWAY INTERVAL – SIRI**

for Frequency based services, the interval between vehicles may be TIMETABLED, AIMED, ESTIMATED or ACTUAL

3.1.29**HEADWAY SERVICE – SIRI**

a frequent service whose time of departure is normally shown to the public as ‘every n minutes’ rather than a fixed time

3.1.30**INCIDENT – TransModel term**

an unforeseen EVENT influencing the operation of the network

In SIRI, progression of an Incident is represented by a Situation.

3.1.31**IN CONGESTION – SIRI**

the status of a vehicle stuck in a traffic jam causing its journey to be delayed and subject to non-deterministic factors; any predictions are likely to be inaccurate

3.1.32**IN PANIC – SIRI**

the status of a vehicle with an active Panic Alarm indicating a security or other incident that is likely to delay the journey according to non-deterministic factors; any predictions are likely to be inaccurate

3.1.33**JOURNEY CANCELLATION – TransModel**

a CONTROL ACTION consisting in deleting a DATED VEHICLE JOURNEY from the latest valid plan

3.1.34**JOURNEY CREATION – TransModel**

a CONTROL ACTION consisting in adding a completely new DATED VEHICLE JOURNEY to the latest valid plan

3.1.35**JOURNEY MEETING – TransModel**

a time constraint for one or several SERVICE JOURNEYS fixing interchanges between them and/or an external event (e.g. arrival or departure of a feeder line, opening time of the theatre, etc.)

3.1.36**JOURNEY PATTERN – TransModel**

an ordered list of STOP POINTS and TIMING POINTS on a single ROUTE, describing the pattern of working for public transport vehicles. A JOURNEY PATTERN may pass through the same POINT more than once. The first point of a JOURNEY PATTERN is the origin. The last point is the destination. Every VEHICLE JOURNEY has a JOURNEY PATTERN associated with it.

In SIRI, JOURNEY PATTERNS are not explicitly exposed in the interface: the LINE and Route DIRECTION elements that appear on VEHICLE JOURNEYS are assumed to be derived from the associated journey pattern.

3.1.37**LATE – SIRI**

a categorisation in presentations indicating that the vehicle has been classified as Late i.e., that a VEHICLE is running behind schedule in excess of some specified criteria. The status of Late will be derived from the real-time progress data.

3.1.38

LINE – TransModel

consists of a set of JOURNEY PATTERNS that are known to the public by the same LINE NUMBER identifier

3.1.39

LINE NUMBER – TransModel

an integer or a short alphanumeric sequence used to identify the LINE to the Public, for example: 11, 23, X3, 5A etc

3.1.40

LOCATION – TransModel

the position of a POINT with a reference to a given LOCATING SYSTEM (e. g. coordinates)

3.1.41

LOCAL VEHICLE – SIRI

a given ORGANISATIONAL UNIT, using a SIRI Control Centre system, manages its own set of Local VEHICLES and VEHICLE JOURNEYS, for which it is responsible for provisioning and updating the data

3.1.42

MONITORED VEHICLE JOURNEY – TransModel

a journey that is monitored as being operated by a LOGICAL VEHICLE. According to the monitoring system capabilities, a MONITORED VEHICLE JOURNEY may be related to a DATED VEHICLE JOURNEY, or only to a JOURNEY PATTERN.

3.1.43

OBSERVED PASSING TIME – TransModel

the actual passing of a public transport vehicle at a pre-defined POINT during a MONITORED VEHICLE JOURNEY. See also TARGET PASSING TIME and ESTIMATE PASSING TIME.

3.1.44

PASSING TIME – TransModel

the concept of PASSING TIME may be viewed as a simple passage (e.g. of a bus at a stop point) or as a longer stay (e.g. in maritime ports of call). The attributes describing the waiting time in the subtypes of PASSING TIME, in particular, will be used to describe such a call. The attribute 'alight and reboard' will express the possibility for the passenger to alight for a while, during the PASSING TIME of a VEHICLE JOURNEY at a particular STOP POINT.

The PASSING TIMES that are computed on a specific OPERATING DAY are called DATED PASSING TIME. This entity has several subtypes;

- TARGET PASSING TIME, the latest official plan for a DATED VEHICLE JOURNEY, on a POINT IN JOURNEY PATTERN;
- ESTIMATED PASSING TIME, a forecast for a MONITORED VEHICLE JOURNEY, on a POINT IN JOURNEY PATTERN;
- OBSERVED PASSING TIME, recorded for a MONITORED VEHICLE JOURNEY, on a particular POINT.

In SIRI Passing times are subsumed into a CALL entity. See Discussion later.

3.1.45

OCCUPANCY – SIRI (Informal TransModel term)

the number of passengers on a vehicle

3.1.46

ON TIME – SIRI

a categorisation in presentations indicating that the vehicle has been classified as neither LATE nor EARLY i.e., that a VEHICLE is running according to schedule within of some specified criteria. The status of Late will be derived from the real-time progress data.

3.1.47**OPERATING DAY – TransModel**

a day of public transport operation in a specific calendar. An OPERATING DAY may last more than 24 h.

3.1.48**PASSENGER TRIP – SIRI (Informal TransModel term)**

made by a traveller when moving from one PLACE to another using scheduled transport will make take one or more RIDES using different vehicles

3.1.49**PI FACILITY – TransModel**

a public transport information facility, as for instance terminals (on street, at information desks, telematic,) or printed material (leaflets displayed at stops, booklets).

SIRI does not model or represent PI FACILITIES; rather it describes data services that may be used to supply PI FACILITIES.

3.1.50**PLACE – TransModel**

a geographic place of any type which may be specified as the origin or destination of a trip. A PLACE may be of dimension 0 (a POINT), 1 (a road section) or 2 (a ZONE)

3.1.51**POINT – TransModel**

a 0-dimensional node of the network used for the spatial description of the network. POINTs may be located by a LOCATION in a given LOCATING SYSTEM

3.1.52**POINT IN JOURNEY PATTERN– TransModel**

a STOP POINT or TIMING POINT in a JOURNEY PATTERN with its order in that JOURNEY PATTERN

3.1.53**PRODUCT CATEGORY – SIRI**

a sub-classification of a transport mode, for example as 'express'

3.1.54**PRODUCTION PLAN – TransModel**

a reference version of production activities (service journeys, dead runs, duties.). CONTROL ACTIONs are described with reference to the PRODUCTION PLAN they amend.

3.1.55**PT TRIP – TransModel**

a part of a trip starting from the first boarding of a public transport vehicle to the last alighting from a public transport vehicle. A PT TRIP consists of one or more RIDES and the movements (usually walks) necessary to cover the corresponding CONNECTION LINKs.

RIDE – TransModel

a part of a TRIP corresponding to the theoretical movement of a user (passenger, driver) on one and only one public transport vehicle, from one STOP POINT to another, on one JOURNEY PATTERN.

Note that a traveller will take one or more RIDES during a TRIP. Each RIDE will be taken using a particular VEHICLE JOURNEY although the RIDE may be shorter than the VEHICLE JOURNEY.

3.1.56**ROAMING – SIRI**

the movement of a VEHICLE through the area managed by a different Control Centre. Within its home Control Centre the vehicle is Local; in other Control Centres it is Foreign.

3.1.57

ROUTE – TransModel

an ordered list of located POINTs defining one single path through the road (or rail) network. A ROUTE may pass through the same POINT more than once.

Each JOURNEY PATTERN may be associated with a particular ROUTE.

3.1.58

SCHEDULE DEVIATION – SIRI

the estimated deviation from the schedule for a VEHICLE JOURNEY, specified in seconds.

In SIRI, positive values are associated with vehicles that are behind their schedule, negative values with ones that are ahead.

3.1.59

SERVICE JOURNEY – TransModel

a passenger carrying VEHICLE JOURNEY for one specified DAY TYPE. The pattern of working is in principle defined by a SERVICE JOURNEY PATTERN.

3.1.60

SERVICE JOURNEY INTERCHANGE – TransModel

the scheduled possibility for transfer of passengers between two SERVICE JOURNEYS at the same or different STOP POINTs.

In SIRI, there are mechanisms for managing the real-time INTERCHANGE between Feeder VEHICLE JOURNEYS and Distributor VEHICLE JOURNEYS. Also known as “Connection Protection”.

There are four different degrees of interchange management:

- **PLANNED** – an interchange is intended in the normal static timetable.
- **ADVERTISED** – an interchange is intended and is publicised as being possible.
- **CONTROLLED** – the interchange is actively monitored to inform travellers whether the interchange can be made.
- **GUARANTEED** – the Distributor Service will be delayed to ensure the connection.

The SERVICE JOURNEY INTERCHANGE allows as well the storing of a quality parameter for ensuring connections, providing the maximum time a vehicle may wait for connecting vehicles, beyond the planned departure time.

3.1.61

SERVICE PATTERN – TransModel

the subset of a JOURNEY PATTERN made up only of STOP POINTs IN JOURNEY PATTERN

3.1.62

SHORT WORKING – SIRI

a strategy to bring a vehicle back onto schedule by curtailing the end of one VEHICLE JOURNEY and the start of another. Short Working is a type of CHANGE IN JOURNEY PATTERN.

3.1.63

SITUATION – Trident

a set of traffic/travel circumstances linked by a causal relationship which apply to a common set of locations. A situation can be composed of situation elements.

3.1.64**STOP AREA – SIRI**

a group of STOP POINTS close to each other

3.1.65**STOP MONITORING – SIRI**

the monitoring of the real time status and expected activities of vehicle arrivals and departures at a Stop Monitoring point.

The SIRI Stop Monitoring Service provides information of the real time status and expected activities for one or more MONITORING POINTs, corresponding typically to STOP POINTs.

3.1.66**STOP MONITORING POINT – SIRI**

a point at which real-time status is reported. Normally corresponds to a STOP POINT.

3.1.67**STOP POINT – TransModel**

a POINT where passengers can board or alight from vehicles

3.1.68**STOP ORDER – TransModel**

the sequence of a STOP within a JOURNEY PATTERN distinguishing repeated visits to a stop by a vehicle within the same journey pattern. A monotonically increasing number that is unique within a given journey pattern, but is not necessarily strictly sequential. The number provides both a unique identifier and a relative ordering.

3.1.69**STOP VISIT – SIRI**

the discrete visit by a VEHICLE making a call at a STOP POINT in the course of a DATED VEHICLE JOURNEY. The visit may include an arrival, departure or both, for each of which it may have separate Targeted (aimed), Estimated and Observed (Actual) times.

3.1.70**STOP VISIT COUNT – SIRI**

a means of distinguishing repeated visits to a stop by a vehicle within the same JOURNEY PATTERN. A Monotonically increasing number that is unique within a given STOP POINT for a given JOURNEY PATTERN. When combined with the STOP POINT Identifier the STOP VISIT COUNT can be used to uniquely identify the position of the vehicle along a JOURNEY PATTERN.

3.1.71**TARGET PASSING TIME – TransModel**

time data about when a public transport vehicle should pass a particular POINT IN JOURNEY PATTERN on a particular DATED VEHICLE JOURNEY, in order to match the latest valid plan. See also OBSERVED PASSING TIME and ESTIMATED PASSING TIME.

In TransModel, TARGET is synonymous with AIMED.

3.1.72**TIMING POINT – TransModel**

a POINT against which the timing information necessary to build schedules may be recorded

In SIRI, may be, but is not necessarily, a STOP POINT. In many systems, Target Times for stops that are not timing points are interpolated simplistically from the timing points by either the scheduling system, or the AVMS system, and may represent a lower level of accuracy of prediction.

3.1.73

TIMETABLED – TransModel

the TIMETABLED arrival or departure time for a Vehicle Journey at a STOP POINT is the planned time for this event, as distinct from the ESTIMATED or OBSERVED time.

In TransModel, TIMETABLED is synonymous with 'Scheduled'.

3.1.74

TRAIN – TransModel

a vehicle composed of TRAIN ELEMENTs in a certain order, i.e. of wagons assembled together and propelled by a locomotive or one of the wagons

3.1.75

TRAIN BLOCK – TransModel

a composite train formed of several TRAIN BLOCK PARTs coupled together during a certain period. Any coupling or separation action marks the start of a new TRAIN BLOCK.

3.1.76

TRAIN BLOCK PART – TransModel

a component of a vehicle TRAIN BLOCK

3.1.77

TRAIN COMPONENT – TransModel

a specification of the order of TRAIN ELEMENTs in a TRAIN

3.1.78

TRAIN ELEMENT – TransModel

an elementary component of a TRAIN (e.g. wagon or locomotive)

3.1.79

VEHICLE JOURNEY – TransModel

the planned movement of a public transport vehicle on a DAY TYPE from the start point to the end point of a JOURNEY PATTERN on a specified ROUTE.

In SIRI, the VEHICLE makes a call at each stop, for timetabled stops at a specific PASSING TIME. There may be a separate Arrival Time and Departure Time. A DATED VEHICLE JOURNEY is an instance of a VEHICLE JOURNEY made on a specific Calendar day.

3.1.80

VEHICLE MONITORING – TransModel

an activity consisting in the assignment, at a certain time, of operational data to a monitored LOGICAL VEHICLE (e.g. that the vehicle is operating a certain MONITORED VEHICLE JOURNEY, or has passed at a certain OBSERVED PASSING TIME at a POINT).

In SIRI, the information reported by the SIRI Vehicle Monitoring Service may include both the vehicle's location, i.e. geospatial position, and other operational data such as the number of passengers, and whether it is in congestion.

3.1.81

VERSION – TransModel

a group of operational data instances which share the same VALIDITY CONDITIONS. A version belongs to a unique VERSION FRAME and is characterised by a unique TYPE OF VERSION. E.g. NETWORK VERSION for Line 12 starting from 2000-01-01.

In SIRI Interface Versions are also used for software release levels.

3.1.82**VERSION FRAME – TransModel**

a set of VERSIONS referring to a same DATA SYSTEM and belonging to the same TYPE OF FRAME. A FRAME may be restricted by VALIDITY CONDITIONS.

In SIRI, used to group VEHICLE JOURNEYS into a timetable.

3.1.83**VISIT NUMBER – SIRI**

a means of distinguishing repeated visits to a stop by a vehicle within the same journey pattern.

A monotonically increasing number that is unique *within a given stop point* for a given journey pattern, as distinct from the TransModel ORDER; a monotonically increasing number that is unique on each call within a given journey pattern (i.e. that provides an overall serial ordering and unique identification of the stop within the whole journey pattern).

3.1.84**ZONE – TransModel**

a two-dimensional PLACE within the service area of a public transport operator (administrative zone, TARIFF ZONE, ACCESS ZONE, etc)

3.2 Communications & Software Concepts

For each term, it is indicated whether the term derives from WS-PubSub, general software usage, or whether the term is specific to SIRI.

3.2.1**ACCESS CONTROL – SIRI**

an application mechanism used to check Requests against a predefined set of Permissions to ensure that a Requestor or Subscriber is allowed to use the service according to an Authorisation policy. The policy may set what Capabilities the Subscriber may access, what Topic content they may retrieve, and how much computational resource they may consume.

3.2.2**ACCESS PERMISSION – SIRI**

an application mechanism used to specify whether a participant may use Service Capabilities, or access, specific Topic content of a Service

3.2.3**BUILT-IN CONSTRAINT – General Software Term**

XML allows a number of different rules as to the correct form of XML documents to be expressed in the schema using XML's Built-in language features. For example; whether elements are optional; the multiplicity of elements; regular expression as to values and uniqueness; and keyref constraints.

3.2.4**CAPABILITY – SIRI**

a coherent named set of features that a SIRI Functional Service may implement to provide particular application functionality. Some capabilities are common to all services; others are specific to individual functional services. Each SIRI functional service has a number of required capabilities, a number of capabilities for which alternatives are allowed, and a number of optional capabilities. A Capability Matrix is used both to specify the named capabilities for each SIRI functional service, and for the capabilities common to all SIRI functional services.

3.2.5**CLIENT – General Software Term**

an entity that makes Requests to a Server and receives Responses in reply. In this usage, client and server are roles, not specific computers: in a server-to-server environment, both 'server' computers are peers and may act as client or server depending on the specific protocols they use.

3.2.6

COMPOUND REQUEST – SIRI

a request that contains more than one request for a concrete SIRI Functional Service within it: each concrete request specifies a different topic. Similarly a compound subscription contains more than one SIRI Functional Service subscription request

3.2.7

CONFIGURATION – General Software Term

the process of deploying a computer system or systems in an environment so that they will function, including setting appropriate values for all parameterised properties such as addresses, capabilities, and permissions and provisioning with data

3.2.8

CONSUMER – WS-PubSub

an entity that receives Notification messages from a Producer as a result of a previous Subscription made to a Service. In SIRI, in order to manage recovery, a Consumer must know the Subscriber which asked for its subscriptions.

3.2.9

DATA HORIZON – SIRI

the span of time within which data of a given type is available. For stable long term data, this may be the validity period of the timetable or stop data. For more volatile short term data such as daily operational changes, it may be a shorter operation period such as the day or week. For real-time data this will be the retention period in the system of very volatile data, such as short term movement and prediction data, for example an hour, or as soon as the data is obsolete. Systems that keep historic logs of data value may offer a longer data horizon for some types of volatile data.

3.2.10

DATA READY NOTIFICATION – SIRI

the first message of the Fetched Delivery sequence: it informs the Consumer that the Notification Producer Service has updated data that is now ready to fetch using a Data Supply message.

3.2.11

DATA VALIDITY – SIRI

the period of time for which the information can be used, after which it becomes stale

3.2.12

DELIVERY – SIRI

a message or message sequence sent from the Producer to the Consumer to return payload content, either in immediate response to a Request, or sent asynchronously when a Notification Producer determines that the conditions of a Subscription are satisfied

3.2.13

DIRECT DELIVERY – SIRI

a one step Delivery pattern in which the notification and payload is sent as a single message from the Producer to the Consumer

3.2.14

ENDPOINT ADDRESS – WS-PubSub

the Address part of Endpoint Reference, specified as (the URI to send a message to) and Endpoint Reference Properties, that identify stateful resources

3.2.15

ENDPOINT REFERENCE – WS-PubSub

a web service endpoint is a referenceable, entity, or processor resource to which Web Service messages can be targeted. Endpoint references convey the information needed to identify and reference a Web service. Endpoint references are used to provide addresses for individual messages sent to and from Web Services, both synchronously and asynchronously. An endpoint reference includes an Address (the URI to which to send a message) and also Endpoint Reference Properties, that identify stateful resources, such as

subscriptions. They may also indicate a Port and Processing Policies. WS-PubSub and the other web service standards require the separation of the endpoint references from their bindings to a given transport protocol, such as SOAP.

In SIRI, each Participant is an endpoint for each of its roles in message exchange, i.e. Subscriber, Producer and Consumer. A Subscription Reference is an Endpoint property and is typically made up of two parts: (i) a Participant Reference, which may be specified in the configuration to indicate the Control Centre, and is not necessarily repeated explicitly on individual messages, and (ii) the Subscription Identifier, which is a serial number for an individual subscription that is unique within the SIRI Functional Service and Participant Reference.

3.2.16

ERROR CONDITION – SIRI

a description of a recognized mode of failure, reified in SIRI as a named error. Requests may be refused because of an Error Condition is detected. Different Error conditions are each represented in SIRI as separate elements each with an error code and a recommended error handling procedure.

3.2.17

FETCHED DELIVERY – SIRI

a two step Delivery in which first a Data Ready message is sent from the Producer service to the Consumer to notify the Consumer that data is ready, and then secondly the Consumer fetches the data by sending a Data Supply request to the Producer Service, which then finally sends a Data Supply Response message with the actual payload

3.2.18

FILTER – WS-PubSub

a set of constraints on the nature and volume of data to be returned in the Delivery. A Filter is specified on a Request or a Subscription message. Filters may include both a Topic Expression of content related terms, for example the STOP POINT, JOURNEY or Temporal span, and also a Subscription Policy, containing terms regulating the processing of the subscription, for example the Volume, indicating how many entries should be returned

3.2.19

HEARTBEAT – SIRI

a message sent at regular intervals by a Service to a Consumer to indicate it is functioning correctly. The heartbeat frequency, that is, how often a heart beat message should be sent, is specified as part of the subscription policy. A heartbeat message is an optional feature of SIRI; if a heartbeat is not provided, it is the responsibility of the Subscriber to determine whether the Service has failed by periodically polling the server using the Check Status message.

3.2.20

INITIAL TERMINATION TIME– WS-PubSub

the service requestor's suggestion for the initial termination time of the Subscription being created, also known informally as 'Lease Wanted'. This time is an absolute UTC time, timed according to the time source used by the Notification Producer.

3.2.21

INCREMENTAL UPDATE – SIRI

a Delivery containing only that information which has changed since the last update

3.2.22

INTERFACE VERSION – General Software Term

a release level assigned to a coherent set of software artefacts, such as an interface. In SIRI there are two version levels – the overall version level for the general services, and the version level for each individual SIRI functional service. The latter functional service level may be used as a single version identifier.

3.2.23

INTRINSIC CONSTRAINT – SIRI

XML allows a number of different rules as to the correct form of XML documents to be expressed in the schema using XML's built-in language built-in features. For example; whether elements are optional; the multiplicity of elements; any regular expressions constraining values; and uniqueness and keyref constraints. Apart from these constraints, there are some additional business rules on the structure and use of the SIRI XML model, which cannot readily be expressed using XML, but which can be clearly defined.

These '*intrinsic*' constraints for schema cross-validation are described in the SIRI document and should be observed by implementors. For example, in a Stop Monitoring Service delivery MonitoredCall at a stop, at least one form of time should be provided, but whether this is a target, estimated, or observed time, or even a headway frequency will depend on the service and whether the journey is monitored.

3.2.24

INFORMATIVE CHANNEL – SIRI

a categorisation of the informative messages that is used to filter messages from the message service. Informative messages have an identifier and version.

3.2.25

INFORMATIVE MESSAGE – SIRI

an informational message that is exchanged between Participants using a General Message service. Informative messages have an identifier and version so they can be updated and revoked. Their content may be in plain text, or structured according to an agreed format. Informative messages may be segregated into separate information channels according to an agreed categorisation, for example, Warning, Advice, etc.

3.2.26

ITEM – SIRI

a transient data container element included in a SIRI functional service response that has a timestamp. It may optionally have an Item Identifier which can be used to reference it subsequently, for example to associate a cancellation of an earlier item.

3.2.27

LEASE – WS-PubSub

the allowed duration of a Subscription. In SIRI, leases are specified by an Initial Termination Time and cannot be negotiated or renewed

3.2.28

LIFE SIGN – SIRI

a message sent by a Consumer Client to a Producer Server to indicate that it is still interested in receiving Subscriptions. Life-sign messages allow the Producer to detect failed clients and terminate their subscriptions, therefore making a more efficient use of its resources. SIRI does not currently provide automatic Life Sign messages

3.2.29

MESSAGE REFERENCE – WS-PubSub

the identifier issued to identify an individual request within a conversation, and subsequently used to refer to the request in further exchanges within a stateful resource pattern, such as Publish/Subscribe, or Fetched Delivery

3.2.30

METADATA – General Software Term

any form of data about data, in particular the structure of data, for example, the name and schema of the DATA SYSTEM used to describe STOP POINTS, or the SIRI XML schemas themselves. Also used to describe the data to categorise an xml schema or instance document for automated indexing by search engines.

3.2.31**MULTIPART DESPATCH – SIRI**

delivery of large packet of data by breaking it down into two or more Delivery messages, chained together by a 'MoreData' flag

3.2.32**NAMESPACE – General Software Term**

a well defined named scope within which a set of unambiguous, i.e. unique identifiers for a given entity type or types may be distinguished. Separate names spaces are allowed in SIRI for various types of reference data, for example, (i) message identifiers, (ii) subscription identifiers (iii) identifiers of reference data such as stop points, product categories, etc. In SIRI the Participant Reference is used as a general purpose namespace associated with a particular Service Participant. Namespace is also used as a technical term within XML in a related sense, to identify the scope within which XML element, and attribute names are unique.

3.2.33**NOTIFICATION – WS-PubSub**

the act of transmitting a Notification Message to a Notification Consumer. Notifications are sent from the Publisher to the Producer and then from the Producer to the Consumer. The direct unmediated forwarding of notifications from the Publisher by the Producer without filtering or transformation is termed '*unbrokered*' notification. SIRI requires the mediation of messages by the Producer.

3.2.34**NOTIFICATION CONSUMER – WS-PubSub**

a Client that receives Notification Messages from a Notification Producer. The role may be performed by the same or a different entity as that of the Subscriber who created the Subscription which requested the sending of the Notification Messages in the first place.

3.2.35**NOTIFICATION PRODUCER – WS-PubSub**

a Service that implements the distribution of Notification messages to satisfy Subscriptions; the Notification Messages themselves are generated by a Publisher (and may be routed to the Notification Producer via a Notification Broker). A Notification Producer maintains a list of Subscription resources and uses the Topic Filters of the individual Subscriptions to match the Notification Messages with the Subscribers' interests. If it identifies a match, it issues a notification to the Notification Consumer associated with the Subscription.

3.2.36**NOTIFICATION BROKER – WS-PubSub**

a separate intermediary entity that may be used to distribute the Notification Messages produced by a Publisher entity to one or more Notification Producer services. This allows the decoupling of Publisher and Producer roles if desired. A Notification Broker may also provide specific services such as Access Control.

3.2.37**PARTICIPANT – SIRI**

a system that participates in the exchange of messages using the SIRI protocols. A Participant has a Participant Reference, used to identify the participant in message exchanges, and also used to provide a general purpose namespace to scope arbitrary identifiers of model elements such as line and vehicle identifiers. In SIRI Consumers and Notification Producers (i.e. Control Centres) are Participants.

3.2.38**PARTICIPANT REFERENCE – SIRI**

unique identifier of a Control Centre or other type of Service Participant. The reference is bilaterally agreed between participating systems, and will typically be unique for a region of a country within which systems need to communicate. The Participant Reference is used to scope other data identifiers within each bilateral data reference agreement.

3.2.39**PAYLOAD – SIRI**

the content data part of a Delivery message, as opposed to the elements used to manage the message exchange such as the Endpoint Reference elements

3.2.40

PREDICTION INACCURATE – SIRI

a basic data quality measure used to indicate when the Predicted Times are known or thought to be imprecise. In some cases the cause of the inaccuracy may be indicated by a more specific reason, for example IN CONGESTION.

3.2.41

PRODUCER – WS-PubSub

an entity that sends Notification messages to a Consumer as a result of a previous Subscription made to it for a Functional Service. Events that give rise to Notification messages are sent to the Producer by a Publisher entity.

3.2.42

PRODUCTION TIMETABLE – SIRI

the revised version of the TIMETABLE for a Service containing updates to the original published timetable. The original TIMETABLED TIMES are referred to as TARGET TIMES.

3.2.43

PROVISIONING – SIRI

the populating of a system with a complete set of stable data necessary for its operation, both reference data and content; for example, the stop identifiers and the timetable data for an AVMS system. Provisioning is distinct from Configuration – the setting up of the systems' operational parameters and other variable features – in that it may be routinely repeated from time to time when a new data set is prepared.

3.2.44

PUBLISH-SUBSCRIBE – WS-PubSub

a pattern of interaction between a Client (as Subscriber and Consumer) and Server (as Notification Producer) involving the sending of an initial Subscription and the subsequent asynchronous receipt of one or more Notification Messages that contain a payload of information. The Subscription has a Lease, which defines its duration.

3.2.45

PUBLISHER REGISTRATION – WS-PubSub

a Publisher Registration represents the relationship between a Publisher and a Notification Broker, an optional WS-PubSub intermediary that can be introduced to delegate the distribution of Notification Messages to one or more distinct entities that act as Notification Producers

3.2.46

Publisher – WS-PubSub

an entity that processes events in the data feeds and sends Notification messages to a Producer for brokering and distribution to Consumers. The Producer may carry out additional mediation such as filtering or data transformation. The use of a Notification Producer is transparent in SIRI.

3.2.47

REQUEST – General Software Term

any type of message sent from a Client to a Server to ask it to perform an action. A Request usually has a corresponding Response, and also various Error Conditions for when the Request fails.

3.2.48

REQUESTOR – General Software Term

an entity that makes a Request to a Service to ask it to perform an action or send a reply

3.2.49

SCHEMA VALIDATION – XML

the process of parsing an XML document against its schema. To be validated successfully, an XML document must be both *well-formed*: that is, comprise a set of tags that are syntactically correct XML so that it can be parsed, and *valid*: that is, conform to any constraints expressed in the document as to data type and integrity of reference.

3.2.50**SENSITIVITY THRESHOLD – SIRI**

a term in a Subscription Policy specifying of the degree of change that is permitted in the values of certain quantitative Topic data elements or other Subscription Policy values before a further update Delivery should be provided by the Server to its Subscribers. Also known as ‘hysteresis’.

3.2.51**SERVER – General Software Term**

a computer running a Service that responds to Requests from a Client

3.2.52**SERVICE – WS-PubSub**

a Service is a process running on a server computer that responds to requests of a particular type. Some types of service may initiate requests in their own right. SIRI is made up of a number of different types of SIRI functional Service.

3.2.53**SERVICE LAYER – General Software Term**

a separation of implementation concerns as a functional layer in the software. Each layer encapsulates specific functions. A Service Layer may only communicate with the layers above and below it. Two Service Layers are provided in SIRI; the Communications Service Layer and the Technical Service Layer. The Communications Service Layer establishes and maintains the integrity of the connection (and hides the use of a separate Transport Layer). The Technical Services Layer operates on the Communications Layer and accommodates the individual Service functions.

3.2.54**SERVICE PARTICIPANT – SIRI**

a SIRI Service Participant is a participating system that exchanges SIRI messages with another Service Participant. Each Service Participant has a unique identifier, (the Participant Code), which provides a scope (i.e. unique namespace) for all non-global data references, such as stop identifiers, vehicle identifiers, and also for message identifiers of requests and subscriptions. Service Participants will either be SIRI Functional Service systems providing information, or accredited client systems that send request and subscriptions to the services to obtain information.

3.2.55**SIRI FUNCTIONAL SERVICE – SIRI**

a specific concrete Service that provides a function, such as Stop or Connection Monitoring. It comprises a set of named messages making up a SIRI interface that must be used according to both the general SIRI communication rules and the specific semantics of the particular Service.

3.2.56**SITUATION – WS-PubSub**

some occurrence within a service or its environment of interest to third parties. A Situation can be a change of state in the service itself, or an event in the context of the systems it monitors. A Publisher that detects a Situation will create a Notification Message.

3.2.57**SUBSCRIBER – WS-PubSub**

an entity that acts as a Service Requestor, sending a Subscription Request on behalf of a Consumer to a Notification Producer. The Consumer entity will usually be the same entity as the Subscriber, but may also be a separate entity.

3.2.58**SUBSCRIPTION – WS-PubSub**

a Subscription is a resource created to represent the relationship between a Notification Consumer, a Notification Producer, Topic and other filters and policies. A Subscription is created when a Subscriber sends a Subscribe message to a Notification Producer, which acts as the factory for new subscriptions. A Subscription may be subsequently altered through a Subscription Manager.