

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

Part 3: Functional service interfaces

ICS 35.240.60

National foreword

This Draft for Development is the UK implementation of CEN/TS 15531-3:2007.

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 3: Functional
service interfaces**

Öffentlicher Verkehr - Dienstleistungsschnittstelle für
zeitnahe Informationen zum Betrieb des öffentlichen
Verkehrs - Teil 3: Funktionale Dienstleistungsschnittstellen

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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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: rue de Stassart, 36 B-1050 Brussels

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Foreword

This document (CEN/TS 15531-3:2007) 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 3 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

There are many potential ways for passenger transport operations centres to interact. The approach taken by SIRI is for an open-ended set of standard data structures, carried over a communications channel constructed using one of a small number of specific options.

Part 2 of this Technical Specification specifies the communications channel. This section specifies a number of functional modules, based on the 'use cases' identified in Annex B to Part 1:

- **Production Timetable (PT):** this service enables the provision of information on the planned progress of vehicles operating a specific service, identified by the vehicle time of arrival and departure at specific stops on a planned route for a particular Operational Day.
- **Estimated Timetable (ET):** this service enables the provision of information on the actual progress of Vehicle Journeys operating specific service Lines, detailing expected arrival and departure times at specific stops on a planned route. There will be recorded data for stops which have been passed, and predicted data for stops not yet passed. In addition the Estimated Timetable service allows Vehicle Journeys to be cancelled, added or changed.
- **Stop Timetable (ST):** this service provides a stop-centric view of timetabled vehicle arrivals and departures at a designated stop. It can be used to reduce the amount of information that needs to be transmitted in real-time to stops and displays, as reference data for a Stop Monitoring Service; and provides a data feed of the static timetables.
- **Stop Monitoring (SM):** this service provides a stop-centric view of vehicle arrivals and departures at a designated stop. It can be used by displays and other presentation services to provide departure board and other presentations of timetable and real-time journey information both at stops and at a distance.
- **Vehicle Monitoring (VM):** this service enables the provision of information on the current location and status of a set of vehicles. It does not relate to specific stops. It provides all the current relevant information from one AVMS relating to all vehicles fulfilling a set of selection criteria.
- **Connection Timetable (CT):** this service may be used to provide information about the scheduled arrivals of a feeder vehicle to the operator of a connecting distributor service. The distributor operator can then plan how to guarantee the connection, either with the expected vehicle or a different vehicle.
- **Connection Monitoring (CM):** this service is used to provide information about the expected arrival of a feeder vehicle to the operator of a connecting distributor service. The distributor operator can then manage the service to guarantee the connection, based on actual vehicle running.
- **General Message (GM):** the SIRI "General Message" service is used to exchange informative messages between identified individuals in free or an arbitrary structured format. It enables messages to be sent and to be revoked. Messages are assigned validity periods in addition to the actual content.

2 Normative references

Not applicable.

3 Terms and definitions

For the purposes of this document, the terms and definitions given in CEN/TS 15531-1:2007 apply.

4 Symbols and abbreviations

For the purposes of this document, the symbols and abbreviations given in CEN/TS 15531-1:2007 apply.

5 Production Timetable Service [PT]

5.1 Purpose

The SIRI Production Timetable Service transmits daily timetables that include any planned updates that are known about at the time of transmission. The service is used typically to communicate between Scheduling systems and AVMS systems, and also between AVMS systems and intelligent clients of the AVMS system. The timetables exchanged should cover all lines covered by the AVMS system.

The SIRI Production Timetable Service is also used to transmit the planned interchanges between journeys, including information about the linking of vehicle parts through the interchange, such as whether passengers are able to remain seated in the vehicle.

The provision of known updates gives a more accurate data set of journeys for the SIRI Estimated Timetable Service to reference, allowing a more efficient real-time exchange of content. However, the provision of a Production Timetable Service is not absolutely essential for the functioning of the Estimated Timetable service.

Because of the enhanced quality of data given by an increased integration with operational and back-office scheduling systems, SIRI implementations that are able to obtain production timetables should always provide and make use of a SIRI Production Timetable Service.

Note that an AVMS system may be aware of additional operational journeys and calls such as dead runs, and layovers. As the schedule information system usually only knows about vehicle journeys that are relevant to the passenger, the AVMS should only transmit passenger carrying vehicle journeys to the schedule information system.

5.2 Capability and Permission Matrices

5.2.1 Capability Matrix

Table 1 shows the set of required and optional capabilities is defined for the Production Timetable service.

If the service supports Capability Discovery the ***ProductionTimetableCapabilitiesRequest*** / ***ProductionTimetableCapabilitiesResponse*** message pair can be used to determine the implementation's capabilities.

Table 1 — ProductionTimetableCapabilities Matrix

<i>ProductionTimetableCapabilities</i>			+Structure	Capabilities describing implementation of Production Timetable service
<i>inherit</i>	...	1:1	See xxx- <i>Capability-Response</i>	See SIRI Part 2-12.4 for Common Capability attributes.
<i>Topic</i>	<i>TopicFiltering</i>	0:1	+Structure	Which optional filtering features are supported.
	<i>FilterByValidityPeriod</i>	1:1	<i>xsd:boolean</i>	Whether results can be filtered by Validity Period. Required Facility: Fixed is <i>true</i> .
	<i>FilterByOperatorRef</i>	1:1	<i>xsd:boolean</i>	Whether results can be filtered by Operator. Default is <i>true</i> .
	<i>FilterByLineRef</i>	1:1	<i>xsd:boolean</i>	Whether results can be filtered by Line. Default is <i>true</i> .
	<i>FilterByVersionRef</i>	1:1	<i>xsd:boolean</i>	Whether results can be filtered by Timetable Version. Default is <i>true</i> .

Request Policy	RequestPolicy		0:1	+Structure	Which features of Request Policy are supported by the service?
		Language	1:*	<i>xsd:language</i>	National languages used by service.
				<i>choice</i>	Location reference system for coordinates.
	a	GmlCoordinateFormat	0:1	<i>SrsNameType</i>	Default coordinate format is given by a GML value.
	b	WgsDecimalDegrees		<i>EmptyType</i>	Default coordinate data system is WGS 84 latitude and longitude.
Sub- scription Policy	SubscriptionPolicy		0:1	+Structure	Which features of Subscription Policy are supported by the service?
		HasIncremental-Updates	0:1	<i>xsd:boolean</i>	Whether incremental updates can be specified for updates. Default is <i>true</i> .
Access Control	AccessControl		0:1	+Structure	Which optional Access Control features are supported by service?
		RequestChecking	0:1	<i>xsd:boolean</i>	Whether access control of requests is supported. Default is <i>false</i> .
		CheckOperatorRef	0:1	<i>xsd:boolean</i>	If access control is supported, whether access control by Operator is supported. Default is <i>true</i> .
		CheckLineRef	0:1	<i>xsd:boolean</i>	If access control is supported, whether access control by Line is supported. Default is <i>true</i> .
		CheckConnection-Link_Ref	0:1	<i>xsd:boolean</i>	If access control is supported, whether access control by ConnectionLink is supported. Default is <i>true</i> .
any	Extensions		0:1	any	Placeholder for user extensions.

5.2.2 Permission Matrix

If the implementation supports both Capability Discovery and Access Controls, then the **ProductionTimetableCapabilitiesResponse** response can include the access permissions for the requestor participant to access data. Table 2 shows this.

Table 2 — Production Timetable Service Permissions

ProductionTimetablePermission			+Structure	Permissions to use implementation of Production Timetable service.
In-herit	...	1:1	<i>xxxService-Permissions</i>	See SIRI Part 2-12.5 for Common Permission elements.
Topic	OperatorPermissions	0:1	+Structure	Operator permissions for participant. See Part 2.
	LinePermissions	0:1	+Structure	Line permissions for participant. See Part 2.
	ConnectionLinkPermissions	0:1	+Structure	ConnectionLink permissions for participant. See Part 2.

5.3 ProductionTimetableRequest

5.3.1 ProductionTimetableRequest Definition

The **ProductionTimetableRequest** states which timetables should be returned – see Table 3.

Table 3 — ProductionTimetableRequest Parameters

ProductionTimetableRequest			+Structure	Request for daily production timetables
Attributes	version	1:1	VersionString	Version Identifier of <i>Production Timetable</i> Service, e.g. 1.0c
Endpoint Properties	Request-Timestamp	1:1	xsd:dateTime	See SIRI Part 2 for common properties of SIRI Functional Service Requests.
	Message-Identifier	0:1	Message-Qualifier	
Topic	ValidityPeriod	0:1	ClosedDate-Range-Structure	Start and end of timetable validity (time window) of journeys for which schedules are to be returned. Refers to the departure time at the first stop of each vehicle journey. If blank the configured data horizon will be used.
	Start	1:1	xsd:dateTime	The (inclusive) start time.
	End	1:1	xsd:dateTime	The (inclusive) end time.
	Timetable-VersionRef	0:1	xsd:string	Communicate only differences to the timetable specified by this version of the timetable.
	OperatorRef	0:*	→Operator-Code	Filter the results to include only results for the specified operator or operators. Optional SIRI capability: <i>TopicFiltering / ByOperator</i> .
	LineRef	0:1	→LineCode	Filter the results to include only results for the given line or lines.
	DirectionRef	0:1	→Direction-Code	Filter the results to include only journeys for vehicles running in a specific relative direction. Optional SIRI capability: <i>TopicFiltering / ByDirection</i> .
Policy	Language	0:1	xml:lang	Preferred language in which to return text values. Optional SIRI capability: <i>NationalLanguage</i> .
	Incremental-Updates	0:1	xsd:boolean	Whether the producer should return the complete set of current data, or only provide updates to the last timetable returned, i.e. additions, modifications and deletions, as indicated by the TimetableVersionRef . If <i>false</i> each subscription response will contain the full information as specified in this request.
any	Extensions	0:1	any	Placeholder for user extensions.

The **ProductionTimetableRequest** can be used in both a direct request, and for a subscription. If used for a subscription, additional **ProductionTimetableSubscriptionPolicy** parameters can be specified.

The primary *Topic* term on the request is the time window for which timetables are to be returned. Additional topic filtering on line and timetable version is also allowed. If filtering is not specified, all lines known to the AVMS are transmitted.

If the timetable version is not available an error code is returned **NoInfoForTopic**. In this situation a subscription is not set up.

5.3.2 ProductionTimetableRequest Example

The following is an example of a **ProductionTimetableRequest**.

```
<ServiceRequest>
  <RequestTimestamp>2004-12-17T09:30:47-05:00</RequestTimestamp>
  <RequestorRef>NADER</RequestorRef>
  <ProductionTimetableRequest version="1.0">
```

```

<RequestTimestamp>2001-12-17T09:30:47-05:00</RequestTimestamp>
<ValidityPeriod>
  <StartTime>14:20:00</StartTime>
  <EndTime>14:20:00</EndTime>
</ValidityPeriod>
<TimetableVersionRef>002</TimetableVersionRef>
<OperatorRef>Smooth</OperatorRef>
<LineRef>123</LineRef>
<DirectionRef>Outbound</DirectionRef>
</ProductionTimetableRequest>
</ServiceRequest>

```

5.4 ProductionTimetableSubscriptionRequest

5.4.1 ProductionTimetableSubscriptionRequest Definition

The **ProductionTimetableSubscriptionRequest** (Table 4) requests the asynchronous delivery of the information described by a **ProductionTimetableRequest**. The **ProductionTimetableSubscriptionRequest** Policy parameters control the processing of the subscription.

Table 4 — ProductionTimetableSubscriptionRequest Parameters

ProductionTimetableSubscriptionRequest			+Structure	Request for a subscription to the SIRI Production Timetable Service.
Identity	SubscriberRef	0:1	→ParticipantCode	See SIRI Part 2 for common SubscriptionRequest parameters.
	SubscriptionIdentifier	1:1	SubscriptionQualifier	
Lease	InitialTerminationTime	1:1	xsd:dateTIme	
Request	ProductionTimetable-Request	1:1	+Structure	See ProductionTimetableRequest .

5.4.2 ProductionTimetableSubscriptionRequest Example

The following is an example of a **ProductionTimetableSubscriptionRequest**.

```

<SubscriptionRequest>
  <RequestTimestamp>2004-12-17T09:30:47-05:00</RequestTimestamp>
  <RequestorRef>NADER</RequestorRef>
  <ProductionTimetableSubscriptionRequest>
    <SubscriberRef>NADER</SubscriberRef>
    <SubscriptionIdentifier>0000456</SubscriptionIdentifier>
    <InitialTerminationTime>2001-12-17T09:30:47-05:00</InitialTerminationTime>
    <ProductionTimetableRequest version="1.0">
      <RequestTimestamp>2001-12-17T09:30:47-05:00</RequestTimestamp>
      <ValidityPeriod>
        <StartTime>14:20:00</StartTime>
        <EndTime>14:20:00</EndTime>
      </ValidityPeriod>
    </ProductionTimetableRequest>
  </ProductionTimetableSubscriptionRequest>
</SubscriptionRequest>

```

```

<TimetableVersionRef>002</TimetableVersionRef>
<OperatorRef>Smooth</OperatorRef>
<LineRef>123</LineRef>
<DirectionRef>Outbound</DirectionRef>
</ProductionTimetableRequest>
</ProductionTimetableSubscriptionRequest>
</SubscriptionRequest>

```

5.5 ProductionTimetableDelivery

5.5.1 General

The **ProductionTimetableDelivery** returns the position of a vehicle or group of vehicles.

5.5.2 ServiceDelivery with a ProductionTimetableDelivery

One or more **ProductionTimetableDelivery** elements may be returned as part of a SIRI Functional ServiceDelivery. Table 5 shows this element.

Table 5 — ServiceDelivery / ProductionTimetableDelivery Elements

ServiceDelivery			+Structure	See SIRI Part 2-7.2.1 ServiceDelivery
HEADER	...	1:1	See ServiceDelivery	
Payload	ProductionTimetableDelivery	0:*	+Structure	See ProductionTimetableDelivery element.

5.5.3 ProductionTimetableDelivery Element

Each **ProductionTimetableDelivery** is made up of **DatedTimetableVersionFrame** elements. There will be status messages for any request that could not be returned. Table 6 shows this element.

Table 6 — ProductionTimetableDelivery Elements

ProductionTimetableDelivery			+Structure	Describes one or more Dated Timetables.
Attributes	version	1:1	VersionString	Version Identifier of Production Timetable Service. Fixed, e.g. 1.0.
LEADER	...	1:1	xxx ServiceDelivery	See SIRI Part 2-7.2.1.1 xxx ServiceDelivery .
Payload	DatedTimetableVersionFrame	0:*	+Structure	A version of the timetable to run on a specified date. See DatedTimetableVersionFrame element.
any	Extensions	0:1	any	Placeholder for user extensions.

5.5.4 DatedTimetableVersionFrame Element

5.5.4.1 General

Each production timetable is returned as a **DatedTimetableVersionFrame** element. Each **DatedTimetableVersionFrame** contains a version of the timetable for a line and direction, and comprises one or more **DatedVehicleJourney** elements. Table 7 shows this element.

Table 7 — DatedTimetableVersionFrame Elements

DatedTimetableVersionFrame			+Structure	Provides a schedule of dated vehicle journey for a line and direction.
Log	RecordedAtTime	1:1	<i>xsd:dateTime</i>	Time at which data was recorded.
Identity	VersionRef	0:1	<i>→VersionCode</i>	Identifier of Timetable version frame.
Line	LineRef	1:1	<i>→LineCode</i>	Identifier for the line.
	DirectionRef	1:1	<i>→DirectionCode</i>	Identifier of the relative direction the vehicle is running along the line, for example, "in" or "out", "clockwise". Distinct from a destination.
Journey Pattern Info	:::	0:1	<i>JourneyPattern-InfoGroup</i>	See SIRI Part 2 JourneyPatternInfo-Group .
Service Info	:::	0:1	<i>ServiceInfoGroup</i>	See SIRI Part 2 ServiceInfoGroup .
Notes	DestinationDisplay	0:1	<i>NLString</i>	Name of Destination of journey.
	LineNote	0:1	<i>NLString</i>	Text associated with line.
Real time defaults	HeadwayService	0:1	<i>xsd:boolean</i>	Whether this is a Headway Service, that is one shown as operating at a prescribed interval rather than to a fixed timetable.
	Monitored	0:1	<i>xsd:boolean</i>	Whether there is real-time information available for journey, if not present, not known.
Journeys	DatedVehicleJourney	0:*	+Structure	Provides schedule information about the vehicle journey along which a vehicle is running.
any	Extensions	0:1	any	Placeholder for user extensions.

5.5.4.2 DatedVehicleJourney Element

Each **DatedVehicleJourney** contains an ordered list of **DatedCall** elements representing the sequence of stop calls, as well as other properties that apply to the journey as a whole. Table 8 shows this element.

Table 8 — DatedVehicleJourney Elements

DatedVehicleJourney			+Structure	Provides schedule information about the vehicle journey along which a vehicle is running.
Vehicle Journey Identity	DatedVehicle-JourneyCode	1:1	<i>→Vehicle-JourneyCode</i>	Identifies the dated vehicle journey.
	VehicleJourneyRef	0:1	<i>→Vehicle-JourneyCode</i>	Vehicle Journey from which this journey is different.
	ExtraJourney	0:1	<i>xsd:boolean</i>	Whether this journey is an addition to the plan Can only be used when both participants recognise the same schedule version. If omitted, defaults to <i>false</i> : the journey is not an addition.
	Cancellation	0:1	<i>xsd:boolean</i>	Whether this journey is a Cancellation of a journey in the plan. Can only be used when both participants recognise the same schedule version. If omitted, defaults to <i>false</i> : Journey is not a Cancellation.
Journey Pattern Info	:::	0:1	<i>JourneyPattern-InfoGroup</i>	See SIRI Part 2 JourneyPatternInfoGroup .
Service Info	:::	0:1	<i>ServiceInfo-Group</i>	See SIRI Part 2 ServiceInfoGroup .
Journey Info	VehicleJourney-Name	0:1	<i>NLString</i>	For train services with Named Journeys. Train name, e.g. "West Coast Express". If omitted: No train name. Inherited property.

	JourneyNote	0:*	NLString	Additional descriptive text associated with journey. Inherited property.
Notes	DestinationDisplay	0:1	NLString	The appropriate text to be used as Destination for this Vehicle Journey. Can be overridden at individual calling points.
	LineNote	0:1	NLString	Additional Text associated with line. Inherited property.
Timetable-info	HeadwayService	0:1	xsd:boolean	Whether this is a Headway Service, that is one shown as operating at a prescribed interval rather than to a fixed timetable.
Real-time Info	Monitored	0:1	xsd:boolean	Whether there is real-time information available for journey, if not present, not known.
Operational Block	:::	0:1	OperationalBlock Group	See SIRI Part 2 OperationalBlockGroup .
Children	a DatedCalls	1:1	+Structure	Complete sequence of stops along the route path, in calling order. Calls are in order within a journey pattern.
	DatedCall	2:*	+Structure	Individual DatedCall . See below.
	b	2:*	DatedCalls-AsFlatGroup	Unnested children for compatibility.
any	Extensions	0:1	any	Placeholder for user extensions.

5.5.4.3 DatedCall Element

Each **DatedCall** describes the times at a stop. A journey must contain at least two calls. Table 9 shows this element.

Table 9 — DatedCall Elements

DatedCall			+Structure	Provides information about a call in a dated vehicle
Stop Identity	StopPointRef	1:1	→StopPointCode	Identifier of stop. Defaults to that of context i.e. that specified on StopPoint .
	VisitNumber	0:1	VisitNumberType	For journey patterns that involve repeated visits by a vehicle to a stop, the VisitNumber count is used to distinguish each separate visit. Default is '1'
	Order	0:1	xsd:positive-Integer	For implementations for which the overall Order within journey pattern is not used for VisitNumber , (i.e. if VisitNumbersOrder is <i>false</i>) then can be used to associate the overall Order as well if useful.
	StopPointName	0:1	NLString	Name of Stop.
Info	TimingPoint	0:1	xsd:boolean	Whether the stop is a timing point. Times for stops that are not timing points are sometimes interpolated crudely from the timing points, and may represent a lower level of accuracy. Default is <i>true</i> .
	BoardingStretch	0:1	xsd:boolean	Whether this is a Hail and Ride Stop. A hail and ride stop may represent a linear stretch in the stop model. Default is <i>false</i> .
	RequestStop	0:1	xsd:boolean	Whether Vehicle stops only if requested explicitly by passenger. Default is <i>false</i> .
Service Info	DestinationDisplay	0:1	NLString	The publicised destination at this point in the journey; used to help identify the vehicle to the public. Since vehicles can change their published destination during a journey, the destination included here should be what the vehicle will display when it reaches this stop. The destination display is specified by exception: if none is specified, the value from any previous DatedCall instances for the same journey will be used. If there are none then any values from the underlying DatedVehicleJourney will be used, or failing that, from

				the DatedTimetableVersionFrame .
Call	CallNote	0:1	NLString	Text annotation that applies to this call.
Facility	FacilityChange	0:1	+Structure	Information about Equipment Availability at stop that may affect access or use. See DisruptionGroup in Part 2 for details.
Arrival	AimedArrivalTime	0:1	xsd:dateTime	Aimed Arrival Time in either the original or Production Timetable. Can be omitted at the end stop.
	Arrival-PlatformName	0:1	NLString	Bay or platform name. Inherited property. Can be omitted if the same as the DeparturePlatformName .
	Arrival-BoardingActivity	0:1	alighting noAlighting passthru	Type of alighting allowed at stop. Default is <i>alighting</i> .
Departure	Aimed-DepartureTime	0:1	xsd:dateTime	Aimed Departure Time in either the original or Production Timetable.
	Departure-PlatformName	0:1	NLString	Bay or platform name from which vehicle will depart.
	Departure-BoardingActivity	0:1	boarding noBoarding passthru	Type of boarding allowed at stop. Default is <i>boarding</i> .
Headway	AimedHeadway-Interval	0:1	Positive-DurationType	Target interval for frequency based services.
Children	Targeted-Interchange	0:*	+Structure	Information on any planned connections. If omitted: No connections, i.e. TargetedInterchange .
any	Extensions	0:1	any	Placeholder for user extensions.

5.5.4.4 TargetedInterchange Element

Each **TargetedInterchange** describes the connections that may be made at a stop to another onwards distributor journey. Table 10 shows this element.

Table 10 — TargetedInterchange Elements

TargetedInterchange			+Structure	Information on any planned connections. If omitted: No connections.
Identity	InterchangeCode	0:1	→Interchange-Code	Identifier of Journey Interchange.
	DistributorVehicle-JourneyRef	1:1	→DatedVehicle-JourneyCode	Identifies the distributor dated vehicle journey.
Connection	Distributor-ConnectionLink	1:1	+Structure	ConnectionLink over which interchange takes place.
	ConnectionCode	1:1	ConnectionCode	Identifier of connection Link.
	StopPointRef	0:1	→StopPoint-Code	Interchange stop from which the distributor journey departs. If omitted: the distributor journey stop is the same as the feeder journey stop, i.e. that of the containing dated call.
	Interchange-Duration	0:1	PositiveDuration-Type	Time (Duration) needed by passenger to change from feeder to distributor.
	Frequent-TravellerDuration	0:1	PositiveDuration-Type	Time (Duration) needed by passenger who is familiar with interchange to change from feeder to distributor. If absent, use InterchangeDuration and a standard weighting.

	Occasional-TravellerDuration	0:1	<i>PositiveDuration-Type</i>	Time (Duration) needed by passenger who is not familiar with interchange to change from feeder to distributor. If absent, use InterchangeDuration and a standard weighting.
	ImpairedAccess-Duration	0:1	<i>PositiveDuration-Type</i>	Time (Duration) needed by impaired mobility passenger to change from feeder to distributor. If absent, use InterchangeDuration and a standard weighting.
<i>Identity</i>	Distributor-VisitNumber	0:1	<i>VisitNumber-Type</i>	Sequence of visit to stop within distributor vehicle journey. Increases monotonically, but not necessarily sequentially.
	DistributorOrder	0:1	<i>xsd:positive-Integer</i>	For implementations for which the overall Order within journey pattern is not used for VisitNumber , (i.e. if VisitNumberIsOrder is <i>false</i>) then can be used to associate the overall Order as well if useful.
<i>Interchange Properties</i>	StaySeated	0:1	<i>xsd:boolean</i>	Whether Vehicle stops only if requested explicitly by passenger. Default is <i>false</i> .
	Guaranteed	0:1	<i>xsd:boolean</i>	Whether the interchange is guaranteed. Default is <i>false</i> ; interchange is not guaranteed.
	Advertised	0:1	<i>xsd:boolean</i>	Whether the interchange is advertised as a connection. Default is <i>false</i> .
	MaximumWaitTime	0:1	<i>PositiveDuration-Type</i>	Maximum Additional that Distributor will wait for Feeder
any	Extensions	0:1	any	Placeholder for user extensions.

5.5.5 ProductionTimetableDelivery Example

The following is an example of a **ProductionTimetableDelivery**.

```

<ServiceDelivery>
  <!--=====HEADER===== -->
  <ResponseTimestamp>2004-12-17T09:30:46-05:00</ResponseTimestamp>
  <ProducerRef>KUBRICK</ProducerRef>
  <Status>true</Status>
  <MoreData>>false</MoreData>
  <!--=====PAYLOAD===== -->
  <ProductionTimetableDelivery version="1.0">
    <ResponseTimestamp>2001-12-17T09:30:47-05:00</ResponseTimestamp>
    <SubscriberRef>NADER</SubscriberRef>
    <SubscriptionRef>00123456</SubscriptionRef>
    <Status>true</Status>
    <ValidUntil>2001-12-17T10:30:47-05:00</ValidUntil>
    <DatedTimetableVersionFrame>
      <LineRef>123</LineRef>
      <DirectionRef>Out</DirectionRef>
      <PublishedLineName>String</PublishedLineName>
      <DirectionName xml:lang="EN">Outbound</DirectionName>
      <!-- Service Info Group -->
      <OperatorRef>Smooth</OperatorRef>
      <ProductCategoryRef>Fun SpecialProductCategoryRef>

```

```

<ServiceFeatureRef>normalStopping</ServiceFeatureRef>
<VehicleFeatureRef>lowStep</VehicleFeatureRef>
<ServiceFeatureRef>cyclesPermitted</ServiceFeatureRef>
<LineNote>Special services at Easter</LineNote>
<!-- Timetable real-time info Group -->
<Monitored>true</Monitored>
<DatedVehicleJourney>
  <!-- Identity Group -->
  <DatedVehicleJourneyCode>DVC0008767</DatedVehicleJourneyCode>
  <VehicleJourneyRef>VJ123</VehicleJourneyRef>
  <ExtraJourney>false</ExtraJourney>
  <PublishedLineName>123 Out</PublishedLineName>
  <!-- Service Info Group -->
  <OperatorRef>Sharp</OperatorRef>
  <ProductCategoryRef>plusbus</ProductCategoryRef>
  <ServiceFeatureRef>hailAndRider</ServiceFeatureRef>
  <VehicleFeatureRef>lowDoor</VehicleFeatureRef>
  <VehicleFeatureRef>wheelchairsAllowed</VehicleFeatureRef>
  <ServiceFeatureRef>CyclesPermitted</ServiceFeatureRef>
  <!-- Journey Info Group -->
  <VehicleJourneyName ">Shoppers Special</VehicleJourneyName>
  <JourneyNote>Not suitable for claustrophobes.</JourneyNote>
  <Monitored>true</Monitored>
  <HeadwayService>false</HeadwayService>
  <!-- == CALL 1 == -->
  <DatedCall>
    <StopPointRef>HLTS00101</StopPointRef>
    <BoardingStretch>false</BoardingStretch>
    <RequestStop>false</RequestStop>
    <DestinationDisplay>Limbo</DestinationDisplay>
    <AimedArrivalTime>2001-12-17T09:30:47-05:00</AimedArrivalTime>
    <ArrivalBoardingActivity>alighting</ArrivalBoardingActivity >
    <AimedArrivalTime>2001-12-17T09:30:47-05:00</AimedArrivalTime>
    <DeparturePlatformName>1</DeparturePlatformName>
    <DepartureBoardingActivity>boarding</ DepartureBoardingActivity >
  </DatedCall>
  <!-- == CALLI 2 ==-->
  <DatedCall>
    <StopPointRef>HLTS00102</StopPointRef>
    <BoardingStretch>true</BoardingStretch>
    <DestinationDisplay>Hell First Circle</DestinationDisplay>
    <AimedArrivalTime>2001-12-17T09:30:47-05:00</AimedArrivalTime>
    <AimedDepartureTime>2001-12-17T09:30:47-05:00</AimedDepartureTime>
    <TargetedInterchange>

```

```

        <DistributorVehicleJourneyRef>V45681</DistributorVehicleJourneyRef>
        <DistributorConnectionLink>
            <ConnectionLinkCode>01340</ConnectionLinkCode>
            <DefaultDuration>P3M</DefaultDuration>
        </DistributorConnectionLink>
        <DistributorVisitNumber>1</DistributorVisitNumber>
        <Guaranteed>true</Guaranteed>
    </TargetedInterchange>
</DatedCall>
<!-- == CALL 3 == -->
<DatedCall>
    <StopPointRef>HLTS00103</StopPointRef>
    <DestinationDisplay>Hell</DestinationDisplay>
    <CallNote>Can change here to </CallNote>
    <TimetabledArrivalTime>2001-12-17T09:30:47-05:00</TimetabledArrivalTime>
    <ArrivalPlatformName>4</ArrivalPlatformName>
    <TimetabledDepartureTime>2001-12-17T09:30:47-05:00</TimetabledDepartureTime>
    <DepartureBoardingActivity>NoBoarding</DepartureBoardingActivity>
    <TargetedInterchange>
        <InterchangeCode>I765</InterchangeCode>
        <DistributorVehicleJourneyRef>V45678</DistributorVehicleJourneyRef>
        <DistributorConnectionLink>
            <ConnectionLinkCode>01345</ConnectionLinkCode>
            <StopPointRef>HLTS00103</StopPointRef>
            <StopPointName>Gare de Nord</StopPointName>
            <DefaultDuration>P5M</DefaultDuration>
            <FrequentTravellerDuration>P3M</FrequentTravellerDuration>
            <OccasionalTravellerDuration>P7M</OccasionalTravellerDuration>
            <ImpairedAccessDuration>P15M</ImpairedAccessDuration>
        </DistributorConnectionLink>
        <DistributorVisitNumber>2</DistributorVisitNumber>
        <StaySeated>false</StaySeated>
        <Guaranteed>true</Guaranteed>
        <Advertised>true</Advertised>
        <MaximumWaitTime>P15M</MaximumWaitTime>
    </TargetedInterchange>
</DatedCall>
</DatedVehicleJourney>
</DatedTimetableVersionFrame>
</ProductionTimetableDelivery>
</ServiceDelivery>

```

5.5.6 Efficient Delivery of Large Timetables

Production Timetable Service responses may be very large. The XML messages may be broken down into smaller packets for transmission using the **MoreData** attribute in the **DataSupplyAnswer** message. See Multipart Dispatch earlier.

In order to reduce the data volume it is possible to exchange only the changes instead of the entire schedule. However, for this to work the daily updated schedule of the AVMS must originate from the same database as the seasonal schedule of the schedule information system. Note also that the daily updated planned schedules usually exist as a progression of the seasonal schedule, which means that over time, the deviations from the originally created seasonal schedule become greater. To obtain just changes, the active schedule version against which changes are desired must be specified in the **TimetableVersionRef** of the subscription request. If the same or an earlier version is active in the data sender, then it need only transmit the changes to the planned schedule in the Production Timetable service.

6 Estimated Timetable Service [ET]

6.1 Purpose

The Estimated Timetable service is used by the AVMS to inform interested schedule information systems of the current status of all known vehicle journeys. This enables the schedule information system to provide up-to-the-minute information for short-term journey planning. It can also be used to support intelligent displays that calculate the deviation from timetable themselves using a timetable and a real time difference delay by the SIRI Stop Monitoring Service.

Message content can include:

- Schedule deviations with predictions for future route sections.
- Failure of a vehicle journey.
- Additional journeys.
- Change to the vehicle capacity (passenger load).
- Change to vehicle type/vehicle equipment.
- Platform changes.
- Stop obstruction.
- Path (i.e. journey pattern) changes.

As with the production timetable service, the AVMS must only transmit the boardable vehicle journeys, i.e. the vehicle journeys that carry passengers.

6.2 Capability and Permission Matrices

6.2.1 Capability Matrix

The following set of required and optional capabilities is defined for the Estimated Timetable service. If the service supports Capability Discovery, the **EstimatedTimetableCapabilitiesRequest** / **EstimatedTimetableCapabilitiesResponse** message pair can be used to determine the implementation's capabilities.

Table 11 — EstimatedTimetable Service Capability

EstimatedTimetableCapabilities			+Structure	Capabilities describing implementation of Estimated Timetable service.
<i>inherit</i>	...	1:1	See xxx- Capability- Response	See SIRI Part 2-12.4 for Common Capability attributes.
Topic	TopicFiltering	0:1	+Structure	Which optional filtering features are supported.
	DefaultPreview-Interval	0:1	Positive-DurationType	Default Preview Interval.
	FilterByOperator-Ref	0:1	xsd:boolean	Whether results can be filtered by Operator. Required Facility: Default is <i>true</i> .
	FilterByLineRef	0:1	xsd:boolean	Whether results can be filtered by Line. required Facility: Default is <i>true</i> .
	FilterByVersionRef	0:1	xsd:boolean	Whether results can be filtered by Timetable Version. Default is <i>true</i> .
Request Policy	RequestPolicy	0:1	+Structure	Which optional features of the Request Policy are supported by the service?
	Language	1:*	xsd:language	National languages used by service.
			choice	Location reference coordinate system.
	a GmlCoordinate-Format	0:1	SrsNameType	Default coordinate format is given by a GML format name value.
	b WgsDecimal-Degrees		EmptyType	Default coordinate data system is WGS 84 latitude and longitude in decimal degrees of arc.
Sub- scription Policy	SubscriptionPolicy	0:1	+Structure	Which features of the SubscriptionPolicy are supported by service?
	HasIncremental-Updates	0:1	xsd:boolean	Whether incremental updates can be specified for updates Default is <i>true</i> .
	HasChange-Sensitivity	0:1	xsd:boolean	Whether change threshold can be specified for updates. Default is <i>true</i> .
Access Control	AccessControl	0:1	+Structure	Which optional Access Control features are supported by service?
	RequestChecking	0:1	xsd:boolean	Whether access control of requests is supported. Default is <i>false</i> .
	CheckOperatorRef	0:1	xsd:boolean	If access control is supported, whether access control by Operator is supported. Default is <i>true</i> .
	CheckLineRef	0:1	xsd:boolean	If access control is supported, whether access control by Line is supported. Default is <i>true</i> .
	CheckConnection-LinkRef	0:1	xsd:boolean	If access control is supported, whether access control by ConnectionLink is supported. Default is <i>true</i> .
any	Extensions	0:1	any	Placeholder for user extensions.

6.2.2 Permission Matrix

If the implementation supports both Capability Discovery and Access Controls, then the **EstimatedTimetable-CapabilitiesResponse** response can include the access permissions for the requestor participant to access data.

Table 12 — EstimatedTimetable Service Permissions

<i>EstimatedTimetablePermission</i>			+Structure	Permissions to use implementation of Estimated Timetable service.
Inherit	:::	1:1	<i>xxxService-Permissions</i>	See SIRI Part 2-12.5 for Common Permission elements.
Topic	<i>OperatorPermissions</i>	0:1	+Structure	Operator permissions for participant. See Part 2.
	<i>LinePermissions</i>	0:1	+Structure	Line permissions for participant. See Part 2.
	<i>ConnectionLinkPermissions</i>	0:1	+Structure	Connection Link permissions for participant. See Part 2.

6.3 EstimatedTimetableRequest

6.3.1 EstimatedTimetableRequest Definition

The ***EstimatedTimetableRequest*** states which timetables should be returned.

The ***EstimatedTimetableRequest*** can be used in both a direct request, and for a subscription. If used for a subscription, additional ***EstimatedTimetableSubscriptionPolicy*** parameters can be specified.

The primary *Topic* term on the request is the time window for which timetables are to be returned. Additional topic filtering on line is also allowed. If filtering is not specified, all lines known to the AVMS are transmitted.

If the timetable version is not available, an error code is returned NoInfoForTopic. In this situation a subscription is not set up.

Table 13 — EstimatedTimetableRequest Parameters

EstimatedTimetableRequest			+Structure	Request for Estimated timetables.
Attributes	Version	1:1	VersionString	Version Identifier of Estimated Timetable Service, e.g. '1.0c.'
Endpoint Properties	Request-Timestamp	1:1	xsd:dateTime	See SIRI Part 2 Common properties of SIRI Functional Service Requests.
	Message-Identifier	0:1	Message-Qualifier	
Topic	Preview-Interval	0:1	Positive-DurationType	Maximum Preview time in minutes requested by the schedule information system. Preview horizon only limits real time prediction data, information on additional journeys, cancellations etc, that are beyond the interval may still be included.
	Timetable-VersionRef	0:1	xsd:string	Communicate only differences to the timetable specified by this version of the timetable.
	OperatorRef	0:1	→OperatorCode	Filter the results to include only results for the specified operator. Optional SIRI capability: <i>TopicFiltering / ByOperator</i> .
	LineRef	0:1	→LineCode	Filter the results to include only results for the given line. If no <i>LineRef</i> is specified as a subscription filter, this implicitly implies transmission of data for all lines in the AVMS.
	DirectionRef	0:1	→DirectionCode	Filter the results to include only Stop Visits for vehicles running in a specific relative direction, for example, "inbound" or "outbound". (Direction does not specify a destination.) Optional SIRI capability: <i>TopicFiltering / ByDirection</i> .
Policy	Language	0:1	xml:lang	Preferred language in which to return text values. Optional SIRI capability: <i>NationalLanguage</i> .
any	Extensions	0:1	any	Placeholder for user extensions.

6.3.2 EstimatedTimetableRequest Example

The following is an example of an **EstimatedTimetableRequest**.

```

<ServiceRequest>
  <EstimatedTimetableRequest version="1.0">
    <RequestTimestamp>2001-12-17T09:30:47-05:00</RequestTimestamp>
    <PreviewInterval>P1Y2M3DT10H30M</PreviewInterval>
    <TimetableVersionRef>0008</TimetableVersionRef>
    <OperatorRef>SMOOTH</OperatorRef>
    <LineRef>123</LineRef>
    <DirectionRef>INBOUND</DirectionRef>
  </EstimatedTimetableRequest>
</ServiceRequest>

```

6.4 EstimatedTimetableSubscriptionRequest

6.4.1 EstimatedTimetableSubscriptionRequest Definition

The **EstimatedTimetableSubscriptionRequest** requests the asynchronous delivery of the information described by an **EstimatedTimetableRequest**. The **EstimatedTimetableSubscriptionRequest** Policy parameters control the processing of the subscription.

At the start of the subscription, the AVMS is responsible for transmitting the current full status to the schedule information system, i.e. it transmits all real-time data that deviates from the planned schedule at the start of the subscription.

Table 14 — EstimatedTimetableSubscriptionRequest Parameters

EstimatedTimetable-SubscriptionRequest			+Structure	Request for a subscription to the SIRI Estimated Timetable Service.
Identity	SubscriberRef	0:1	→ParticipantCode	See SIRI Part 2, Common SubscriptionRequest parameters.
	SubscriptionIdentifier	1:1	Subscription-Qualifier	
Lease	InitialTerminationTime	1:1	xsd:dateTime	
Request	EstimatedTimetable-Request	1:1	+Structure	See EstimatedTimetableRequest .
Policy	ChangeBeforeUpdate	1:1	PositiveDuration-Type	Threshold value in seconds after which the deviations from planned schedule or the last message are to be transmitted.

6.4.2 EstimatedTimetableSubscriptionRequest Example

The following is an example of an **EstimatedTimetableSubscriptionRequest**.

```
<SubscriptionRequest>
  <!--=====ENDPOINT REFERENCES=====-->
  <RequestTimestamp>2004-12-17T09:30:47-05:00</RequestTimestamp>
  <RequestorRef>NADER</RequestorRef>
  <!-- Subscription 1 for VIS123 to Place 975 -->
  <EstimatedTimetableSubscriptionRequest>
    <SubscriberRef>NADER</SubscriberRef>
    <SubscriptionIdentifier>000765</SubscriptionIdentifier>
    <InitialTerminationTime>2001-12-17T09:30:47-05:00</InitialTerminationTime>
    <EstimatedTimetableRequest version="1.0">
      <RequestTimestamp>2001-12-17T09:30:47-05:00</RequestTimestamp>
      <PreviewInterval>P1Y2M3DT10H30M</PreviewInterval>
      <TimetableVersionRef>0008</TimetableVersionRef>
      <OperatorRef>SMOOTH</OperatorRef>
      <LineRef>123</LineRef>
      <DirectionRef>INBOUND</DirectionRef>
    </EstimatedTimetableRequest>
    <ChangeBeforeUpdates>P1Y2M3DT10H30M</ChangeBeforeUpdates>
  </EstimatedTimetableSubscriptionRequest>
</SubscriptionRequest>
```

</SubscriptionRequest>

6.5 The EstimatedTimetableDelivery

6.5.1 General

The **EstimatedTimetableDelivery** returns the position of a vehicle or group of vehicles.

6.5.2 ServiceDelivery with a EstimatedTimetableDelivery

One or more **EstimatedTimetableSubscriptionRequest** elements may be returned as part of a SIRI **ServiceDelivery**.

Table 15 — ServiceDelivery / EstimatedTimetableDelivery Elements

ServiceDelivery			+Structure	See SIRI Part 2-7.2.1 ServiceDelivery
HEADER	:::	1:1	See ServiceDelivery	
Payload	EstimatedTimetableDelivery	0:*	+Structure	See EstimatedTimetableDelivery element.

6.5.3 EstimatedTimetableDelivery Element

Each **EstimatedTimetableDelivery** is made up of **EstimatedVehicleJourney** elements. There will be status messages for any requests that could not be fulfilled.

Table 16 — EstimatedTimetableDelivery Elements

EstimatedTimetableDelivery			+Structure	Describes one or more Dated Timetables.
Attributes	version	1:1	VersionString	Version Identifier of Production timetable Service. Fixed.
LEADER	:::	1:1	xxxServiceDelivery	See SIRI Part 2-7.2.1.1 xxx ServiceDelivery .
Payload	EstimatedTimetableVersionFrame	0:*	+Structure	See EstimatedTimetableVersionFrame element.
any	Extensions	0:1	any	Placeholder for user extensions.

6.5.4 EstimatedTimetableVersionFrame Element

Each production timetable is returned as an **EstimatedTimetableVersionFrame** element. Each **EstimatedTimetableVersionFrame** comprises one or more **EstimatedVehicleJourney** elements grouped for a version of the timetable.

Table 17 — EstimatedTimetableVersionFrame Elements

EstimatedTimetableVersionFrame			+Structure	Provides a schedule of dated vehicle journey for a line and direction
Log	RecordedAtTime	1:1	xsd:dateTime	Time at which data was recorded.
Identity	VersionRef	0:1	→VersionCode	Identifier of Timetable version frame.
Journeys	EstimatedVehicleJourney	1:*	+Structure	Provides real-time information about a vehicle journey along which a vehicle is running. See EstimatedVehicleJourney element.
any	Extensions	0:1	any	Placeholder for user extensions.

6.5.5 EstimatedVehicleJourney Element

6.5.5.1 Overview

Each **EstimatedVehicleJourney** contains an ordered list of **EstimatedCall** elements, as well as other properties.

Note that there are three different ways to match the journeys described in the real-time data to the planned schedule:

- A full **DatedVehicleJourneyRef**, if known.
- A signature of the journey comprising its origin and destination points and arrival and departure times at those points.
- A real-time vehicle journey code (**EstimatedVehicleJourneyCode**).

Method (ii) allows installations that do not have a Production Timetable service still to make use of data.

Table 18 — EstimatedVehicleJourney Elements

EstimatedVehicleJourney			+Structure	Provides real-time information about the vehicle journey along which a vehicle is running.
Vehicle Journey Identity	LineRef	1:1	→LineCode	Identifier for the line.
	DirectionRef	1:1	→DirectionCode	Identifier of the relative direction the vehicle is running along the line, for example, "in" or "out", "clockwise". Distinct from a destination.
			choice	One of the following three ways of identifying a journey.
	a DatedVehicle-JourneyRef		→DatedVehicle-JourneyCode	Identifies the vehicle journey.
	b DatedVehicle-Journey-IndirectRef	–1:1	+Structure	If no vehicle journey reference is available, identify it by origin and destination and the scheduled times at these stops.
	OriginRef	1:1	→StopPointCode	The origin is used to help identify the vehicle journey.
	Aimed-Departure-Time	1:1	xsd:dateTime	Departure Time at Origin stop.
	Destination-Ref	1:1	→StopPointCode	The origin is used to help identify the vehicle journey.
	AimedArrival-Time	1:1	xsd:dateTime	Arrival Time at Origin stop.
	c EstimatedVehicle JourneyCode	1:1	Estimated-VehicleJourney-Code	If this is the first message about an extra unplanned vehicle journey, a new and unique code must be given for it. ExtraJourney should be set to 'true'.
Change	ExtraJourney	0:1	xsd:boolean	Whether this journey is an addition to the plan. Can only be used when both participants recognise the same schedule version. If omitted, defaults to <i>false</i> : the journey is not an addition.
	Cancellation	0:1	xsd:boolean	Whether this journey is a Cancellation of a journey in the plan. Can only be used when both participants recognise the same schedule version. If omitted, defaults to <i>false</i> : Journey is not a Cancellation.

Journey Pattern Info	...	0:1	JourneyPatternInfoGroup	See SIRI Part 2 JourneyPatternInfoGroup .	
Service Info	...	0:1	ServiceInfoGroup	See SIRI Part 2 ServiceInfoGroup .	
Journey Info	VehicleJourney-Name	0:1	NLString	For train services with Named Journeys. Train name, e.g. “West Coast Express”. If omitted: No train name. Inherited property.	
	JourneyNote	0:*	NLString	Additional descriptive text associated with journey. Inherited property.	
Estimated-Info	HeadwayService	0:1	xsd:boolean	Whether this is a Headway Service, that is one shown as operating at a prescribed interval rather than to a fixed timetable.	
Disruption-Group	...	0:1	DisruptionGroup	See SIRI Part 2 DisruptionGroup . DetailLevel: normal.	
Real-time	Monitored	0:1	xsd:boolean	Whether there is real-time information available for journey, if not present, not known. Inheritable.	
	PredictionInaccurate	0:1	xsd:boolean	Whether the vehicle is in congestion. If not, present, not known. Inheritable.	
	Occupancy	0:1	full seatsAvailable standingAvailable	How full the vehicle is. Enumeration. If omitted: Passenger load is unknown.	
Operational Info	...	0:1	OperationalInfoGroup	See SIRI Part 2 OperationalInfoGroup .	
Calls	a	EstimatedCalls	0:1	+Structure	Complete sequence of stops along the route path, in calling order.
		EstimatedCall	0:*	+Structure	Individual EstimatedCall . See below.
	b		0:*	Estimated-CallsAsFlatGroup	Unnested EstimatedCall instances for compatibility with legacy formats.
		IsComplete-StopSequence	0:1	xsd:boolean	Whether the above call sequence is complete, i.e. represents every call of the route and so can be used to replace a previous call sequence Default is <i>false</i> .
any	Extensions	0:1	any	Placeholder for user extensions.	

6.5.5.2 EstimatedCall Element

Each ***EstimatedCall*** describes the times at a stop. A journey must contain at least two calls.

Note that if the ***Occupancy*** field in the ***EstimatedCall*** structure is filled, this represents a predicted passenger load. If the corresponding field is filled in a ***MonitoredVehicleJourney***, this overwrites the last current passenger occupancy value.

Table 19 — EstimatedCall Elements

EstimatedCall			+Structure	Provides real-time information about a call at a stop.
Stop Identity	StopPointRef	0:1	→StopPoint-Code	Identifier of stop point.
	VisitNumber	0:1	VisitNumber-Type	For journey patterns that involve repeated visits by a vehicle to a stop, the VisitNumber count is used to distinguish each separate visit. If not specified, default is '1'.
	Order	0:1	xsd:positive-Integer	For implementations for which the overall Order within journey pattern is not used for VisitNumber , (i.e. if VisitNumberIsOrder is <i>false</i>) then can be used to associate the overall Order as well if useful.
	StopPointName	0:1	NLString	Name of stop.
Change	ExtraCall	0:1	xsd:boolean	Whether this call is an addition to the plan. Can only be used when both participants recognise the same schedule version. If omitted, defaults to <i>false</i> : the call is not an addition.
	Cancellation	0:1	xsd:boolean	Whether this call is a Cancellation of a call in the plan. Can only be used when both participants recognise the same schedule version. If omitted, defaults to <i>false</i> : Call is not a Cancellation.
Real time Info	Prediction-Inaccurate	0:1	xsd:boolean	Whether the vehicle is in congestion. If not, present, not known. Inheritable.
	Occupancy	0:1	full seatsAvailable standing-Available	How full the vehicle is at the stop. Enumeration. If omitted: Occupancy is as for journey. Enumeration.
Call Property	TimingPoint	0:1	xsd:boolean	Whether the stop is a timing point. Times for stops that are not timing points are sometimes interpolated crudely from the timing points, and may represent a lower level of accuracy. Default is <i>true</i> .
	BoardingStretch	0:1	xsd:boolean	Whether this is a Hail and Ride Stop. Default is <i>false</i> .
	RequestStop	0:1	xsd:boolean	Whether Vehicle stops only if requested explicitly by passenger. Default is <i>false</i> .
	Destination-Display	0:1	NLString	The name of the destination of the journey; used to help identify the vehicle to the public: Since vehicles can change their destination during a journey, the destination included here should be what the vehicle will display when it reaches this stop.
	CallNote	0:*	NLString	Text annotation that applies to this call.
DisruptionGroup	:::	0:1	DisruptionGroup	See SIRI Part 2 DisruptionGroup . <i>DetailLevel</i> : normal.
Arrival	AimedArrival-Time	0:1	xsd:dateTime	Planned Arrival Time in either the original or Production Timetable. Can be omitted if equal to the departure time, or at the origin stop.
	ExpectedArrival-Time	0:1	xsd:dateTime	Estimated time of arrival.
	ArrivalStatus	0:1	onTime arrived delayed early cancelled noReport	Classification of the timeliness of the arrival part of the call according to a fixed list of values. This may reflect a presentation policy, for example calls less than one minute behind target time are still classified as on-time. Applications may use this to guide their own presentation of times. If not specified, same as DepartureStatus .

	Arrival-PlatformName	0:1	<i>NLString</i>	Bay or platform name. Can be omitted if the same as the DeparturePlatformName . If there no arrival platform name separate from the departure platform name, the precedence is (i) any arrival platform on any related dated timetable element, (ii) any departure platform name on this estimated element; (iii) any departure platform name on any related dated timetable call.
	Arrival-BoardingActivity	0:1	<i>alighting</i> <i>noAlighting</i> <i>passThru</i>	Type of boarding and alighting allowed at stop. Default is <i>Alighting</i> .
Departure	AimedDeparture-Time	0:1	<i>xsd:dateTime</i>	Planned Departure Time in either the original or Production Timetable. Can be omitted at the destination stop.
	Expected-DepartureTime	0:1	<i>xsd:dateTime</i>	Estimated time of departure.
	DepartureStatus	0:1	<i>onTime</i> <i>arrived</i> <i>delayed</i> <i>early</i> <i>cancelled</i> <i>noReport</i>	Classification of the timeliness of the departure part of the call, according to a fixed list of values. This may reflect a presentation policy, e.g. calls less than one minute behind target time are still classified as on-time. Applications may use this to guide their own presentation of times.
	Departure-PlatformName	0:1	<i>NLString</i>	Bay or platform name from which vehicle will depart.
	Departure-BoardingActivity	0:1	<i>boarding</i> <i>noBoarding</i> <i>passThru</i>	Type of boarding and alighting allowed at stop. Default is <i>Boarding</i> .
	AimedHeadway-Interval	0:1	<i>PositiveDuration</i>	Target interval for frequency based service.
	Estimated-HeadwayInterval	0:1	<i>PositiveDuration</i>	Estimated interval for frequency based service.
any	Extensions	0:1	any	Placeholder for user extensions.

6.5.6 EstimatedTimetableDelivery Example

The following is an example of an **EstimatedTimetableDelivery**.

```

<ServiceDelivery>
  <!--=====HEADER===== -->
  <ResponseTimestamp>2004-12-17T09:30:46-05:00</ResponseTimestamp>
  <ProducerRef>KUBRICK</ProducerRef>
  <Status>true</Status>
  <MoreData>>false</MoreData>
  <!--=====PAYLOAD===== -->
  <EstimatedTimetableDelivery version="1.0">
    <ResponseTimestamp>2001-12-17T09:30:47-05:00</ResponseTimestamp>
    <SubscriberRef>NADER</SubscriberRef>
    <SubscriptionRef>0004</SubscriptionRef>
    <Status>true</Status>
    <ValidUntil>2001-12-17T19:30:47-05:00</ValidUntil>
    <EstimatedVehicleJourney>
      <LineRef>LZ123</LineRef>
      <DirectionRef>INBOUND</DirectionRef>
      <DatedVehicleJourneyRef>00008</DatedVehicleJourneyRef>
    
```

```

<Cancellation>false</Cancellation>
<PublishedLineName>124</PublishedLineName>
<OperatorRef>SMOOTH</OperatorRef>
<ProductCategoryRef>NMTOKEN</ProductCategoryRef>
<ServiceFeatureRef>NMTOKEN</ServiceFeatureRef>
<VehicleFeatureRef>DisabledAccess</VehicleFeatureRef>
<ServiceFeatureRef>CyclesPermitted</ServiceFeatureRef>
<DestinationName>Howard's End</DestinationName>
<VehicleJourneyName>Shoppers Special</VehicleJourneyName>
<JourneyNote>Not o bank holidays</JourneyNote>
<Monitored>true</Monitored>
<PredictionInaccurate>false</PredictionInaccurate>
<PassengerLoad>full</PassengerLoad>
<!-- Call 1-->
<EstimatedCall>
  <StopPointRef>00001</StopPointRef>
  <ExtraStop>false</ExtraStop>
  <PredictionInaccurate>false</PredictionInaccurate>
  <Occupancy>SeatsAvailable</Occupancy>
  <BoardingStretch>false</BoardingStretch>
  <RequestStop>false</RequestStop>
  <CallNote>Starts here</CallNote>
  <AimedArrivalTime>2001-12-17T09:30:47-05:00</AimedArrivalTime>
  <ArrivalBoardingActivity>NoAlighting</ArrivalBoardingActivity>
  <AimedDepartureTime>2001-12-17T09:30:47-05:00</AimedDepartureTime>
  <DeparturePlatformName>1</DeparturePlatformName>
</EstimatedCall>
<!-- Call 2-->
<EstimatedCall>
  <StopPointRef>00002</StopPointRef>
  <ExtraStop>false</ExtraStop>
  <PredictionInaccurate>false</PredictionInaccurate>
  <Occupancy>SeatsAvailable</Occupancy>
  <AimedArrivalTime>2001-12-17T09:30:47-05:00</AimedArrivalTime>
  <AimedDepartureTime>2001-12-17T09:30:47-05:00</AimedDepartureTime>
  <ExpectedArrivalTime>2001-12-17T09:30:47-05:00</ExpectedArrivalTime>
  <ExpectedDepartureTime>2001-12-17T09:30:47-05:00</ExpectedDepartureTime>
  <BoardingActivity>BoardingAndAlighting</BoardingActivity>
  <RequestStop>true</RequestStop>
  <DeparturePlatformName>3</DeparturePlatformName>
  <ArrivalPlatformName>4</ArrivalPlatformName>
</EstimatedCall>
<!-- Call 3 -->
<EstimatedCall>

```

```

    <StopPointRef>00003</StopPointRef>
    <ExtraStop>false</ExtraStop>
    <PredictionInaccurate>true</PredictionInaccurate>
    <Occupancy>full</Occupancy>
    <AimedArrivalTime>2001-12-17T09:30:47-05:00</AimedArrivalTime>
    <ExpectedArrivalTime>2001-12-17T09:30:47-05:00</ExpectedArrivalTime>
    <ArrivalPlatformName>5</ArrivalPlatformName>
    <AimedDepartureTime>2001-12-17T09:30:47-05:00</AimedDepartureTime>
    <ExpectedDepartureTime>2001-12-17T09:30:47-05:00</ExpectedDepartureTime>
    <DepartureBoardingActivity>NoBoarding</DepartureBoardingActivity>
  </EstimatedCall>
  <IsCompleteStopSequence>false</IsCompleteStopSequence>
</EstimatedVehicleJourney>
</EstimatedTimetableDelivery>
</ServiceDelivery>

```

6.6 Handling of Predictions in the Estimated Timetable Service

6.6.1 Supplementary Rule for the Delay Profile

There are various mechanisms supported in SIRI to prevent unnecessary data traffic. Some of these can involve a limited amount of independent recomputation by the schedule information system to process the transmitted data, in particular delays; this recomputation should be done in a consistent manner.

In particular, to reduce the transmitted data volume, the producer *only need complete the stops at which the delay has changed* (the 'interpolation rule'). The schedule information system assigns the last reported delay (or rather schedule deviation, as a vehicle may also be early) to all stops along the route until the next reported delay is received.

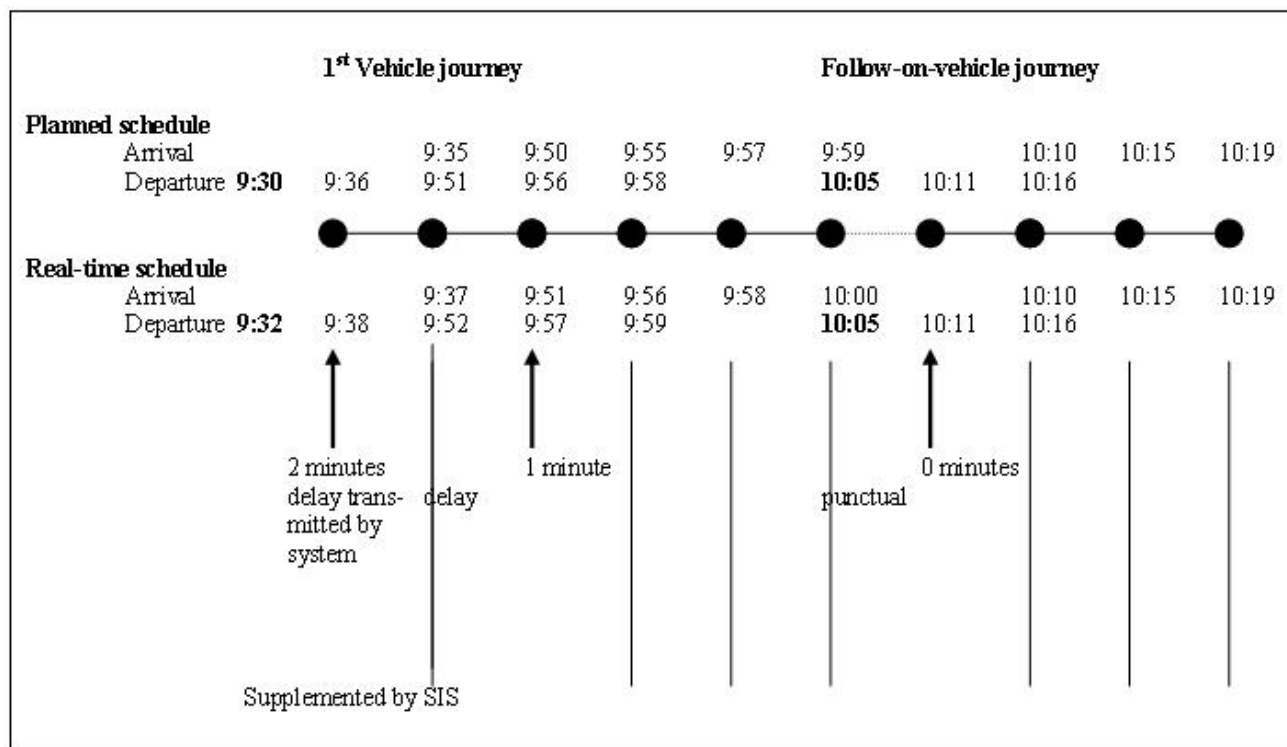


Figure 1 — Supplementary Rule for Delay Extrapolation

The Producer can use its authority to adjust predictions if it establishes that there are waiting times at upcoming stops that could compensate for the delay. The schedule information system receives a message for these stops by means of multiple **EstimatedCall** structures (in a single delivery). For the stops in between, the schedule information system must interpolate the current real-time status. In this case the overall sovereignty for making delay prognoses still rests with the Producer and the principle that it is the authoritative source is not violated. Using interpolation, the schedule information system can then complete the remaining fields from a single transmission, without needing additional information from subsequent or previous messages.

6.6.2 Other Supplementary Rules

Interpolation rules must be agreed for each implementation. The use of the interpolation rule is only recommended for the transmission of delays or early times.

On the basis of early practical experiences with inter-system AVMS interfaces, further rules should be exactly specified for the independent supplementation of transmitted data in order to avoid any confusion in interpretation. The producer control computer must know the stops for which the schedule information system carries out extrapolation and the stops for which the predictions need to be sent. In SIRI an indication can be given as to whether a stop is a timing point or not which may be relevant to the interpolation process.

6.6.3 Quality of Prognoses and Prediction Windows

Customers expect vehicle journey information from real-time enabled systems to be more accurate, informative and timely than the planned schedules. For example, with the help of the SIRI Estimated Timetable service the schedule information system can mark vehicle journeys as “delayed x min”, “punctual” or “cancelled”.

Systems should therefore be able to distinguish between there being no messages from the Producer because there is no significant delay, from the case when the Producer is unable to generate any messages for the vehicle at all, for example, because the vehicle has no radio equipment. In the first case the vehicle

journey should be explicitly marked as punctual in the schedule information system; and in the latter case, as having an unknown accuracy. SIRI includes a number of elements (**Monitored**, **PredictionInaccurate**, **InCongestion**, **InPanic**) that can be used to represent this.

In order to be able to make reliable predictions, the schedule information system should base its vehicle journey information on information from explicit messages, and not on conclusions drawn from the assumed successful passing of events.

The further ahead in time a prediction is being attempted, the less certain the factors that will influence it, and so the greater likelihood of inaccuracy. This increasing indeterminism also applies to the prediction of traffic flows. In practice, predictions are only reliable for vehicle journeys in the near future. To avoid misrepresenting the apparent accuracy of prognoses, every producer system has a restricted **PreviewInterval**, which defines a rolling forward window within which predictions will be attempted. The Preview Interval is specific to each implementation and lies in the region of 20-60 min. This prevents it attempting to make predictions about the punctuality of vehicle journeys that lie too far in the future.

Passengers do not in any case expect an exact long-term prognosis of punctuality. It would make little sense then for a schedule information system, when responding to an enquiry made in the morning about a journey that evening, to mark the evening vehicle journeys as 'punctual'.

When setting up an SIRI Estimated Timetable subscription, the schedule information system requests a desired Preview Interval from the Producer.

6.6.4 Reporting Rules and Monitored Journeys

The Producer must report every vehicle journey for which there are predictions at least once.

The Producer only transmits the predictions for the vehicle journeys that start within the Preview Interval. A future vehicle journey lies within the Preview Interval if the departure time of the vehicle journey at the origin stop point lies in the time window from the current time until the end time given by the Preview Interval.

The prediction message should be generated as early as possible within the Preview Interval, that is, as soon as the Producer can give a prediction for the start of the vehicle journey. If this is not possible, a message should be generated for the vehicle journey after the comparison between the planned and real-time data (after logon, after first radio contact, before/at/after the start stop).

As soon as a follow-on vehicle journey falls into the Preview time, it too should be reported with its entire delay profile as soon as possible (i.e. with the prediction for the start stop and all subsequent stops).

For every transmitted vehicle journey, the predicted delay profile is reported up to the end of the vehicle journey, even if the vehicle journey finishes after the prediction horizon.

A vehicle journey that has been reported once must continue to be reported until it is completed, or until predictions become impossible.

The schedule information system can therefore assume a vehicle journey to be punctual if it has received an initial message for the journey from the Producer, and if the **Monitored** property has not been set to false. Without the active transmission of this information, the journey is regarded as unmonitored, and the schedule information system switches back to using only planning data for the journey.

This procedure ensures that the schedule information system only marks vehicle journeys as punctual when they are actually monitored by the Producer, and are being transmitted without error. It is possible to further improve the reliability if, in the case of punctual vehicles too, the Producer continues to send messages from time to time after the first real-time message.

The disadvantage is the slightly greater volume of data that needs to be transmitted. The re-initialisation of a real-time data subscription (e.g. after a restart) in particular would generate a new message to the schedule information system from every vehicle affected by the subscription currently in operation.

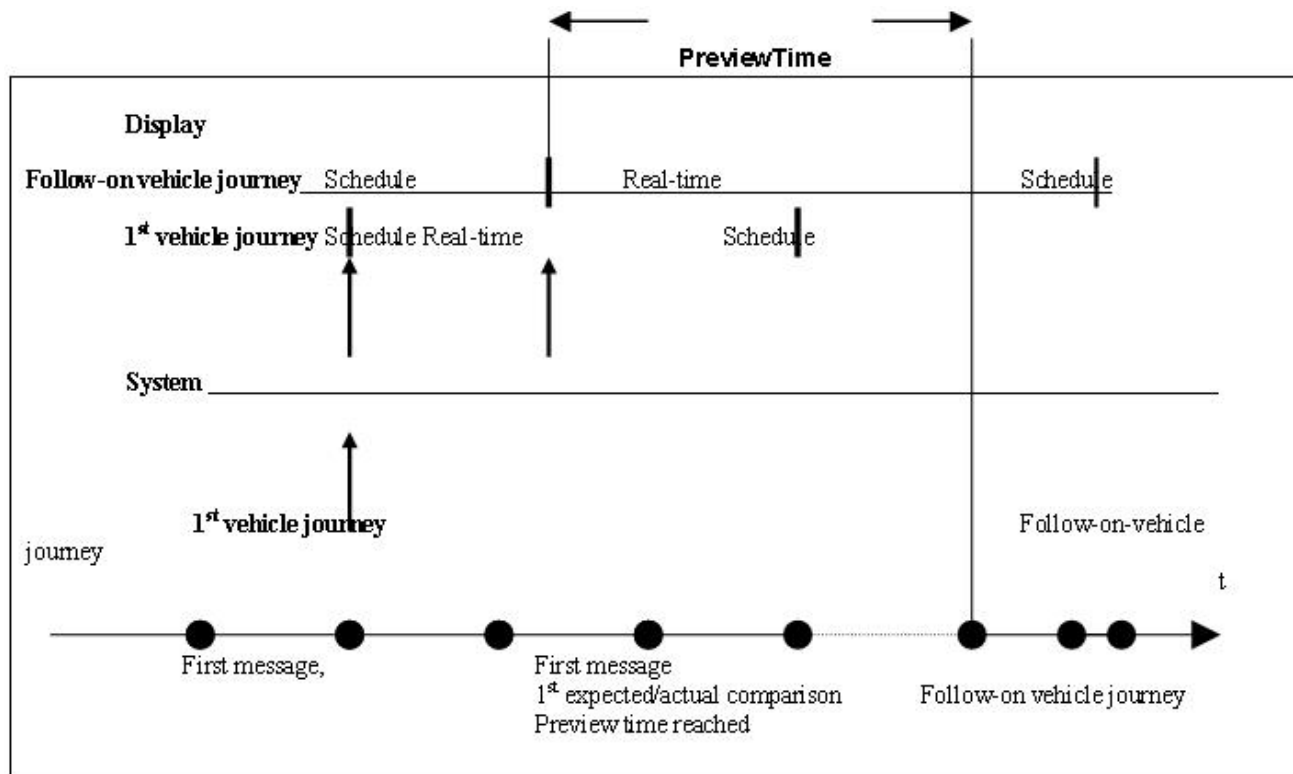


Figure 2 — Preview Time and Active First Message

6.6.5 Temporal Reporting Behaviour – Sensitivity Threshold

The SIRI Estimated Timetable service reports the current absolute arrival and departure times for a vehicle journey. The content of a delay message therefore does not represent information as a difference to a value in the preceding message, e.g. “+5 min”, or to the static planned schedule. Every individual SIRI Estimated Timetable message can be interpreted on its own. It can be made available in the schedule information system if there is a corresponding reference to the planned data.

Note that Stop Visits and monitored journeys may also be assigned a descriptive categorisation of their relative progress; for example ‘onTime’, ‘late’, ‘early’: this progress status is a presentation hint to display systems that may reflect an informational policy of the operator, for example that trains less than two minutes behind the planned times should be regarded as on-time regardless.

The triggering of the *communication* of vehicle journey delays however *is* relative to differences in the data since the last message, and takes the form of a hysteresis function: As soon as a delay prediction for a stop exceeds the last transmitted value by a specific threshold (either negatively or positively), the Producer triggers a real-time message to the schedule information system which overwrites the old value.

It is recommended that a single sensitivity threshold be globally defined for the entire real-time data subscription, with a value in the range of one to two minutes. The alternative approach of defining the threshold values for each line, or even each vehicle journey or interval is not recommended because of the resulting complexity. Instead, the presence of a global sensitivity value should be interpreted as signifying that the schedule information system does not wish to receive any messages whose difference in content lies below the threshold value. For transmissions in the opposite direction however, the Producer may suppress messages that lie above the threshold as it is in a better position to determine whether it would be useful to transmit the data or not. For example, the messages could be suppressed when the headways are short, i.e. the vehicles run in rapid succession. This allows the Producer to dynamically vary threshold values as appropriate.

A preview interval can be used to limit the data horizon for predictions. Other changes, for example additional journeys or journey cancellations, will still be included even if beyond the prediction horizon.

6.6.6 Prediction Inaccurate – In Congestion

If the AVMS establishes that a vehicle is travelling extremely slowly or is at a complete standstill, it can activate the **InCongestion** and **PredictionInaccurate** elements in the **EstimatedVehicleJourney** structure for the relevant vehicle journey. At the same time, the operation of hysteresis mentioned above is suspended, i.e. the Producer suppresses further messages as long as **PredictionInaccurate** is active. This avoids the continuing exchange of redundant messages that would arise as the delay increased. The system avoids sending delay messages when it must be assumed they will only increase further after another 2 minutes.

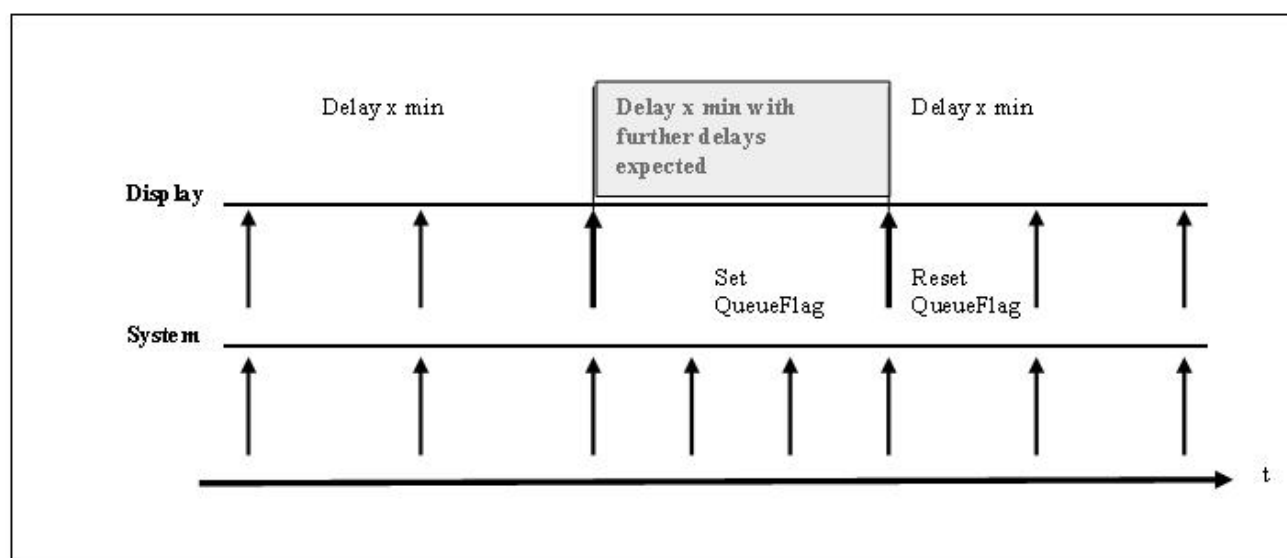


Figure 3 — Reporting Behaviour in the case of PredictionInaccurate

With the transmission of a new current prediction, the Producer deactivates the **PredictionInaccurate** status and signals that the change sensitivity function has been resumed.

The schedule information system can provide special behaviour to process **PredictionInaccurate** content. In contrast to how it handles a breakdown in communication, the schedule information system does not revert to the backup level of planned data, but is able to trigger messages such as “20 min delay, more delays expected”.

The **PredictionInaccurate** is an overall status: it may be further explained by additional elements such as **InCongestion** and **InPanic**.

6.6.7 Unexpected Termination of Monitoring

If a vehicle logs off from its block, or becomes unattainable via radio (‘loss of contact’), the Producer must be able to revoke a previously reported prediction. In this case, for every vehicle journey already reported, the Producer sends the Consumer system an **EstimatedVehicleJourney** message with the **Monitored** attribute set to false (i.e. unmonitored). This action makes the schedule information system aware of the inaccuracy pertaining to predictions for these vehicle journeys, so that it can inform passengers. After a message reporting a vehicle journey as unmonitored, the journey has the same status as if it had not been reported at all. A more specific diagnosis of the error condition (e.g. GPRS, radio etc) can be included in the form of a **MonitoringError** code, allowing Producer systems to handle different failure modes differently.

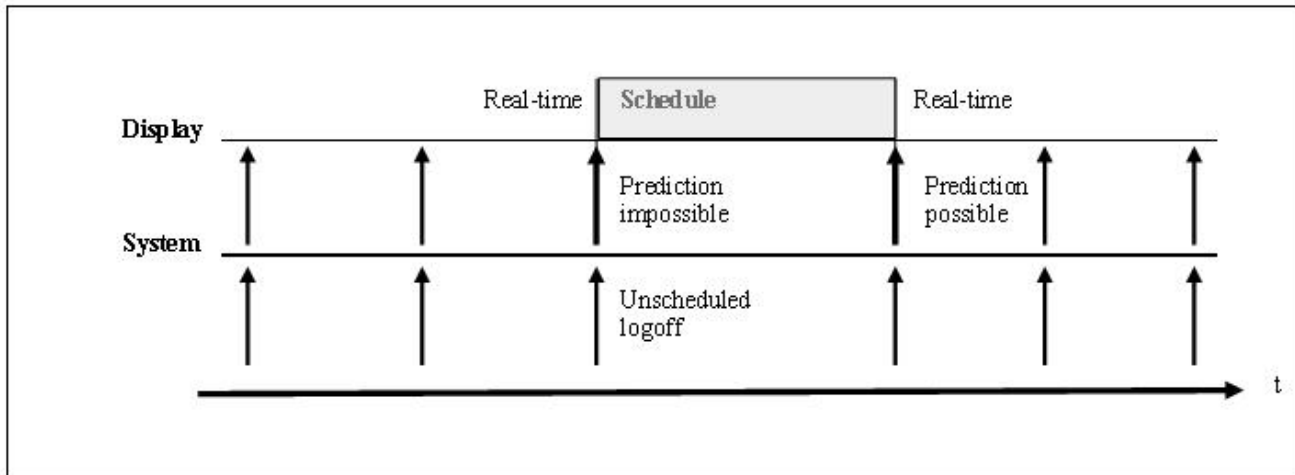


Figure 4 — Loss of Contact

6.7 General Rules and Definitions for Timetable Data

6.7.1 General

This section outlines further important rules for the implementation and handling of the SIRI Production Timetable and SIRI Estimated Timetable services, including the handling of deleted, additional vehicle journeys, and the transmission of planned connections and connections where the passengers remain seated.

6.7.2 Cancelled Vehicle Journeys

There are two situations in which cancelled vehicle journeys need to be communicated by the data producer:

- *Production Stage Cancellation:* The data producer and the consumer system both know the same version of the timetable; however, in the control centre a vehicle journey is cancelled before transmission of the planned schedules in the SIRI Production Timetable service. In this case, the vehicle journey to be cancelled in the planned schedule is communicated in a **DatedTimetableVersionFrame**, as a **DatedVehicleJourney** marked as a **Cancellation**.
- *Real-time Cancellation:* After completion of the SIRI Production Timetable transmission, a vehicle journey is cancelled in the control centre. In this case, the vehicle journey to be cancelled is communicated as an **EstimatedVehicleJourney** marked as a **Cancellation**.

6.7.3 Additional Vehicle Journeys

There are two situations in which additional vehicle journeys must be communicated by the data sender:

- *Production Stage Addition:* The data sender and the schedule information system both know the same version of the timetable; however, in the control centre, an additional vehicle journey is added before transmission of the planned schedules in the SIRI Production Timetable service. In this case, the additional vehicle journey is communicated in a **DatedTimetableVersionFrame** as a **DatedVehicleJourney** marked with the **ExtraJourney** property.
- *Real-time Addition:* After completion of the SIRI Production Timetable transmission, an additional vehicle journey is added by the dispatcher. In this case, the additional vehicle journey is communicated as an **EstimatedVehicleJourney** marked with the **ExtraJourney** property.

If the additional vehicle journey follows a path that deviates from the other journeys of the line, it must be guaranteed that this path has been previously supplied in the planning system. Otherwise, it may not be possible to represent the additional vehicle journey within the network topology of the schedule information.

system. In the case of an unknown path, there must be a suitable error response from the schedule information system.

6.7.4 Changes to Journeys & Routings

In the case of major despatching alterations, it may be necessary to retransmit information for the entire route, including new planning and prognosis times. This is the case for any additional journeys not included in the planning data (see above), as well as for any journey pattern i.e. path changes to an existing route. The **IsCompleteStopSequence** on **EstimatedVehicleJourney** must be set to “true” to inform the schedule information system that an entire route is being exchanged: if the path change involves the omission of stops when compared with the original plan, they are omitted altogether.

Changes to the attributes of a service, such as vehicle or service features (e.g. provision for bicycles, etc) must be sent as elements of the **EstimatedVehicleJourney**.

6.7.5 Changes to Call Attributes

Changes to the attributes of a call at a stop, such as whether passengers can board or alight, must be sent in an **EstimatedCall**. If the call is cancelled altogether it should be marked with the Cancellation property. The delay extrapolation rule cannot be applied in these situations.

6.7.6 Planned Connections and “Stay Seated” Connections

An interchange over a connection link exists between two vehicle journeys when a passenger can sensibly transfer between them as part of a meaningful journey.

Transfers between journeys at an interchange may be one-way: the feeder vehicle only sets down passengers, and the distributor only picks up, or two-way: that is, both vehicles act as both feeder and distributor to each other, and if either is late for the rendezvous, the other will wait.

The interchange time needed to make a transfer may also be material. It would be inappropriate to link two vehicle journeys where the changeover time is not adequate to allow the passenger to reach the second vehicle.

Information as to which interchanges are possible at a connection link are possible through the course of the operating day under normal conditions (even where the changeover times are tight), is of great interest to the schedule information system. For this reason, connecting vehicle journey pairs, along with the associated planning data, should be transferred to the schedule information system. The schedule information system represents the current viability of these transfers to the customer with display messages such as “connection expected”.

The planned connections are transmitted in the **TargetedInterchange** structure, which is part of a **DatedCall**.

A “stay seated” transfer, where the passengers remain seated on the same vehicle, represents a special case. It is treated as a virtual connection in the same vehicle. This situation arises in practice when the vehicle in question transfers to a different line at the end of the current vehicle journey, hence to begin a new vehicle journey (line change within a block). For the passenger making a trip, the change between these two individual vehicle journeys is represented as a connection. However, the passenger can remain seated in the same vehicle (assuming this is permitted). In these circumstances, the information that she need not get off the vehicle is useful.

6.7.7 Handling Train Data

With train travel, it is often not possible to apply the regular line modelling as used in local public transport. However, in order to be able to apply the same data model for the train schedules, it is recommended that the timetable links for a corresponding line definition are used. In this case, the **DatedVehicleJourneyRef** will be the (unique) train number and the **PublishedLineName** will be composed of train type and train number (e.g. IC 18). This allows a train journey to be broken down into several “lines” on the basis of the timetable links.